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(54) Liquid bleaching composition

(57) The present invention provides an aqueous liquid bleaching composition having a pH-value of less than or equal to 7 and comprising surfactant material including ethoxylated nonionic surfactant having on average more than 7 ethylene oxide groups, a bleach catalyst and an antifoam system containing fatty acid having an iodine value lower than 1.0.

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Description

Field of the invention

[0001] The present invention relates to a novel liquid bleaching composition and a method for treating a textile, especially laundry fabrics, using the same. More in particular, the invention relates to a liquid bleaching composition having favourable cleaning, bleaching and foaming characteristics.

Background of the invention

[0002] The use of bleaching catalysts for stain removal has been developed over recent years. The recent discovery that some catalysts are capable of bleaching effectively in the absence of an added peroxyl source has recently become the focus of some interest, as will be clear from e.g. WO-99/65905, WO-00/12667, WO-00/12808, WO-00/29537, and WO-00/60045.

[0003] The shelf life of a product may be regarded as the period of time over which the product may be stored whilst retaining its required quality. A satisfactory shelf life is in many instances a crucial factor for the success of a commercial product. A product with a short shelf life generally dictates that the product is made in small batches and is rapidly sold to the customer. It is also a concern to the owners of a brand with a short shelf life that the consumer uses the product within the shelf life; otherwise the consumer may be inclined to change to a similar product of another brand. In contrast, a similar product with a long shelf life may be made in larger batches, held as stock for a longer period of time and the period of time that a consumer stores the product is not of a great concern to the owners of the particular brand concerned. Despite the shelf life being an important consideration, the product must also be active during use.

[0004] It is an object of the present invention to provide a liquid bleaching composition that has favourable storage properties whilst being active in use.

It is another object of the invention to provide a liquid bleaching composition that shows good bleaching and cleaning performance, and additionally has moderate foaming characteristics when in use.

It is a further object of the invention to provide a liquid bleaching composition that is chemically and physically stable when in storage.

We have now surprisingly found that one or more of these objects can be achieved when using an aqueous liquid bleaching composition according to the present invention.

Summary of the invention

[0005] Accordingly, in one aspect the present invention provides an aqueous liquid bleaching composition having a pH-value of less than or equal to 7, and comprising surfactant material including ethoxylated nonionic surfactant having on average more than 7 ethylene oxide groups, a bleach catalyst and an antifoam system containing fatty acid having an iodine value lower than 1.0,

wherein the bleach catalyst is an organic substance which forms a complex with a transition metal for bleaching a substrate with atmospheric oxygen, the liquid bleaching composition upon addition to an aqueous medium providing a diluted bleaching medium substantially devoid of a peroxygen bleach or a peroxy-based or peroxyl-generating bleach system.

[0006] The nonionic surfactant present in the composition of the invention preferably is a condensation product of a linear or branched alcohol with on average more than 7 and less than 12 ethylene oxide (EO) groups, more preferably from 8 to 10 EO groups. Desirably, this nonionic surfactant is a condensation product of a C8-C18 primary, linear alcohol with on average from 8 to 10 EO groups. Most preferably, said nonionic surfactant comprises on average 9 ethylene oxide groups.

[0007] Furthermore, in a second aspect the invention provides a method of bleaching a textile, comprising the steps of:

(i) diluting from 0.5 to 20 g of a liquid bleaching composition according to the present invention with 1 litre of water;
(ii) treating the textile with the diluted composition;
(iii) rinsing the textile with water; and
(iv) drying the textile.

[0008] The iodine value according to the present invention is a measure for the level of saturation of the fatty acid: the lower the iodine value of the fatty acid, the higher is the degree of saturation. In connection with the present invention, the iodine value of a fatty acid is defined as the weight of halogens expressed as iodine absorbed by 100 parts by weight of the fatty acid. It follows that a lower iodine value will be measured if the level of saturation of the fatty acid is higher. The iodine value is determined by the Wijs' method described by IFFO (ISO 3961:1996, May 1998) in which the test sample is dissolved in a solvent and Wijs' reagent added. After about one hour reaction time, potassium iodide and water are added to the mixture. Iodine liberated by the process is titrated with sodium thiosulphate solution.

Detailed description of the invention.

[0009] It has been found that the aqueous liquid bleaching composition of the invention shows both good cleaning and favourable bleaching performance. In addition, it was observed that said composition has moderate foaming characteristics when in use. Furthermore, liquid bleaching compositions according to the invention were found to have favourable storage properties: owing to their improved storage stability, their bleaching and cleaning activities were maintained after prolonged periods of storage.

In order to still further enhance the storage stability of the liquid composition of the invention, said composition may suitably contain a compound selected from sodium xylene sulphonate, ethanol and propylene glycol.

[0010] Preferably, the aqueous liquid bleaching composition of the invention has a water content of 40 to 90% by weight, more preferably 45 to 80% by weight.

Furthermore, the liquid composition of the invention is preferably isotropic and transparent. Reason is that transparent liquid detergent compositions are generally regarded to have a visually attractive appearance.

pH-value

[0011] The pH-value of the composition of the invention is less than or equal to 7, preferably in the range of from 6 to 7, more preferably from 6.5 to 7. This range of pH-values is needed for obtaining a chemically stable composition. More in particular, it was found that the bleach catalyst can remain stable and does not dissociate when the liquid composition of the invention is stored at a pH of less than or equal to 7.

Furthermore, when protease enzyme is present in the composition of the invention, said relatively low pH-value range may also be beneficial for maintaining the activity of the protease enzyme, depending on the type thereof.

[0012] However, for obtaining favourable bleaching and cleaning performance when the composition of the invention is used for treating textile, it is preferred that the pH-value of said composition is raised to the range of from 7.5 to 9 upon dilution with water. Hence, it is preferred that said composition additionally contains a pH-changing means capable of bringing about this increase of pH-value. Desirably, the pH-changing means is capable of raising the pH-value to at least 8 upon dilution with water.

[0013] The pH-changing means is effectively provided by a pH-jump system containing a boron compound, particularly borax decahydrate, and a polyol. The borate ion and certain cis 1,2-polyols complex when present in the undiluted composition, so as to cause a reduction in pH-value to a value of less than or equal to 7. Upon dilution, the complex dissociates liberating free borate to raise the pH-value in the diluted solution resulting in a pH-jump.

[0014] Examples of polyols that exhibit the complexing mechanism with borax include catechol, galactitol, fructose, sorbitol, and pinacol. For economic reasons, sorbitol is the preferred polyol.

[0015] The desired ratio of the polyol to the boron compound needs to be considered since it influences performance. To achieve the desired pH-value during storage of less than or equal to 7, ratios greater than 1:1 are preferred. The level of the boron compound, particularly borax, incorporated in the composition of the invention also influences the performance. Borax levels of at least 1% by weight are desired to ensure sufficient buffering. Excessive amounts of borax (>10% by weight) give good buffering properties; however, such levels lead to a pH-value of the undiluted composition that is higher than desired. Generally, pH-jump systems in which the weight ratio of the polyol and boron compound ranges from 1:1 to 10:1 are preferred for use in the present invention.

[0016] When applying a borax-sorbitol pH-jump system, said system preferably comprises at least 2% by weight of Sorbitol and at least 1 % by weight of borax.

In practice, compositions containing, as a pH-jump system, a combination of 5% wt borax and 20% wt sorbitol were found to yield the best results.

Such a pH-jump system is known from EP-A-381,262.

Salts of calcium and magnesium have been found to enhance the pH-jump effect by further lowering the pH of the undiluted composition. Other di- and trivalent cations may be used but Ca and Mg are preferred. Any anion may be used providing the resulting Ca/Mg salt is sufficiently soluble.

[0017] Chloride, although it could be used, is not preferred because of oxidation problems.

[0018] Other types of pH-jump systems are based on the principle of insoluble alkaline salts in the undiluted composition that dissolve on dilution to raise the solution pH. Examples of such alkaline salts are sodium tripolyphosphate (STP), sodium carbonate, sodium bicarbonate, sodium silicate, sodium pyro- and ortho-phosphate.

An alternative type of pH-jump system for use in a liquid detergent composition includes a metal cation and an N-containing compound, as disclosed in US-A-5,484,555.

The antifoam

[0019] The antifoam system of the present invention contains a fatty acid having an iodine value of lower than 1.0, preferably lower than 0.3, and a suitable neutralising agent therefor.
As mentioned above, the iodine value is a measure for the level of saturation of the fatty acid; the lower the iodine value of the fatty acid, the higher is the degree of saturation. Preferably, the fatty acid has a degree of saturation of more than 95%, said degree of saturation being most preferably 100%.
Reason is that such saturated fatty acids have been found to perform favourably for reducing and controlling foaming characteristics, and also to lead to improved chemical stability of the bleach catalyst present in the composition of the invention.
Good anti-foaming results were obtained when the fatty acid is a mixture of lauric acid, myristic acid, palmitic acid, stearic acid, arachidic acid, and behenic acid.

[0020] Preferably, the level of the fatty acid of the invention is at most 8%, more preferably at most 4% by weight, most preferably at most 2% by weight based on the full liquid composition of the invention.

[0021] For cost reasons, the neutralising agent is preferably an alkali metal hydroxide, more preferably sodium hydroxide.

The bleach catalyst

[0022] The bleach catalyst according to the invention is an organic substance which forms a complex with a transition metal for bleaching a substrate with atmospheric oxygen, the liquid bleaching composition upon addition to an aqueous medium providing a diluted bleaching medium substantially devoid of a peroxygen bleach or a peroxy-based or peroxyl-generating bleach system.
The above term "substantially devoid of" should be construed within the spirit of the invention. It is clearly preferred that the liquid bleaching composition of the invention has as low a content of peroxyl species as possible. Therefore, in the context of the present invention this term "substantially devoid of" is intended to mean that the liquid bleaching composition of the invention contains less than 1%, preferably less than 0.3%, by weight of a peroxygen bleach or a peroxy-based or peroxyl-generating bleach system. Most preferably, said liquid bleaching composition is devoid of a peroxygen bleach or a peroxy-based or peroxyl-generating bleach system. In addition, it is preferred that the presence of alkyl hydroperoxides is kept to a minimum in a liquid bleaching composition of the invention.

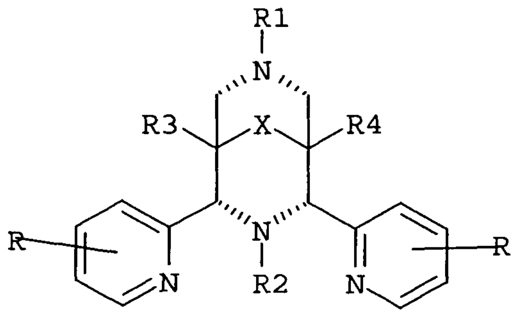
[0023] The bleach catalyst per se may be selected from a wide range of transition metal complexes of organic molecules (ligands). In typical washing compositions the level of the organic substance is such that the in-use level is from 0.05 μM to 50 mM, with preferred in-use levels for domestic laundry operations falling in the range 1 to 100 μM.
Higher levels may be desired and applied in industrial textile bleaching processes. A mixture of different catalysts may be employed in the bleaching composition.

[0024] Suitable organic molecules (ligands) for forming complexes and complexes thereof are found, for example in:

> GB 9906474.3; GB 9907714.1; GB 98309168.7, GB 98309169.5;
> GB 9027415.0 and GB 9907713.3; DE 19755493; EP 999050; WO-A-9534628; EP-A-458379; EP 0909809; United States Patent 4,728,455; WO-A-98/39098; WO-A-98/39406,
> WO 9748787, WO 0029537; WO 0052124, and WO0060045 the complexes and organic molecule (ligand) precursors of which are herein incorporated by reference. An example of a preferred catalyst is a transition metal complex of MeN4Py ligand (N,N-bis(pyridin- 2-yl-methyl)-1,1-bis(pyridin-2-yl)-1-aminoethane).

[0025] The ligand forms a complex with one or more transition metals, in the latter case for example as a dinuclear complex. Suitable transition metals include for example: manganese in oxidation states II-V, iron II-V, copper I-III, cobalt I-III, titanium II-IV, tungsten IV-VI, vanadium II-V and molybdenum II-VI.

[0026] An example of a preferred catalyst is a monomer ligand or transition metal catalyst thereof of a ligand having the formula (I):

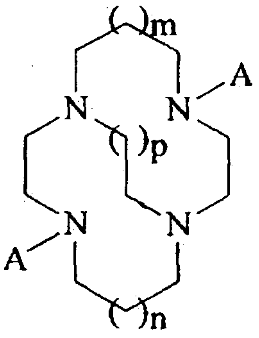


(I)

wherein each R is independently selected from: hydrogen, F, Cl, Br, hydroxyl, C1-C4-alkylO-, -NH-CO-H, -NH-CO-C1-C4-alkyl, -NH2, -NH-C1-C4-alkyl, and C1-C4-alkyl;
R1 and R2 are independently selected from:
C1-C4-alkyl,
C6-C10-aryl, and,
a group containing a heteroatom capable of coordinating to a transition metal, wherein at least one of R1 and R2 is the group containing the heteroatom;
R3 and R4 are independently selected from hydrogen, C1-C8 alkyl, C1-C8-alkyl-O-C1-C8-alkyl, C1-C8-alkyl-O-C6-C10-aryl, C6-C10-aryl, C1-C8-hydroxyalkyl, and -(CH2)$_n$C(O)OR5
wherein R5 is independently selected from: hydrogen, C1-C4-alkyl, n is from 0 to 4, and mixtures thereof; and,
X is selected from C=O, -[C(R6)$_2$]$_y$- wherein Y is from 0 to 3 each R6 is independently selected from hydrogen, hydroxyl, C1-C4-alkoxy and C1-C4-alkyl.

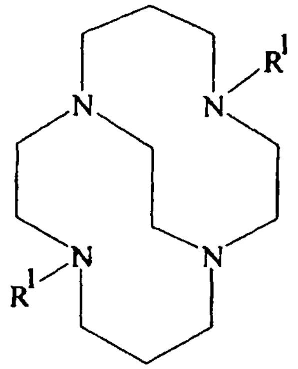
[0027] With regard to the above formula (I) it is also particularly preferred that R1 and R2 may also be independently selected from: C1 to C22-optionally substituted alkyl, and an optionally substituted tertiary amine of the form -C2-C4-alkyl-NR7R8, in which R7 and R8 are independently selected from the group consisting of straight chain, branched or cyclo C1-C12 alkyl, benzyl, the -C2-C4-alkyl- of the -C2-C4-alkyl-NR7R8 may be substituted by 1 to 4 C1-C2-alkyl, or may form part of a C3 to C6 alkyl ring, and in whichR7 and R8 may together form a saturated ring containing one or more other heteroatoms.

[0028] Another preferred class of ligands are macropolycyclic rigid ligands of the formula:



wherein m and n are 0 or integers from 1 to 2, p is an integer from 1 to 6, preferably m and n are both 0 or both 1 (preferably both 1), or m is 0 and n is at least 1; and p is 1; and A is a nonhydrogen moiety preferably having no aromatic content; more particularly each A can vary independently and is preferably selected from methyl, ethyl, propyl, isopropyl, butyl, isobutyl, tert-butyl, C5-C20 alkyl, and one, but not both, of the A moieties is benzyl, and combinations thereof.

[0029] Preferably, the macropolycyclic ligand is of the formula:



wherein "R^1" is independently selected from H, and linear or branched, substituted or unsubstituted C1-C20 alkyl, alkylaryl, alkenyl or alkynyl; and all nitrogen atoms in the macropolycyclic rings are coordinated with the transition metal.

[0030] Of the macropolycyclic ligands 5,12-dimethyl-1,5,8,12-tetraaza-bicyclo[6.6.2]hexadecane is preferred. This ligand is most preferred as its manganese complex [Mn(Bcyclam)Cl_2] and may be synthesised according to WO9839098.

[0031] The transition metal complex preferably is of the general formula (AI):

$$[M_aL_kX_n]Y_m$$

in which:

M represents a metal selected from Mn(II)-(III)-(IV)-(V), Cu(I)-(II)-(III), Fe (II)-(III)-(IV)-(V), Co(I)-(II)-(III), Ti(II)-(III)-(IV), V(II)-(III)-(IV)-(V), Mo(II)-(III)-(IV)-(V)-(VI) and W(IV)-(V)-(VI), preferably from Fe(II)-(III)-(IV)-(V);
L represents the ligand, preferably N,N-bis(pyridin-2-yl-methyl)-1,1-bis(pyridin-2-yl)-1-aminoethane, or its protonated or deprotonated analogue;
X represents a coordinating species selected from any mono, bi or tri charged anions and any neutral molecules able to coordinate the metal in a mono, bi or tridentate manner;
Y represents any non-coordinated counter ion;
a represents an integer from 1 to 10;
k represents an integer from 1 to 10;
n represents zero or an integer from 1 to 10;
m represents zero or an integer from 1 to 20.

Surfactant material

[0032] The liquid bleaching composition of the invention also contains surfactant material, preferably at a concentration of 0.1 to 50% by weight, based on the total composition. This surfactant system in turn comprises 5 to 100 % by weight of one or more nonionic surfactants and additionally may comprise 0 - 95 % by weight of one or more anionic surfactants. The surfactant system may also contain amphoteric or zwitterionic detergent compounds. The liquid bleaching composition according to the invention will generally be used as a dilution in water of about 0.05 to 2%.

[0033] In general, the nonionic and anionic surfactants of the surfactant system may be chosen from the surfactants described "Surface Active Agents" Vol. 1, by Schwartz & Perry, Interscience 1949, Vol. 2 by Schwartz, Perry & Berch, Interscience 1958, in the current edition of "McCutcheon's Emulsifiers and Detergents" published by Manufacturing Confectioners Company or in "Tenside-Taschenbuch", H. Stache, 2nd Edn., Carl Hauser Verlag, 1981.

[0034] Suitable nonionic detergent compounds for use in the composition of the present invention are aliphatic alcohols, acids, amides or alkyl phenols with on average more than 7 ethylene oxide groups. Specific nonionic detergent compounds are C_6-C_{22} alkyl phenol-ethylene oxide condensates, containing on average more than 7 EO groups, preferably from 8 to 10 EO groups per molecule, and the condensation products of aliphatic C_8-C_{18} primary or secondary linear or branched alcohols with on average more than 7 ethylene oxide groups, generally from 8 to 40 EO groups, preferably from 8 to 10 EO groups. Most preferred for use in the liquid detergent composition of the invention are C_{12}-C_{15} primary, linear alcohols with on average 9 ethylene oxide groups.

[0035] Suitable anionic detergent compounds which may be used are usually water-soluble alkali metal salts of organic sulphates and sulphonates having alkyl radicals containing from about 8 to about 22 carbon atoms, the term alkyl being used to include the alkyl portion of higher acyl radicals. Examples of suitable synthetic anionic detergent compounds are sodium and potassium alkyl sulphates, especially those obtained by sulphating higher C_8-C_{18} alcohols, produced for example from tallow or coconut oil, sodium and potassium alkyl C_9-C_{20} benzene sulphonates, particularly sodium linear secondary alkyl C_{10}-C_{15} benzene sulphonates; and sodium alkyl glyceryl ether sulphates, especially those ethers of the higher alcohols derived from tallow or coconut oil and synthetic alcohols derived from petroleum. The preferred anionic detergent compounds are sodium C_{11}-C_{15} alkyl benzene sulphonates, sodium C_{12}-C_{18} alkyl sulphates and sodium linear alcohol ethoxy sulphates.

[0036] Preferred surfactant systems are mixtures of anionic with nonionic detergent active materials. Especially preferred is a surfactant system that is a mixture of sodium C_{11}-C_{15} alkyl benzene sulphonate, a C_{12}-C_{15} primary alcohol 3-9 EO ethoxylate, and sodium linear alcohol ethoxy sulphate.

[0037] The nonionic detergent is preferably present in amounts greater than 10%, e.g. 25-90% by weight of the surfactant system. Anionic surfactants can be present for example in amounts in the range from about 5% to about 40% by weight of the surfactant system.

Other components

[0038] The liquid bleaching composition of the invention may additionally comprise builders, solvents, enzymes, perfumes, sequestrants, polymers, fluorescers, and dyes. The use and amount of these components are such that the bleaching and cleaning performance of the composition is favourable depending on economic and environmental factors.

[0039] One skilled in the art will appreciate that some adventitious peroxyl species may be in the composition nevertheless it is most preferred that the bleaching composition of the present invention has less that 1%, preferably less than 0.1%, most preferably less than 0.01%, of a peroxyl species present. These adventitious peroxyl are predominantly alkyl hydroperoxides formed by autoxidation of the surfactants.

[0040] The composition may additionally contain enzymes as found in WO-01/00768 A1 page 15, line 25 to page 19, line 29, the contents of which are herein incorporated by reference.

[0041] Builders, polymers and other enzymes as optional ingredients may also be present, as found in WO-00/60045.

[0042] Suitable detergency builders as optional ingredients may also be present, as found in WO-00/34427.

[0043] In the context of the present invention, bleaching should be understood as relating generally to the decolourisation of stains or of other materials attached to or associated with a substrate. However, it is envisaged that the present invention can be applied where a requirement is the removal and/or neutralisation by an oxidative bleaching reaction of malodours or other undesirable components attached to or otherwise associated with a substrate. Furthermore, in the context of the present invention bleaching is to be understood as being restricted to any bleaching mechanism or process that does not require the presence of light or activation by light.

[0044] The present invention extends to both isotropic and complex liquid compositions, a brief discussion of which follows. Isotropic liquid compositions are clearly preferred Some isotropic formulations are termed 'micro-emulsion' liquids that are clear and thermodynamically stable over a specified temperature range. The 'micro-emulsion' formulation may be water in oil, or oil in water emulsions. Some liquid formulations are macro-emulsions that are not clear and isotropic. Emulsions are considered meta-stable. Liquid formulations of the present invention may also contain for example; monoethoxy quats; AQAs and bis-AQAs; cationic amides; cationic esters; amino/diamino quats; glucamide; amine oxides; ethoxylated polyethyleneimines; enhancement polymers of the form linear amine based polymers, e.g. bis-hexamethylenetriamine; polyamines e.g. TETA, TEPA or PEI polymers.

[0045] The liquid may be contained within a sachet as found in WO-02/068577. The sachet is a container within the context of the present invention.

[0046] The liquid composition preferably also contains one or more antioxidants as described in WO-02/072747 and WO-02/072746.

[0047] The invention will now be illustrated by way of the following non-limiting examples, in which all parts and percentages are by weight unless otherwise indicated.

EXAMPLES 1, A and B

[0048] The following liquid detergent formulations were prepared:

Example	1	A	B
Ingredient	%(wt)	% (wt)	%(wt)
LAS acid	6.0	6.0	6.0
SLES 3 EO	6.0	6.0	6.0
NI 9EO	6.0	6.0	-
NI 7EO	-	-	6.0

Table continued

Example	1	A	B
Ingredient	%(wt)	% (wt)	%(wt)
Proxel GXL	0.016	0.016	0.016
Sorbitol	3.3	3.3	3.3
Borax.10H_2O	2.3	2.3	2.3
MPG	4.7	4.7	4.7
NaOH	0.75	0.75	0.75
Prifac 5908	1.7	-	1.7
Prifac 7908	-	1.7	-
Protease enzyme	0.4	0.4	0.4
Bleach catalyst	0.03	0.03	0.03
Water	balance to 100		

[0049] Wherein:

LAS acid = C_{10}-C_{14} alkyl benzene sulphonic acid;
SLES = sodium lauryl ether sulphate (with on average 3 ethylene oxide groups);
NI 9EO = C_{12}-C_{15} linear fatty alcohol ethoxylated with an average of 9 ethylene oxide groups;
NI 7EO = C_{12}-C_{13} fatty alcohol ethoxylated with an average of 7 ethylene oxide groups;
MPG = monopropylene glycol;
Prifac 5908 = palmkernel fatty acid having an iodine value lower than 1.0;
Prifac 7908 = palmkernel fatty acid having an iodine value higher than 1.0;
Proxel GXL = biocide (20% active).

[0050] As a bleach catalyst, the following chemical compound was used in the examples: 9.9-dihydroxy-2,4-di-(2-pyridyl)-3-methyl-7-(pyridin-2-ylmethyl)-3,7-diaza-bicyclo[3.3.1]nonane-1,5-dicarboxylate Iron(II) dichloride.
This bleach catalyst was prepared as described in Heidi Borzel, Peter Comba, Karl S. Hagen, Yaroslaw D. Lampeka, Achim Lienke, Gerald Linti, Michael Merz, Hans Pritzkow, Lyudmyla V. Tsymbal in Inorganica Chimica Acta 337 (2002), 407-419. WO-02/48301 provides synthetic details of similar compounds.

[0051] As shown, sodium hydroxide was used as neutralizing agent. The level of the neutralising agent in the liquid formulations of examples 1 and A was sufficient to bring the pH to 7.
These formulations were prepared just by adding the ingredients in the order of the formulation listed above and then mixing them.

[0052] It can be derived from the above that the formulations of example 1 are according to the present invention and that the formulations of (comparative) examples A and B are outside the scope of the invention.

[0053] Samples of all of these liquid formulations were stored in glass vials for two weeks at a pH of 7 and a temperature of 5°C. After this 2 weeks storage period it turned out that the formulations of examples 1 and A were physically stable whereas the formulation of example B showed clear signs of phase separation and precipitation of a white solid. This clearly showed the advantage of using 9EO nonionic surfactant in stead of 7EO nonionic surfactant having regard to the physical stability of the formulation.

Method of determining the bleach catalyst activity

[0054] The residual bleaching activity of the liquid formulations of examples 1 and A were determined at 40°C in a H_2O_2-containing $NaH_2PO_4.H_2O$ pH 7 buffer and Acid Blue 45 (CAS No. 2861-02-1) as substrate, using the following protocol.

[0055] Samples of 70 mg liquid were diluted in 10.00 ml MilliQ water. We added 45 μl of this solution to an assay of 230 μL containing 20mM H_2O_2, 75 μM Acid blue 45 and 54 mM $NaH_2PO_4.H_2O$ pH 7 buffer.
The changes in absorbance at 600 nm were measured for 5 min. at 40°C using a spectrophotometer. The absolute changes in absorbance were correlated to activities obtained with freshly prepared calibration samples. The measured activities expressed as μMol/l are shown in Table 1.

Table 1:

[0056] The residual bleaching activity (expressed in μMol/l), as function of fatty acid type in the tested liquid formulation after storage thereof for 2 weeks at 37°C and a pH of 7.

Fatty acid type	1.7% (wt)
Prifac 5908	2.0
Prifac 7908	1.3

[0057] The results in Table 1 clearly show a bleach activity advantage in using a type of fatty acid according to the present invention (prifac 5908).

Claims

1. An aqueous liquid bleaching composition having a pH-value of less than or equal to 7 and comprising surfactant material including ethoxylated nonionic surfactant having on average more than 7 ethylene oxide groups, a bleach catalyst and an antifoam system containing fatty acid having an iodine value lower than 1.0, wherein the bleach catalyst is an organic substance which forms a complex with a transition metal for bleaching a substrate with atmospheric oxygen, the liquid bleaching composition upon addition to an aqueous medium providing a diluted bleaching medium substantially devoid of a peroxygen bleach or a peroxy-based or peroxyl-generating bleach system.

2. liquid bleaching composition according to claim 1, wherein the ethoxylated nonionic surfactant includes on average from 8 to 10 ethylene oxide groups.

3. Liquid bleaching composition according to claim 1 or 2, wherein alkali metal hydroxide is present as neutralising agent.

4. A liquid bleaching composition according to any of claims 1-3, wherein the fatty acid has an iodine value lower than 0.3.

5. Liquid bleaching composition according to any of claims 1-4, wherein the fatty acid is a mixture of lauric acid, myristic acid, palmitic acid, stearic acid, arachidic acid and behenic acid.

6. Liquid bleaching composition according to any of claims 1-5, wherein said composition has a pH-value in the range of from 6 to 7, preferably from 6.5 to 7.

7. Liquid bleaching composition according to any of claims 1-6, wherein the composition further contains a pH-changing means capable of raising the pH-value of said composition to the range of from 7.5 to 9.0 upon dilution of said composition with water.

8. Liquid bleaching composition according to claim 7, wherein the pH-changing means is capable of raising the pH-value to at least 8 upon dilution with water.

9. Liquid bleaching composition according to claim 7 or claim 8, wherein the pH-changing means is provided by a borax-sorbitol pH-jump system.

10. Liquid bleaching composition according to claim 9, wherein said pH-jump system comprises at least 2% by weight of sorbitol and at least 1% by weight of borax.

11. Liquid bleaching composition according to any of claims 1-10, wherein the water content of said composition is in the range of from 40 to 80% by weight.

12. A method of bleaching a textile, comprising the steps of:

    (i) diluting from 0.5 to 20 g of a liquid bleaching composition according to any of claims 1-11 with 1 litre of water;
    (ii) treating the textile with the diluted composition;
    (iii) rinsing the textile with water; and
    (iv) drying the textile.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 07 6345

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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)
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