LIQUID DETERGENT BLEACH COMPOSITION


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Int. Cl. C11d 7/54

U.S. Cl. 252—95

ABSTRACT OF THE DISCLOSURE

A liquid detergent bleach composition comprising an aqueous mixture of a detergent, a bleaching or oxidizing agent, and a hydrotropic in which the components are present in such an amount so as to provide a clear liquid at room temperature is disclosed.

This invention relates to a stable, liquid detergent-bleach composition.

Much effort has been directed towards an attempt to formulate a liquid detergent containing a bleaching agent, such as sodium hypochlorite which is perhaps the most commonly used, cheapest and most effective bleaching agent for liquid compositions.

This problem has been solved to some extent in the dry state, and typical dry powder compositions previously proposed have included sodium or calcium hypochlorite and a detergent, together with compounds such as alkali metal phosphates, silicates, carbonates and/or sulphates. These dry compositions are intended to be mixed with water immediately prior to use. Other previously proposed compositions have included a quaternary ammonium compound and, whilst a reasonably effective clear solution may be obtained, the quaternary ammonium compound is neither a very potent detergent nor is it cheap.

The difficulties encountered in formulating a suitable inexpensive liquid preparation have been to find a wash-active material which is soluble and also sufficiently inert that the oxidising or bleaching agent does not react with it, thereby causing the preparation to lose its oxidising and/or detergent powers.

We have, for example, found that sodium lauryl ether sulphate, which is a commercially available water-soluble detergent, is incompatible with sodium hypochlorite in that when the two are mixed a heavy precipitate of insoluble matter is produced making the product unsuitable as a commercial proposition.

We have now discovered, however, that hydrotropes, such as for example, sodium xylene sulphonate, which are known clarifying agents, when added to such a preparation not only produce a liquid which is clear at room temperature and in some cases even down to 0° C., but also that the mixture of the three components retains its detergent power, and retains its oxidising power over a length of time at least substantially equal to that which would be expected from sodium hypochlorite alone.

Based on this discovery, the present invention provides a liquid detergent bleach composition, comprising an aqueous mixture of a detergent, a bleaching or oxidising agent, and a hydrotropic which is an alkali metal or alka-line earth metal salt of a mono- or polyalkylated benzene or naphthalene sulphonate of which the alkyl groups contain from 1 to 4 carbon atoms, the three components being present in amounts such as to provide a clear liquid at room temperature.

 Whilst such three component compositions are stable, we have also found that there is an optimum level for alkalinity of the composition due to the presence of hydroxyl ions and this alkalinity is preferably between 1 and 2% expressed in terms of free sodium hydroxide, although in fact the alkalinity may be due to other cations provided by compounds such as magnesium hydroxide, potassium hydroxide or lithium hydroxide. The optimum alkalinity depends upon the particular formulation and quality of the raw materials. Thus, for example, when the bleaching agent is sodium hypochlorite, it is preferred to use a quality of sodium hypochlorite with the lowest possible sodium chloride content, but a higher content of sodium chloride can be tolerated by appropriate adjustment of the alkalinity of the mixture.

The detergent of the present composition may be any of those detergents commonly employed and may be used alone, or in admixture with other detergents. A first class of detergents which may be employed in the present compositions is the metal alcohol sulphates of which the alcohol contains from 6 to 22 carbon atoms. The alcohol may be a synthetic alcohol, a branched chain alcohol or a fatty alcohol. The alcohols may be pure or may be mixtures of alcohols, particularly such mixtures of fatty alcohols as are available commercially. Examples of suitable detergents in this class include sodium lauryl sulphate, sodium decyl sulphate, sodium myristyl sulphate, and the corresponding lithium salts. The metal component of the detergents of this class is preferably an alkali metal such as sodium or lithium, or an alkaline earth metal such as magnesium.

The second class of detergents which may be employed in the present compositions is the metal alcohol ether sulphates, of which the alcohol is the same as that of the first class of detergents and of which the metal is preferably an alkali metal or an alkaline earth metal.

The alcohol ethers from which the second class of detergents is derived are made by reacting the alcohol with an olefin oxide. The preferred alcohol ethers are made by reacting the alcohol with ethylene oxide to give an ethoxylated alcohol of which the average composition comprises from 1 to 4 mols of ethylene oxide per mol of alcohol. Examples of this class of detergent are sodium lauryl ether sulphate (including the commercially available material which also comprises sodium decyl ether sulphate and sodium myristyl ether sulphate) and lithium lauryl ether sulphate.

A third class of detergent which may be employed in the present compositions is the alkali metal alkyl aryl sulphonates including for example sodium dodecyl benzene sulphonate and lithium dodecyl benzene sulphonate.

A fourth class of detergents which may be employed in the present compositions is the oxidation products of fatty amines and derivatives thereof, which products are generally known in the detergent industry as amine oxides and which are employed as detergents in their own right or as builders. An example of a suitable detergent in this class is dimethyl cocamido oxide.

Other classes of detergents, not specifically mentioned above, may also be employed, such other classes being well known.

As indicated above, the detergents may be employed alone or in admixture with one another, including mixtures of detergents within the same class and mixtures of detergents in different classes. While all the above mentioned detergents are compatible with one another, detergents in other classes not specifically mentioned may or may not be entirely compatible with one another and mixtures of incompatible detergents should be avoided. In particular, it is preferred not to employ mixtures of cationic and anionic detergents.

As indicated above, the hydrotropes employed in the present compositions are a well known family of clarifying agents comprising the alkali metal or alkaline earth metal salts of mono- or polyalkylated benzene or naphtha-
laine sulphonates of which the alkyl groups contain from 1 to 4 carbon atoms. The preferred hydrotrope is sodium xylene sulphonate which is commercially available as an unspecified mixture of the isomeric sulphonates, but other hydrotropes, such as the water-soluble alkali metal and alkaline earth metal salts, e.g., the sodium, potassium, lithium and magnesium salts of xylene or tolune sulphonic acid may be used.

The range of proportions of the three components of the mixture may be varied within wide limits but will generally be interrelated in the sense that the amount of hydrotrope required will depend upon the amount of detergent present and the nature of the detergent and the amount of detergent which may be added to the composition will depend upon the amount of hydrotrope present.

In general the ratio by weight of hydrotrope to detergent will be from 2:1 to 1:2, with a preferred ratio of 1:1 for most general commercial purposes. However, as indicated above, the ratio may depend upon the particular detergent may be increased to 5:1 or more for detergents which are not readily water-soluble, such as sodium lauryl sulphate. The amount of bleaching or oxidising agent may be varied widely and the compositions of the present invention include not only compositions which are primarily regarded as bleaching or oxidising compositions and which contain a large amount of bleaching or oxidising agent and a small amount of detergent for wetting purposes, such as may be used for sterilising dairy equipment, but also compositions which are primarily regarded as detergent compositions and which contain a large amount of detergent and a small amount of bleaching or oxidising agent, such as may be used for washing diapers.

The bleaching or oxidising agent is preferably sodium hypochlorite or lithium hypochlorite, but other agents may be employed.

The composition may, of course, contain conventional additives such as odorifiers, builders, brightening agents and solubilisers, provided that they are compatible with the bleaching or oxidising agent.

The invention will now be illustrated by the following examples:

**Examples**

<table>
<thead>
<tr>
<th>Sodium hypochlorite (10.20% available chlorine)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydroxide (50% active)</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Sodium xylene sulphonate (50% active)</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Available chlorine at day 0</td>
<td>9.25</td>
<td>9.18</td>
<td>8.5</td>
<td>10.3</td>
</tr>
<tr>
<td>Loss of available chlorine after 18 days %</td>
<td>2.1</td>
<td>2.2</td>
<td>3.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Clarity at room temperature</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>After 24 hours at 10°C</td>
<td>H</td>
<td>H</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

* Made from an ethoxylated commercial grade of lauryl alcohol.

NOTE—C=clear; H=slight haze but still essentially clear.

**Examples**

<table>
<thead>
<tr>
<th>Sodium hypochlorite (14.4% available chlorine w.fw.), g</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydroxide (50% active), g</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Sodium xylene sulphonate (50% active), g</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Water, g</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>35</td>
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<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

In the above examples, the amount of detergent, sodium lauryl ethersulphate, determined at the end of the test period was substantially the same as at the beginning, showing that the compositions had retained their detergent power.

The following examples illustrate compositions which have a clarity at ambient temperature, and 0°C, and stability, comparable to the composition of Example 15.

**EXAMPLE 7**

Sodium hypochlorite (14.4%): 70 g.
Sodium xylene sulphonate (30%): 15 g.
Sodium lauryl ether sulphate (26%): 15 g.
Sodium hydroxide: to adjust alkalinity to 1.0% free NaOH

**EXAMPLE 8**

Sodium hypochlorite (14.4%): 80 g.
Sodium lauryl sulphate (100%): 1.1 g.
Sodium xylene sulphonate (30%): 16.7 g.
Water: 2.2 g.
Sodium hydroxide: to adjust alkalinity to 1.0% free NaOH

**EXAMPLE 9**

Sodium hypochlorite (14.4%): 70 g.
Lithium lauryl sulphate (30%): 15 g.
Sodium xylene sulphonate (30%): 15 g.
Sodium hydroxide: to adjust alkalinity to 1.0% free NaOH

**EXAMPLE 10**

Sodium hypochlorite (14.4%): 70 g.
Dimethyl cocamine oxide (30%): 15 g.
Sodium xylene sulphonate (30%): 15 g.
Sodium hydroxide: to adjust alkalinity to 1.0% free NaOH

**EXAMPLE 11**

Sodium hypochlorite (14.4%): 70 g.
Dimethyl cocamine oxide (30%): 1.5 g.
Sodium lauryl ether sulphate (26%): 13.5 g.
Sodium xylene sulphonate (30%): 15 g.
Sodium hydroxide: to adjust alkalinity to 1.0% free NaOH

I claim:

1. A liquid detergent bleach composition, consisting essentially of (a) water; (b) a detergent selected from the group consisting of alkali metal and alkaline earth metal alcohol sulphates of which the alcohol contains from 6 to 22 carbon atoms, alkali metal and alkaline earth metal alcohol ether sulphates of which the alcohol contains from 6 to 22 carbon atoms, and an average of 1 to 4 moles of ethylene oxide per mole of alcohol, alkali metal alkyl benzene sulphonates and fatty amine oxides; (c) an alkali metal hypochlorite bleaching agent; and (d) a hydrotrope selected from the group consisting of alkali metal and alkaline earth metal salts of mono- and polyalkylated benzene and naphththene sulphonates of which the alkyl groups contain from 1 to 4 carbon atoms; the proportions of the components (a), (b), (c) and (d) being interrelated such as to provide a clear liquid at room temperature.

2. A composition as claimed in claim 1, wherein the alkalinity of said composition due to the presence of hydroxyl ions and expressed in terms of free sodium hydroxide, is between 1 and 2%.

3. A composition as claimed in claim 1, wherein the ratio by weight of hydrotrope to detergent in the composition is from 2:1 to 1:2.

4. A composition as claimed in claim 1, wherein said bleaching agent is selected from the group consisting of sodium hypochlorite and lithium hypochlorite.

5. A composition as claimed in claim 1, wherein said detergent is sodium lauryl ether sulphate.

6. A composition as claimed in claim 1, wherein said detergent is sodium or lithium lauryl sulphate.
7. A composition as claimed in claim 3, wherein the hydrotrope is a sodium xylene sulphonate.

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<table>
<thead>
<tr>
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<td>252—95X</td>
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MAYER WEINBLATT, Primary Examiner