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(54) **Cleaning and bleaching compositions.**

(57) Aqueous cleaning and bleaching compositions are disclosed which comprise a hydrophobic liquid ingredient which is emulsified in the composition by using a specific nonionic surfactant mixture. The hydrophobic liquid ingredient is preferably a bleach activator. The compositions disclosed are physically and chemically stable and provide outstanding cleaning.

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Technical field

The present invention relates to cleaning and bleaching compositions which are based on hydrogen peroxide.

Background

Bleaching and cleaning compositions have been extensively described in the art. It is also well known that it is desirable to use hydrogen peroxide rather than other bleaches such as chlorine type bleaches. Indeed, hydrogen peroxide is much milder and therefore safer, both for the item being bleached and for the user. However, hydrogen peroxide based bleaches have the main inconvenient that they perform poorly at low temperature. In response to this object, compositions have been designed which further comprise a bleach activator. The bleach activator reacts with hydrogen peroxide to yield a peracid which is the bleaching species.

Activated bleaching compositions however have the drawback that the activator and the hydrogen peroxide tend to react in the composition. Thus, such activated bleaching compositions tend to be chemically unstable upon storage. It is an object of the present invention to provide activated bleaching compositions which are chemically stable.

Another problem is that bleach activators which are hydrophobic are problematic to use in aqueous compositions as the product tends to separate into two different layer phases which can be visualized by the consumer. Therefore, physical stability upon storage is a further issue.

The present invention meets the above objects in proposing an aqueous cleaning and bleaching composition comprising hydrogen peroxide and a liquid hydrophobic bleach activator, wherein said bleach activator is emulsified in the composition by means of a specific nonionic surfactant mixture.

EP 497 337 describes suspensions of solid water-insoluble peroxyacids in aqueous compositions comprising a mixture of two nonionic surfactants. Compared to the compositions in the '337 patent application, the compositions according to the present invention allow for a faster dissolution of said liquid hydrophobic bleach activator in the wash solution.

The present invention allows for great flexibility in formulating and provides compositions which are chemically and physically stable. As an additional benefit, the nonionic surfactant mixture used to emulsify the hydrophobic activator provides efficient cleaning.

As an additional advantage, it has been found that the nonionic surfactant system used to emulsify said hydrophobic liquid ingredient improves the storage stability of hydrogen peroxide.

Although the present invention finds a preferred application in formulating activated bleaching compositions, the present invention is also applicable to the formulation of bleaching compositions which comprise any hydrophobic liquid ingredient which needs to be kept separate from the hydrogen peroxide.

Summary of the invention

The present invention is an aqueous cleaning and bleaching composition having a pH of from 0.5 to 6, comprising hydrogen peroxide or a source thereof and a hydrophobic liquid ingredient, preferably a bleach activator, wherein said hydrophobic liquid ingredient is emulsified in said composition by a mixture comprising at least one nonionic surfactant with an HLB that is higher than or equal to the HLB of said hydrophobic liquid ingredient and at least one nonionic surfactant with an HLB that is lower than or equal to the HLB of said hydrophobic liquid ingredient, provided that the HLBs of said nonionic surfactants , provided that the HLBs of said nonionic surfactants are not identical.

The present invention also encompasses a process for the manufacture of said composition.

Detailed description of the invention

The compositions according to the present invention are aqueous. Accordingly, the compositions according to the present invention comprise from 10% to 95% by weight of the total composition of water, preferably from 30% to 90%, most preferably from 60% to 80%. Deionized water is preferably used.

The compositions according to the present invention are based on hydrogen peroxide. Accordingly, the compositions according to the present invention comprise hydrogen peroxide or a water-soluble source thereof. Suitable water-soluble sources of hydrogen peroxide include perborate, percarbonate, persulfate and persulfate salts. In a preferred embodiment, the compositions according to the present invention comprise hydrogen peroxide. Typically, the compositions according to the present invention comprise from

0.5% to 20% by weight of the total composition of hydrogen peroxide, preferably from 2% to 15%, most preferably from 3% to 10%.

The compositions of the present invention have a pH as is of from 0.5 to 6. Formulating the compositions according to the present invention in this acidic pH range contributes to the stability of the composition. In a preferred embodiment, the compositions are formulated in a pH range of from 1 to 5. The pH of the composition can be trimmed by all means available to the man skilled in the art.

The compositions according to the present invention further comprise a hydrophobic liquid ingredient. As used herein, the term "hydrophobic liquid ingredient" refers both to liquid ingredients, and solid materials which are dissolved in a hydrophobic liquid phase prior to incorporation into the compositions of the invention. By hydrophobic, it is meant herein any material which is not substantially and stably miscible in water. Hydrophobic materials herein typically have an HLB below 11. In a preferred embodiment, said hydrophobic liquid ingredient is a bleach activator. By bleach activator, it is meant herein any compound which reacts with hydrogen peroxide to form a peracid. In the case of bleach activators, such hydrophobic bleach activators typically belong to the class of esters, amides, imides, or anhydrides. A particular family of bleach activators of interest in the present invention were disclosed in applicant's co-pending European patent application No 91870207.7. Particularly preferred in that family is acetyl triethyl citrate which was also disclosed in the context of bar soaps in FR 2 362 210. Acetyl triethyl citrate has the advantages that it is environmentally friendly as it eventually degrades into citric acid and alcohol. Furthermore, acetyl triethyl citrate has a good hydrolytical stability in the product upon storage and it is an efficient bleach activator. Finally, it provides good building capacity to the composition. As used herein and unless otherwise specified, the term bleach activator includes mixtures of bleach activators. Apart from bleach activators, hydrophobic liquid ingredients of interest herein include hydrophobic peroxyacids, enzymes, brighteners, perfumes and the like.

As used herein, the term hydrophobic liquid ingredient refers to single ingredients or mixtures thereof.

In the compositions according to the present invention, said hydrophobic liquid ingredient is emulsified in the composition by means of a mixture of nonionic surfactants. Said mixture of nonionic surfactants comprises at least two nonionic surfactants.

The first of said nonionic surfactant must have an HLB which is lower than or equal to the HLB of said hydrophobic liquid ingredient, whereas the second nonionic surfactant must have an HLB which is higher than or equal to the HLB of said hydrophobic liquid ingredient, provided the HLBs of said nonionic surfactants are not identical. In a preferred embodiment of the present invention the difference between the HLB values of the two nonionic surfactants herein must be of at least 3. Upon using this nonionic surfactant system, the hydrophobic liquid ingredient is stably emulsified in the composition. The emulsion is physically stable and the hydrophobic liquid ingredient is kept separate from the hydrogen peroxide, thus the composition is also chemically stable. Suitable nonionic surfactants for use herein include alkoxylated fatty alcohols. Indeed, a great variety of such alkoxylated fatty alcohols are commercially available which have very different HLB values. The HLB values of such alkoxylated nonionic surfactants depend essentially on the chain length of the fatty alcohol, the nature of the alkoxylation and the degree of alkoxylation. Hydrophilic nonionic surfactants tend to have a high degree of ethoxylation and a short chain fatty alcohol, while hydrophobic surfactants tend to have a low degree of ethoxylation and a long chain fatty alcohol. Surfactants catalogs are available which list a number of surfactants including nonionics, together with their respective HLB values.

The exact nonionic surfactant system to be chosen depends on the hydrophobic liquid ingredient to be emulsified. Accordingly, a suitable way to proceed is to determine the HLB value of the hydrophobic liquid ingredient, then select two nonionic surfactants which have HLB values below and above said HLB value of said hydrophobic liquid ingredient, wherein the difference in the HLB values of said nonionic surfactants is preferably at least 3.

In a preferred embodiment, the amount by weight of said nonionic surfactant with an HLB lower than or equal to the HLB of said hydrophobic liquid ingredient should be at least equal to or higher than the weight amount of said liquid hydrophobic ingredient.

Also, the amount of said nonionic surfactant with an HLB higher than or equal to the HLB of said liquid hydrophobic ingredient should be chosen so that the weighted average of the HLB values of said nonionic surfactants is equal to the HLB of said hydrophobic liquid ingredient.

In other words, the emulsifying system meets the equation:

$$\text{HLB}(X) = \frac{\%A}{100} \times \text{HLB}(A) + \frac{\%B}{100} \times \text{HLB}(B)$$

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and $\%A + \%B = 100\%$;

where X refers to the hydrophobic liquid ingredient to emulsify, A refers to one of said nonionic surfactants, and B refers to the other said nonionic surfactant.

10 In a particularly preferred embodiment of the invention, the hydrophobic liquid ingredient is a bleach activator and said bleach activator is acetyl triethyl citrate. Acetyl triethyl citrate has an HLB of about 10. An adequate nonionic surfactant system would therefore comprise a first nonionic surfactant with an HLB from 1 to 10, and a second nonionic surfactant with an HLB of above 11. A particularly suitable system comprises a first nonionic surfactant with an HLB of about 6, for instance a Dobanol ® 23-2 and a second
15 nonionic surfactant with an HLB of about 15, for instance a Dobanol ® 91-10. Another suitable nonionic surfactant system comprises a Dobanol ® 23-6.5 (HLB about 12) and a Dobanol ® 23 (HLB below 6). All these Dobanol ® surfactants are commercially available from Shell.

The compositions according to the present invention may further comprise other nonionic surfactants which should however not significantly alter the weighted average HLB value of the overall composition.

20 Preferably, the compositions according to the present invention are free of other surfactant types, especially anionic surfactants.

The compositions according to the present invention may further comprise the usual optional ingredients such as perfumes, dyes, optical brighteners, builders and chelants, pigments, enzymes, soil release agents, dye transfer inhibitors, solvents, buffering agents and the like.

25 The present invention further encompasses a process for the manufacture of the composition described herein. The process according to the present invention comprises at least three steps:

In the first step, a hydrophobic mixture is prepared which comprises at least said hydrophobic liquid ingredient and said nonionic surfactant with a low HLB. This hydrophobic mixture preferably further comprises other hydrophobic ingredients which are to be formulated in the composition, such as perfumes,
30 solvents, enzymes and polymers.

In the second step, a hydrophilic mixture is prepared which comprises at least said water, said hydrogen peroxide and said nonionic surfactant with a high HLB. Said hydrophilic mixture preferably further comprises other hydrophilic ingredients which are to be formulated in the composition such as dyes, optical brighteners, builders, chelants and buffering agents. In this second step hydrogen peroxide is preferably
35 added last, after said buffering agent has been added.

Naturally, said first and said second steps can be performed in any order, i.e second step first is also suitable.

In the third step of the process according to the present invention, said hydrophobic mixture and said hydrophilic mixture are mixed together.

40 The present invention is further illustrated by the following examples.

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Examples

Compositions are made which comprise the listed ingredients in the listed proportions (weight %).

5		I	II	III	IV	V
	Dobanol ® 45-7	-	-	-	-	6.0
	Dobanol ® 91-10	6.6	6.6	-	-	-
	Dobanol ® 23-2	8.4	8.4	8.0	5.2	4.0
10	Dobanol ® 23-6.5	-	-	4.0	9.8	5.0
	Acetyl triethyl citrate	7.0	7.0	7.0	7.0	7.0
	Hydrogen peroxide	7.5	7.5	7.5	7.5	7.5
	Citric acid	4.0	4.0	4.0	4.0	4.0
	S,S-ethylene diamino disuccinic acid	0.1	-	-	-	-
15	Brightener 49 ®	0.1	0.1	-	-	-
	Deionized water	-----balance-----				

Compositions I to IV are each made by preparing two mixtures. A hydrophilic mixture is prepared which comprises the water, citric acid, brightener, S,S-EDDS and the Dobanol ® 91-10 or Dobanol ® 23-6.5. Hydrogen peroxide is added in said hydrophilic mixture as last step, after the buffering agent is added. A second, hydrophobic, mixture is prepared which comprises the acetyl triethyl citrate and the Dobanol ® 23-2.

Then said hydrophobic mixture is poured into said hydrophilic mixture, while mixing.

Compositions I to IV were obtained which were stable emulsions, both from a chemical and a physical standpoint.

Claims

1. An aqueous cleaning and bleaching composition having a pH of from 0.5 to 6, comprising hydrogen peroxide or a source thereof and a hydrophobic liquid ingredient, **characterized in** that said liquid ingredient is emulsified in said composition by a mixture comprising at least one nonionic surfactant with an HLB that is higher than or equal to the HLB of said hydrophobic liquid ingredient and at least one nonionic surfactant with an HLB that is lower than or equal to the HLB of said bleach activator, provided that the HLBs of said nonionic surfactants are not identical.
2. A composition according to claim 1 wherein said hydrophobic liquid ingredient is a bleach activator.
3. A composition according to claim 2 wherein said bleach activator is acetyl triethyl citrate.
4. A composition according to claim 1 which has a pH of from 1 to 5.
5. A composition according to any of the preceding claims which comprises from 0.5% to 20% by weight of the total composition of hydrogen peroxide.
6. A composition according to claim 3 wherein said nonionic surfactant with a high HLB has an HLB above 11.
7. A composition according to claim 3 wherein said nonionic surfactant with a low HLB has an HLB of from 1 to 10.
8. A composition according to any of the preceding claims wherein said emulsifying system meets the equation:

$$HLB(X) = \frac{\%A}{100} \times HLB(A) + \frac{\%B}{100} \times HLB(B)$$

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and %A + %B = 100%;

where X refers to the hydrophobic liquid ingredient to emulsify, A refers to one of said nonionic surfactants, and B refers to the other said nonionic surfactant.

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9. A process for the manufacture of a composition according to any of the preceding claims wherein:
- a hydrophobic mixture is prepared which comprises at least said hydrophobic liquid ingredient and said nonionic surfactant with a low HLB;
 - a hydrophilic mixture is prepared which comprises at least said water, said hydrogen peroxide or source thereof and said nonionic surfactant with a high HLB;
 - said hydrophobic mixture and said hydrophilic mixture are mixed together.

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10. A process according to claim 9 wherein said hydrogen peroxide or source thereof is added last in the preparation of said hydrophilic mixture

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EUROPEAN SEARCH REPORT

Application Number

EP 92 87 0188

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D, A	EP-A-0 497 337 (HOECHST) ----		C11D3/39
A	EP-A-0 386 566 (HENKEL) ----		
A	DE-A-3 729 535 (COLGATE-PALMOLIVE CO.) ----		
A	EP-A-0 265 041 (THE CLOROX COMPANY) ----		
A	WO-A-9 006 986 (HENKEL) ----		
A	WO-A-9 109 103 (THE PROCTER & GAMBLE COMPANY) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			C11D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02 AUGUST 1993	Examiner VAN BELLINGEN I.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			