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(54) **Aqueous emulsions with brighteners**

(57) Aqueous compositions are disclosed which comprise a hydrophobic brightener, i.e. a brightener whose solubility in water is lower than 5 grams per liter at 25 °C, emulsified by a surfactant system comprising at least a hydrophobic surfactant having an HLB up to 9 and a hydrophilic surfactant having an HLB above 10. Preferred emulsions further comprise a bleach and a bleach activator. The compositions herein allow to obtain excellent synthetic fabric whiteness performance.

EP 0 686 691 A1

Technical field

The present invention relates to cleaning compositions. More particularly, the cleaning compositions according to the present invention are stable aqueous emulsions particularly suitable to be used in laundry applications for example as detergent compositions or as pre-wash treating compositions or as laundry additives to be used together with detergents.

Background

A great variety of cleaning compositions have been described in the art. A problem associated with common cleaning compositions is that they do not allow to deliver whitening performance which satisfactorily meet consumer's needs, when used in laundry application to treat different kind of fabrics, especially when used to treat synthetic fabrics such as polyesters, polyamides and the like.

It is therefore an object of the present invention to provide compositions suitable for use in laundry application, whereby the whiteness to synthetic fabrics is improved. It is a further object of the present invention to provide such compositions which can be satisfactorily used for treating various types of fabrics and clean various types of stains while providing at the same time also good fabric safety to the fabrics treated therewith. Also said compositions should provide improved whitening performance to synthetic fabrics under most common wash conditions including conditions under which the wash temperature is low, i.e. below 60 ° C.

We have now found that these objects can be efficiently met by formulating aqueous compositions comprising a hydrophobic brightener wherein said hydrophobic brightener is emulsified in said compositions by a surfactant system comprising at least a hydrophobic surfactant having an HLB (Hydrophilic lipophilic balance) up to 9 and at least a hydrophilic surfactant having an HLB above 10. In other words, it has been found that the present invention through a formulation of a hydrophobic brightener, i.e. a brightener whose solubility in water is lower than 5 grams per liter at 25 ° C, into an emulsion allows to exploit the benefits associated with said brightener, e.g. whitening performance improvement of synthetic items such as polyesters, polyamides and the like. Indeed, the compositions of the present invention allow to incorporate and to deliver hydrophobic brighteners into the wash solution, this under the most common wash conditions, e.g. below 60 ° C. Formulating such hydrophobic brighteners through liquid compositions being not emulsions or even through powder formulations does not allow to obtain the outstanding whitening performance associated with the present invention.

An advantage associated with the formulation of hydrophobic brighteners through emulsions is that said brighteners also contribute to the multi-cycle whitening of cotton fabrics. Indeed, after several wash cycles cotton fibers assume a partially hydrophobic character due for example of deposition of organic species on the fabric surface, i.e. a hydrophobic layer of soils tend to form onto aged fabrics, and thus they become sensitive to hydrophobic brighteners. The hydrophobic brighteners may thus absorb onto said cotton fibers, adsorb UV light and retransmit visible blue light so providing superior whiteness.

Another advantage of the compositions of the present invention is that in addition to their outstanding whitening action said compositions allow also good stain removal. Indeed, the use of hydrophobic surfactants to emulsify said hydrophobic brighteners provides excellent hydrophobic soil removal and good grease cutting properties.

A further advantage of the present invention is that it allows for great flexibility in formulating and provides compositions being chemically and physically stable and suitable to be used in the most efficient manner by the consumer. The preferred compositions therein comprise hydrogen peroxide.

Another advantage of such compositions is that they provide a means to formulate ingredients with very low water solubility, without the need for using alcoholic or solvent mixtures, which are usually undesirable for aesthetic (odor) and toxicity reasons.

Yet another advantage of the present invention is that hydrophobic brighteners, such as Tinopal SOP ® give to said compositions a perleascent color that improves the product aesthetics.

Cleaning compositions comprising optical brighteners have been disclosed in the art. For instance, EP-A-598973 discloses a composition comprising hydrogen peroxide and as a surfactant, a fully nonionic system, i.e. at least one nonionic with an HLB above 15, at least one nonionic with an HLB of from 13 to 15, at least one nonionic with an HLB of from 9 to 13 and at least one nonionic with an HLB below 9. This patent application further discloses the use of Tinopal CBS X® (4-4'-bis (2-2' styryl sulfonate) biphenyl) as an optical brightener. However, this patent application differs from the present invention in that the compositions disclosed therein are not emulsions and in that the hydrophobic brighteners of the present invention are nowhere mentioned therein. Indeed, Tinopal CBS X®, also named Brightener 49®, is a

hydrophilic brightener having a solubility of 30 grams per liter at 25 °C in deionized water.

EP-A-598170 discloses emulsions of at least one hydrophobic nonionic surfactant and at least one hydrophilic nonionic surfactant, said emulsions further comprise hydrogen peroxide, or a source thereof. The invention disclosed in the '170 patent application allows to formulate compositions comprising H₂O₂ and a hydrophobic bleach activator (ATC), wherein said bleach activator is kept separate from H₂O₂. The pH of said emulsions is from 1 to 5. This patent application further discloses the use of optical brighteners as optional ingredients and mentions Brightener 49® in an example. Brightener 49® is not a brightener being almost insoluble in water, i.e. a hydrophobic brightener whose solubility in water is lower than 5 grams per liter at 25 °C.

Summary of the invention

The present invention is an aqueous emulsion comprising at least a hydrophilic surfactant having an HLB above 10 and at least a hydrophobic surfactant having an HLB up to 9, said aqueous emulsion further comprises a hydrophobic brightener whose solubility in water is lower than 5 grams per liter at 25 °C, or mixtures thereof.

The present invention also encompasses a method of bleaching or washing fabrics, especially fabrics having a hydrophobic character such as synthetic fabrics to improve fabrics whiteness.

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

Detailed description of the invention

The compositions according to the present invention are stable aqueous emulsions of surfactants which further comprise a hydrophobic brightener whose solubility in water is lower than 5 grams per liter at 25 °C. By "stable emulsion" it is meant an emulsion which does not substantially separate into distinct layers, upon standing for at least two weeks at 50 °C.

As an essential element, the compositions of the present invention comprise a surfactant system of at least two different surfactants, i.e. at least a hydrophobic surfactant having an HLB up to 9 and at least a hydrophilic surfactant having an HLB above 10 in order to emulsify the hydrophobic brightener. Indeed, said two different surfactants in order to form emulsions which are stable must have different HLB values (hydrophilic lipophilic balance), and preferably the difference in value of the HLBs of said two surfactants is at least 1, preferably at least 3. In other words, by appropriately combining at least two of said surfactants with different HLBs in water, emulsions according to the present invention will be formed.

Said surfactant system makes the compositions able to incorporate a hydrophobic brightener, i.e. a compound being almost insoluble in water medium, and to delivery it into the wash solution as a finely dispersed liquid. Indeed, the present invention allows to exploit the benefits associated with a hydrophobic brightener otherwise not exploitable under common wash conditions, i.e. below 60 °C, either through liquid or powder formulation.

The compositions according to the present invention comprise from 2% to 50% by weight of the total composition of said hydrophilic and hydrophobic surfactants, preferably from 5% to 40% and more preferably from 8% to 30%. The compositions according to the present invention comprise at least from 0.1% by weight of the total composition of said hydrophobic surfactant, or mixtures thereof, preferably at least 3% and more preferably at least 5% and at least from 0.1% by weight of the total composition of said hydrophilic surfactant, or mixtures thereof, preferably at least 3% and more preferably at least 6%.

Preferred to be used herein are the hydrophobic nonionic surfactants and hydrophilic nonionic surfactants. Said hydrophobic nonionic surfactants to be used herein have an HLB up to 9, preferably below 9, more preferably below 8 and said hydrophilic surfactants have an HLB above 10, preferably above 11, more preferably above 12. Indeed, the hydrophobic nonionic surfactants to be used herein have excellent grease cutting properties, i.e. they have a solvent effect which contributes to hydrophobic soils removal. The hydrophobic surfactants act as carrier of the hydrophobic brighteners onto the fabrics allowing thereby said brighteners to work in close proximity with the fabrics surface since the beginning of the wash.

Suitable nonionic surfactants for use herein include alkoxyated fatty alcohols preferably, fatty alcohol ethoxylates and/or propoxylates. Indeed, a great variety of such alkoxyated fatty alcohols are commercially available which have very different HLB values (hydrophilic lipophilic balance). The HLB values of such alkoxyated 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 alkoxylation and a short chain fatty alcohol, while hydrophobic surfactants tend to have a low degree of alkoxylation and a long chain fatty alcohol. Surfactants catalogues are available which list a number of

surfactants including nonionics, together with their respective HLB values.

Suitable chemical processes for preparing the nonionic surfactants for use herein include condensation of corresponding alcohols with alkylene oxide, in the desired proportions. Such processes are well known to the man skilled in the art and have been extensively described in the art. As an alternative, a great variety of alkoxyated alcohols suitable for use herein is commercially available from various suppliers.

Preferred hydrophobic nonionic surfactants to be used in the compositions according to the present invention are surfactants having an HLB up to 9 and being according to the formula $\text{RO}-(\text{C}_2\text{H}_4\text{O})_n(\text{C}_3\text{H}_6\text{O})_m\text{H}$, wherein R is a C_6 to C_{22} alkyl chain or a C_6 to C_{28} alkyl benzene chain, and wherein $n+m$ is from 0.5 to 5 and n is from 0 to 5 and m is from 0 to 5 and preferably $n+m$ is from 0.5 to 4 and, n and m are from 0 to 4. The preferred R chains for use herein are the C_8 to C_{22} alkyl chains. Accordingly suitable hydrophobic nonionic surfactants for use herein are Dobanol^R 91-2.5 (HLB = 8.1; R is a mixture of C_9 and C_{11} alkyl chains, n is 2.5 and m is 0), or Lutensol^R TO3 (HLB = 8; R is a mixture of C_{13} and C_{15} alkyl chains, n is 3 and m is 0), or Tergitol^R 25L3 (HLB = 7.7; R is in the range of C_{12} to C_{15} alkyl chain length, n is 3 and m is 0), or Dobanol^R 23-3 (HLB = 8.1; R is a mixture of C_{12} and C_{13} alkyl chains, n is 3 and m is 0), or Dobanol^R 23-2 (HLB = 6.2; R is a mixture of C_{12} and C_{13} alkyl chains, n is 2 and m is 0), or mixtures thereof. Preferred herein are Dobanol^R 23-3, or Dobanol^R 23-2, Lutensol^R TO3, or mixtures thereof. These Dobanol^R surfactants are commercially available from SHELL. These Lutensol^R surfactants are commercially available from BASF and these Tergitol^R surfactants are commercially available from UNION CARBIDE.

Other suitable hydrophobic nonionic surfactants to be used herein are non alkoxyated surfactants. An example is Dobanol 23 (HLB < 3).

Preferred hydrophilic nonionic surfactants to be used in the compositions according to the present invention are surfactants having an HLB above 10 and being according to the formula $\text{RO}-(\text{C}_2\text{H}_4\text{O})_n(\text{C}_3\text{H}_6\text{O})_m\text{H}$, wherein R is a C_6 to C_{22} alkyl chain or a C_6 to C_{28} alkyl benzene chain, and wherein $n+m$ is from 5 to 11 and n is from 0 to 11 and m is from 0 to 11, preferably $n+m$ is from 6 to 10 and, n and m are from 0 to 10. Throughout this description n and m refer to the average degree of the ethoxylation/propoxylation. The preferred R chains for use herein are the C_8 to C_{22} alkyl chains. Accordingly suitable hydrophilic nonionic surfactants for use herein are Dobanol^R 23-6.5 (HLB = 11.9; R is a mixture of C_{12} and C_{13} alkyl chains, n is 6.5 and m is 0), or Dobanol^R 25-7 (HLB = 12; R is a mixture of C_{12} to C_{15} alkyl chains, n is 7 and m is 0), or Dobanol^R 45-7 (HLB = 11.6; R is a mixture of C_{14} and C_{15} alkyl chains, n is 7 and m is 0), or Dobanol^R 91-5 (HLB = 11.6; R is a mixture of C_9 to C_{11} alkyl chains, n is 5 and m is 0), or Dobanol^R 91-6 (HLB = 12.5; R is a mixture of C_9 to C_{11} alkyl chains, n is 6 and m is 0), or Dobanol^R 91-8 (HLB = 13.7; R is a mixture of C_9 to C_{11} alkyl chains, n is 8 and m is 0), or Dobanol^R 91-10 (HLB = 14.2; R is a mixture of C_9 to C_{11} alkyl chains, n is 10 and m is 0), or mixtures thereof. Preferred herein are Dobanol^R 91-10, or Dobanol^R 45-7, Dobanol^R 23-6.5, or mixtures thereof. These Dobanol^R surfactants are commercially available from SHELL.

Apart from the hydrophilic nonionic surfactants other hydrophilic surfactants may further be used in the present invention such as anionic surfactants, in particular sulfonate and sulfate surfactants. The like anionic surfactants are well-known in the art and have found wide application in commercial detergents. These anionic surfactants include C8-C22 alkyl benzene sulfonates (LAS), C8-C22 alkyl sulfates (AS), unsaturated sulfates such as oleyl sulfate, C10-C18 alkyl alkoxy sulfates (AES) and C10-C18 alkyl alkoxy carboxylates. The neutralizing cation for the anionic synthetic sulfonates and/or sulfates is represented by conventional cations which are widely used in detergent technology such as sodium, potassium or alkanolammonium. Preferred herein are the alkyl sulphate, or mixtures thereof, especially sodium alkyl sulphate having from 10 to 16 carbon atoms in the alkyl chain, preferably from 12 to 14.

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

As a further essential element the compositions according to the present invention comprise a hydrophobic brightener, or mixtures thereof. Brighteners are compounds which have the ability to fluoresce 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-0 265 041, EP-A-0 322 564, EP-A-0 317 979 or "Fluorescent whitening agents" by A.K. Sarkar, published by MERROW, especially page 71-72. Said brighteners are substituted stilbenes and biphenyls such as but not limited to polycyclic oxazole derivatives, styryl stilbene derivatives, aryltriazole derivatives, or mixtures thereof. By hydrophobic brightener it is to be understood herein any brightener whose solubility in water is lower than 5 grams per liter at 25°C. Said hydrophobic brighteners to be used herein preferably have a solubility in water being lower than 3 and more preferably being lower than 1. By "solubility" of a given compound it is to be understood herein the amount of said compound solubilized in deionized water at 25°C. Thus, a compound having a solubility being lower than 5 grams per liter means that when less than 5

grams of said given compound is incorporated in deionized water at 25 °C said compound is entirely dissolved in said water, i.e. a clear and stable solution is obtained. In other words, incorporating 5 grams per liter or more of said given compound in water will result in a precipitation of said compound in said medium.

5 Typically, the compositions according to the present invention comprise from 0.02% to 1% by weight of the total composition of said hydrophobic brightener, preferably from 0.05% to 0.5% and more preferably from 0.05% to 0.2%.

Preferred hydrophobic brighteners for use herein are styryl stilbene derivatives, or aryltriazole derivatives, or polycyclic oxazole derivatives such as benzo-oxazole derivatives, or mixtures thereof and particularly preferred herein are benzo-oxazole derivatives. An example of such a brightener is benzoxazole,2,2'-(thiophenaldyl)bis having the following formula C₁₈H₁₀N₂O₂S, 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.

15 In another embodiment of the present invention the compositions herein further comprise a hydrophilic brightener, or mixtures thereof. By hydrophilic brightener it is to be understood herein any brightener whose solubility in water is higher than 10 grams per liter at 25 °C. Said hydrophilic brighteners to be used herein preferably have a solubility in water being higher than 15 and more preferably being higher than 20. Typically, the compositions according to the present invention comprise from 0% to 1% by weight of the total composition of said hydrophilic brightener, preferably from 0% to 0.5% and more preferably from 0% to 0.2%.

Such hydrophilic brighteners for use herein are the substituted stilbenes and biphenyls in general such as substituted stilbene 2,2'-disulfonic acid derivatives having a solubility in water higher than 10 grams per liter at 25 °C. An example of such a brightener is 4-4'-bis (2-2' styryl sulfonate) biphenyl, commercially available from Ciba-Geigy under the trade name Brightener 49®. Other hydrophilic brighteners suitable to be used herein are for example Brightener 3® or Brightener 47®, also commercially available from Ciba-Geigy.

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.

30 It has been found that the pH of the formulation influences its stability. Other than this, there are no other limitations in the pH of the composition. However, bleaching ingredients being optional but preferred ingredients of the compositions herein, it is of course necessary, for chemical stability purpose to formulate the compositions herein with bleaches at a pH as is of from 0 to 6, preferably of from 0.5 to 5 and more preferably from 0.5 to 4. The pH of the composition can be trimmed by all means available to the man skilled in the art.

Accordingly, preferred compositions according to the present invention comprise bleaches, i.e. hydrogen peroxide or a water-soluble source thereof. Suitable water-soluble sources of hydrogen peroxide include perborate, percarbonate, persilicate and persulphate salts. Hydrogen peroxide is most preferred to be used in the compositions according to the present invention. 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%.

Preferred compositions according to the present invention may further comprise 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. Other bleach activators to be used in the present invention are lactam derivatives. As used herein and unless otherwise specified, the term bleach activator includes mixtures of bleach activators.

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

55 In the present invention, wherein the compositions comprise a hydrophobic brightener having a solubility in water being lower than 5 grams per liter, i.e. being almost insoluble in water, the surfactant system to be chosen to emulsify said hydrophobic brightener depends on the HLB value of said brightener.

Accordingly, a suitable way to proceed is to determine the HLB value of the hydrophobic ingredient (brightener), then select both the hydrophobic surfactants which have HLB values below said HLB value of said hydrophobic ingredient and the hydrophilic surfactants which have HLB values above said HLB value of said hydrophobic ingredient, wherein the difference in the HLB values of said hydrophobic and hydrophilic nonionic surfactants is at least 1, preferably at least 3.

In a preferred embodiment comprising said hydrophobic brightener which is a hydrophobic ingredient, the emulsifying system meets the equation:

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

where X refers to the hydrophobic ingredient to emulsify if several hydrophobic ingredients are present X refers to all of them, A refers to one of said nonionic surfactants (hydrophilic or hydrophobic), and B refers to the other said nonionic surfactant (hydrophilic or hydrophobic).

In a particularly preferred embodiment of the present invention, wherein the compositions comprise Acetyl triethyl citrate as the bleach activator and the hydrophobic brightener, an adequate nonionic surfactant system would comprise a hydrophobic nonionic surfactant with for instance an HLB of 6, such as a Dobanol[®] 23-2 and a hydrophilic nonionic surfactant with for instance an HLB of 15, such as a Dobanol[®] 91-10. Other suitable nonionic surfactant systems comprise for example a Dobanol[®] 23-6.5 (HLB about 12) and a Dobanol[®] 23 (HLB below 6) or a Dobanol[®] 45-7 (HLB = 11.6) and Lutensol[®] TO3 (HLB = 8).

The compositions of the present invention allow to achieve improved whitening performance on hydrophobic-type of fabrics, i.e. synthetic fabrics such as polyesters, polyamides and the like. By "improved whitening performance" it is meant herein that the whiteness on fabrics (synthetic) achieved by using a composition comprising a hydrophobic brightener emulsified by a surfactant system of at least one hydrophobic surfactant and at least one hydrophilic surfactant is improved, as compared to the whiteness obtained by using the same composition with a hydrophilic brightener instead of said hydrophobic one as herein defined. Also through the formulation into an emulsion the hydrophobic brightener is delivered into the wash as a finely dispersed liquid and thus is active at low temperature used in common wash conditions (below 60°C). More particularly the compositions of the present invention which further comprise a hydrophilic brightener as defined herein allow to achieve improved whitening performance on all kinds of fabrics (cotton natural fibers as well as synthetic and mixed fabrics) as compared to the same compositions comprising only said hydrophilic brightener as the brightener.

A further advantage associated with the compositions of the present invention comprising a hydrophobic brightener emulsified in a surfactant system as described herein is that said hydrophobic brightener may contribute to the multi-cycle whitening of cotton fibers even in absence of any hydrophilic brightener which are known to be particularly effective on cotton fabrics. Aged cotton fabrics become partially hydrophobic, i.e. they are covered by thin hydrophobic layers of soils such as deposition of organic materials thus becoming sensitive to hydrophobic brighteners.

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 nonionic surfactant and hydrophobic brightener. Said hydrophobic mixture may further comprises other hydrophobic ingredients which are to be formulated in the composition, such as perfumes, solvents, enzymes, bleach activators and polymers.

In the second step, a hydrophilic mixture is prepared which comprises at least said water, and said hydrophilic nonionic surfactant. Said hydrophilic mixture preferably further comprises other hydrophilic ingredients which are to be formulated in the composition such as dyes, hydrophilic optical brighteners, builders, chelants, hydrogen peroxide and buffering agents. In this second step hydrogen peroxide when present is preferably 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.

The compositions according to the present invention are particularly useful as laundry detergent or as laundry pretreaters, i.e. compositions which are dispensed and left to act onto fabrics before they are

washed, or as laundry additives to be used together with detergents to boost their performance. Indeed, the compositions of the present invention may be incorporated per se in any type of detergents including detergents being in a liquid or a granular form. The technologies used to incorporate the compositions of the present invention in a detergent being in a granular form are those commonly known to those skilled in the art like spraying and/or encapsulation.

The present invention further encompasses a method of bleaching and/or washing fabrics wherein a composition as defined hereinbefore is contacted with said fabrics. More specifically, in the preferred embodiment of the present invention where the compositions of the present invention comprise bleaches, the method of bleaching fabrics to improve fabric whiteness comprises the steps of first contacting said fabrics with a composition of the present invention, then allowing said fabrics to remain in contact with said composition, for a period of time sufficient to bleach said fabrics, typically 2 to 60 minutes, preferably 5 to 30 minutes, then rinsing said fabrics in water to remove said composition. If said fabrics are to be washed, i.e. with a conventional composition comprising at least one surface active agent, it is preferred to perform the method herein before said fabrics are washed. Indeed, it has been observed that bleaching said fabrics with the compositions according to the present invention 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. Accordingly, said method according to the present invention further comprises a subsequent step where said fabrics are washed with a detergent composition comprising at least one surface active agent.

The present invention will be further illustrated by the following examples.

1) Experimental data

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

Compositions	I	II	III	IV
Dobanol ^R 45-7	6	6	6	6
Dobanol ^R 91-10	3	3	3	3
Dobanol ^R 23-2	6	6	6	6
Hydrogen peroxide	7.5	7.5	7.5	7.5
Acetyl triethyl citrate	7.0	7.0	7.0	7.0
Brightener ^R 49	----	----	0.1	0.1
Tinopal SOP ^R	----	0.1	----	0.1
S,S-ethylene diamino disuccinic acid	0.1	0.1	0.1	0.1
Poly(4-vinylpyridine- N-oxyde)	0.1	0.1	0.1	0.1
HOES ^R 3639	0.2	0.2	0.2	0.2
Silicon	0.2	0.2	0.2	0.2
Deionized water	-----balance-----			
Citric acid up to pH 4				
HOES ^R 3639 is a terephthalate based polymer commercially available from Hoechst.				

Composition I is an emulsion taken as reference in the following test and comprises no brighteners at all.

Compositions II and IV are representative of the present invention. Composition II is an emulsion of nonionic surfactants comprising among other hydrogen peroxide, a bleach activator (ATC) and a hydrophobic brightener, Tinopal SOP®. Composition IV differs from composition II in that it further comprises a hydrophilic brightener, Brightener 49®.

Composition III is a composition representative of the prior art, i.e. an emulsion of nonionic surfactants comprising hydrogen peroxide and a bleach activator (ATC) and as a brightener a hydrophilic brightener.

A single tracer launderometer test was carried out by using said bleaching compositions mentioned above followed by the use of a detergent composition.

The test was performed in a stainless steel vessel. First 2 ml of each of the above bleaching compositions I to IV were diluted in 0.5 liters of tap water. The test was carried out at 18 °C. The tracers,

i.e. fabrics such as clothes, towels and the like, with standardized stains were added into the prepared solutions. The vessel was then kept under agitation for 20 minutes. At the end of the washing cycle the tracers were rinsed with water. Then, a detergent commercially available on the market (Dash Ultra®) was used to wash the tracers. 5g of the detergent were diluted into 0.5 liter of tap water. This solution was heated at 40 °C. The vessel was then kept under agitation for 20 minutes with the tracers. At the end of the washing cycle the tracers were rinsed and dried. Then the tracers were evaluated by visual grading.

The table below lists the results in terms of whiteness obtained after one wash cycle for compositions II, III and IV versus composition I on different kinds of fabrics, polyester, cotton/polyester and cotton only. The table also gives the results in terms of whiteness obtained after one wash cycle for composition I on top of which Tinopal Sop^R was added as is directly in the wash solution at the beginning of the wash cycle versus composition I used alone.

	Comp. I *vs. I	Comp. II vs. I	Comp. III vs. I	Comp. IV vs. I
Polyester	0	1.8S	0	1.8S
Cotton/polyester	0	1.0S	1.2S	2.0S
Cotton	0	0.2	1.5S	1.8S
Where: - Results are expressed on a 0 to 4 performance scale evaluated by expert judgment. - S identifies statistically reproducible results.				

* Tinopal Sop^R was added as is on top of composition I in the wash solution at the beginning of the wash cycle.

Comments:

The data clearly shows significant whiteness improvement delivered by the compositions of the present invention comprising a hydrophobic brightener emulsified by a nonionic surfactant system. Indeed, after one wash cycle only the compositions according to the present invention comprising a hydrophobic brightener emulsified in a nonionic surfactant system (compositions II and IV) as compared to both a composition available on the market comprising only a hydrophilic brightener as the brightener (composition III) and to a composition wherein said hydrophobic brightener is not emulsified (composition I*) but incorporated separately as is in the wash solution, provides better whitening performance on synthetic fabrics, e.g. polyester. Said data also shows that the emulsions of the present invention comprising a hydrophobic and a hydrophilic brightener provide fabric whiteness improvement on various types of fabrics, polyester alone, cotton alone or mixtures thereof as compared to the compositions available on the market (see composition IV versus composition III).

2) Examples

Further examples of the compositions according to the present invention are the following. These compositions are made comprising the listed ingredients in the listed proportions (weight %):

	Compositions	I	II	III
5	Dobanol ^R 45-7	6.7	6.0	6.0
	Lutensol T03	8.3	---	----
	Na alkyl sulphate	2.0	---	----
	Dobanol ^R 23-2	----	6.0	6.0
	Dobanol ^R 91-10	----	3.0	3.0
10	Hydrogen peroxide	7.5	7.5	7.5
	Acetyl triethyl citrate	7.0	7.0	7.0
	Brightener ^R 49	0.2	----	----
	Brightener ^R 3	----	0.2	----
	Brightener ^R 47	----	----	0.1
15	Tinopal SOP ^R	0.1	0.05	0.08
	S,S-ethylene diamino disuccinic acid	----	0.1	0.1
	Diethylene triamine penta methylene phosphonic acid	1.0	---	----
	Poly(4-vinylpyridine-N-oxyde)	0.1	0.1	0.1
	HOES ^R 3639	0.2	0.2	0.2
20	Silicon	0.2	0.2	0.2
	Deionized water	-----balance-----		
	H2SO4 up to pH = 4			

Compositions I to III are each made by preparing two mixtures. A hydrophilic mixture is prepared which comprises the hydrophilic ingredients such as water, hydrophilic brightener, S,S-EDDS, poly(4-vinylpyridine-N-oxide), Dobanol[®] 45-7, Dobanol[®] 91-10, diethylene triamine penta methylene phosphonic acid or Na alkyl sulphate. Hydrogen peroxide is added in said hydrophilic mixture as last step. A hydrophobic mixture is prepared which comprises acetyl triethyl citrate, Dobanol[®] 23-2, Lutensol T03, hydrophobic brightener, silicone or Hoes[®] 3639. Then said hydrophobic mixture is poured into said hydrophilic mixture, while mixing.

All the compositions according to the examples above are stable and provide excellent whitening performance and safety to the fabrics treated with them while being also efficient in removing stains. These advantages are observed when using said compositions as a laundry composition or as an additive or as a pre-bleach associated with a detergent composition.

Claims

1. An aqueous emulsion comprising at least a hydrophilic surfactant having an HLB above 10 and at least a hydrophobic surfactant having an HLB up to 9, **characterized in** that said aqueous emulsion further comprises a hydrophobic brightener whose solubility in water is lower than 5 grams per liter at 25 °C, or mixtures thereof.
2. An emulsion according to claim 1 wherein said hydrophobic brightener has a solubility in water being lower than 3 grams per liter, preferably lower than 1 gram per liter.
3. An emulsion according to any of the preceding claims wherein said hydrophobic brightener is an aryltriazole derivative, a styryl stilbene derivative, a polycyclic oxazole derivative, or mixtures thereof, preferably a benzo-oxazole derivative and more preferably said benzo-oxazole is benzoxazol,2,2'-(thiophenadyl)bis.
4. An emulsion according to any of the preceding claims wherein said emulsion comprises from 0.02% to 1% by weight of the total emulsion of said hydrophobic brightener, preferably from 0.05% to 0.5% and more preferably from 0.05 % to 0.2%.
5. An emulsion according to any of the preceding claims wherein said emulsion comprises from 2% to 50% by weight of the total emulsion of said hydrophobic and hydrophilic surfactants, preferably from 5% to 40% and more preferably from 8% to 30%.

6. An emulsion according to any of the preceding claims wherein said hydrophobic surfactant is a nonionic surfactant, preferably a hydrophobic nonionic surfactant having an HLB below 9, preferably below 8 and wherein said hydrophilic surfactant is a nonionic surfactant, preferably a hydrophilic nonionic surfactant having an HLB above 11 , preferably above 12.
7. An emulsion according to any of the preceding claims wherein said emulsion further comprises an anionic surfactant or mixtures thereof, preferably a sodium alkyl sulphate having from 10 to 16 carbon atoms.
8. An emulsion according to any of the preceding claims which further comprises hydrogen peroxide, or a water soluble source thereof and a bleach activator wherein said bleach activator is emulsified by the surfactants.
9. An emulsion according to claim 8 which comprises from 0.5% to 20% by weight of the total emulsion of said hydrogen peroxide.
10. An emulsion according to claims 8 and 9 wherein said bleach activator is acetyl triethyl citrate.
11. An emulsion according to any of the preceding claims which further comprise a hydrophilic brightener whose solubility in water is higher than 10 grams per liter at 25 ° C, preferably higher than 15 grams per liter and more preferably higher than 20 grams per liter.
12. A detergent composition comprising an emulsion according to any of the preceding claims.
13. A process of bleaching or washing fabrics, especially fabrics having a hydrophobic character such as synthetic fabrics, to improve fabric whiteness which comprises the steps of:
 - first contacting said fabrics with a composition or emulsion according to any of the preceding claims,
 - then allowing said fabrics to remain in contact with said composition or emulsion for a period of time sufficient to bleach or wash said fabrics,
 - then rinsing said fabrics in water to remove said composition or emulsion.
14. A process according to claim 13 which further comprises a subsequent step where said fabrics are washed with a detergent composition comprising at least one surface active agent.



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1667

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.6)
X	WO-A-94 12600 (PROCTER & GAMBLE ; SCIALLA STEFANO (IT); CARDOLA SERGIO (IT); RAPIS) 9 June 1994 * the whole document *	1	C11D1/825 C11D1/83 C11D3/39 C11D3/42
D	& EP-A-0 598 973 ---		
D,X	EP-A-0 598 170 (PROCTER & GAMBLE) 25 May 1994 * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			C11D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 November 1994	Examiner Delzant, J-F
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			