

[54] **COMPOSITIONS FOR ACTIVATING AN INORGANIC PEROXIDE BLEACHING AGENT**

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[58] Field of Search ..... 252/186, 99; 8/111; 260/610 A, 610 R

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[57] **ABSTRACT**

A composition for activating an inorganic peroxide bleaching agent comprising (A) an acetic acid ester of a monosaccharide, a disaccharide, a sugar alcohol, an internal anhydride of a sugar alcohol, or erythritol, said ester having at least 2 ester groups on the adjacent carbon atoms, and (B) an acetic acid ester of a polyhydric alcohol having a melting point not higher than about 30°C., the weight ratio of the components being within the range of from 1/9 to 9/1.

**7 Claims, No Drawings**

# COMPOSITIONS FOR ACTIVATING AN INORGANIC PEROXIDE BLEACHING AGENT

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

This invention relates to an activating composition for intensifying the bleaching activity of an inorganic peroxide bleaching agent at low temperatures.

### 2. Description of the Prior Art

When an inorganic peroxide bleaching agent such as sodium perborate is used by itself at a high temperature, such as 80°C. or above, it exhibits a very high bleaching activity. But at a low temperature, such as 40°C. or below, its bleaching effect is extremely low. Accordingly, various studies have heretofore been made on so-called activating agents for intensifying the bleaching effect of such inorganic peroxide bleaching agents at low temperatures.

Because the waste liquors from the bleaching treatment steps are discarded without further treatment, it is desired that such activating agents be readily biologically decomposable. It is also desired that they be non-poisonous.

As conventional activating agents meeting these requirements, there can be mentioned acetic acid esters of sugars and sugar alcohols. In these acetic acid esters, a sufficient effect cannot be obtained by partially esterified compounds, and hence, all of the hydroxyl groups should be esterified with acetic acid.

However, since such completely esterified compounds have a very low water solubility, when the washing is conducted at a low temperature (for instance, 20°C.) for a short time (for instance, 10 minutes), a sufficient bleaching effect cannot be obtained.

## SUMMARY OF THE INVENTION

We have found, unexpectedly in view of the prior art, that when an acetic acid ester of a polyhydric alcohol having a melting point not higher than about 30°C. is added to an acetic acid ester of a sugar or sugar alcohol, not only is the water solubility increased but also the activating effect is greatly enhanced.

This invention provides a composition for activating an inorganic peroxide bleaching agent which consists essentially of (A) an acetic acid ester of a monosaccharide, a disaccharide, a sugar alcohol, an internal anhydride of a sugar alcohol, or erythritol, and mixtures thereof, said ester having at least 2 ester groups on the adjacent carbon atoms, and (B) an acetic acid ester of a polyhydric alcohol having a melting point not higher than 30°C., the weight ratio of A:B being within the range of from 1:9 to 9:1, preferably 1:3 to 3:1, especially about 1:1.

Acetic acid esters of monosaccharides, disaccharides, sugar alcohols, internal anhydrides of sugar alcohols and erythritol employed in this invention include acetic acid esters of hexoses such as glucose, mannose, galactose and fructose; pentoses such as arabinose and xylose; disaccharides such as sucrose, lactose and maltose; hexitols such as sorbitol and mannitol; internal anhydrides of hexitols, i.e., hexitan, such as sorbitan and mannitan; pentitols such as xylitol and arabitol; internal anhydrides of pentitols, i.e., pentitans, such as xylitan; and the like. These acetic acid esters should have at least 2 ester groups on adjacent carbon atoms and they can be up to 100% esterified.

Specific examples of such acetic acid esters are glucose pentacetate, glucose tetracetate, fructose pentacetate, sucrose octacetate, sorbitol hexacetate, sorbitan tetracetate, mannitol hexacetate, mannitan tetracetate, xylitol pentacetate, xylitan triacetate and erythritol tetracetate.

Acetic acid esters of polyhydric alcohols having a melting point not higher than 30°C., which are used in the composition of this invention, include acetic acid esters of ethylene glycol, propylene glycol, butylene glycol, glycerin and diglycerin.

It is preferred that these esters have a degree of esterification of 100%. Glycerine triacetate, i.e., triacetin, and ethylene glycol diacetate are especially preferred, because they have an activity of activating an inorganic peroxide bleaching agent.

Tetracetyl ethylenediamine is an activating agent of low water solubility, like the acetic acid esters of sugars and sugar alcohols employed in this invention. But in this case of tetracetyl ethylenediamine, an improved effect cannot be obtained by mixing it with, for example, triacetin. The specific synergistic effects of (1) improving the water solubility and (2) enhancing the activating property, that characterize the composition of this invention, can be attained only by employing a combination of an acetic acid ester of a sugar or sugar alcohol etc. as set forth above and an acetic acid ester of a polyhydric alcohol having a melting point not higher than 30°C.

The activating composition of this invention can be directly added to a bleaching liquor containing an inorganic peroxide, or it can be incorporated in advance into an inorganic peroxide bleaching agent. In the latter case, the composition can be kneaded with a granulating agent such as polyethylene glycol 6000 and formed into granules having flowability. The composition may further comprise surfactants such as anionic surfactants, non-ionic surfactants and amphoteric surfactants, neutral inorganic salts such as sodium sulfate, alkaline inorganic salts such as sodium tripolyphosphate, heavy metal chelating agents such as sodium nitrilotriacetate, redeposition-preventive agents such as carboxymethyl cellulose, perfumes, fluorescent dyes, and the like.

Inorganic peroxide bleaching agents to which the composition of this invention can be applied are substances capable of releasing hydrogen peroxide in an aqueous solution. Examples of such bleaching agents are hydrogen peroxide, sodium perborate, sodium percarbonate, sodium peroxyphosphate and sodium peroxydicarbonate.

The mixing ratio of the activating composition of this invention to the inorganic peroxide is within the range of from 1/9 to 9/1 on the weight basis. When the bleaching agent is used at a low temperature for a short time, it is preferred that the proportion of the activating composition is increased. It is also preferred that when the bleaching agent is used at a relatively high temperature for a long time, the proportion of the activating composition is reduced.

This invention will now be further described by reference to the following illustrative examples, in which all references to "parts" and percent % are on a weight basis.

## EXAMPLE 1

The activating agents listed in the following Table 1

were respectively added in an amount of 0.5 part to 100 parts of a 0.5% aqueous solution of sodium perborate. The state of dissolution of the activating agent was examined after the mixture had been allowed to stand until at 20°C. for 1 minute. Then a bleaching test was conducted at 20°C. for 10 minutes. The results obtained are shown in the following Table 1.

The bleaching test was carried out as follows: Three soiled cloths for the bleaching test (cloth of 10 cm × 7 m soiled with tea) were put into a Terg-O-Tometer and subjected to rotating agitation at 100 rpm, at 20°C for 10 minutes. The cloths were then rinsed with city water, air-dried and ironed.

The effectiveness of compositions was determined by measuring the reflectivities of the cloths before and after the treatment.

**Bleaching Force:** The bleaching force is expressed in terms of the value of ((reflectivity of bleached cloth) (reflectivity of untreated cloth)).

Table 1

| Run No.       | Activating Agent (weight ratio)       | Form of Activating Agent | Dissolving State After 1 Minute                            | Bleaching Force |
|---------------|---------------------------------------|--------------------------|------------------------------------------------------------|-----------------|
| 1<br>control) | glucose pentacetate/triacetin (100/0) | powder                   | suspended (powder not dissolved)                           | 12.8            |
| 2             | glucose pentacetate/triacetin (75/25) | powder                   | slightly suspended (powder mostly dissolved)               | 15.0            |
| 3             | glucose pentacetate/triacetin (50/50) | powder                   | substantially dissolved (powder almost entirely dissolved) | 18.6            |
| 4             | glucose pentacetate/triacetin (25/75) | paste                    | completely dissolved                                       | 13.2            |
| 5<br>control) | glucose pentacetate/triacetin (0/100) | liquid                   | completely dissolved                                       | 10.6            |
| 6<br>control) | not added                             | —                        | —                                                          | 2.1             |

## EXAMPLE 2

In each test, 0.5 part of an activating agent listed in the following Table 2 was added to 100 parts of a bleaching agent aqueous solution containing 1.0% of dium percarbonate, 0.05% of sodium dodecylbenzenesulfonate and 1.0% of sodium tripolyphosphate. The bleaching test was conducted in the same manner as in Example 1 and the results shown in the following Table 2 were obtained.

Table 2

| Run No.        | Activating agent (Weight ratio)                         | Bleaching Force |
|----------------|---------------------------------------------------------|-----------------|
| 7<br>control)  | sorbitol hexacetate/ethylene glycol diacetate (100/0)   | 13.6            |
| 8              | sorbitol hexacetate/ethylene glycol diacetate (50/50)   | 17.5            |
| 9<br>control)  | sorbitol hexacetate/ethylene glycol diacetate (0/100)   | 8.5             |
| 10<br>control) | tetracetylene diamine/ethylene glycol diacetate (100/0) | 14.2            |
| 11<br>control) | tetracetylene diamine/ethylene glycol diacetate (50/50) | 11.5            |
| 12<br>control) | tetracetylene diamine/ethylene glycol diacetate (0/100) | 8.5             |
| 13<br>control) | not added                                               | 5.6             |

From the above results, it is seen that a mixture of sorbitol hexacetate and ethylene glycol diacetate ex-

hibits a synergistic effect, whereas ethylene glycol diacetate is ineffective when combined with tetracetylene diamine.

## EXAMPLE 3

50 Parts of sucrose octacetate was mixed with 50 parts of diglycerin tetracetate. Then 100 parts of corn starch and 100 parts of polyethylene glycol were added to the mixture. The resulting composition was granulated by means of a pelletizer having an orifice diameter of 0.7 mm to obtain a granular activating composition. Using the thus-formed activating composition, a powdery bleaching agent was prepared according to the following recipe:

|                              |          |
|------------------------------|----------|
| sodium perborate             | 30 parts |
| sodium tripolyphosphate      | 15 parts |
| sodium carbonate             | 10 parts |
| sodium metasilicate          | 2 parts  |
| sodium laurylsulfate         | 5 parts  |
| sodium sulfate               | 3 parts  |
| above activating composition | 35 parts |

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An activating agent composition for activating an inorganic peroxide bleaching agent, consisting essentially of

A. acetic acid ester of a substance selected from the group consisting of a monosaccharide, a disaccha-

ride, a sugar alcohol, an internal anhydride of a sugar alcohol, erythritol and mixtures thereof, said

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ester having at least two ester groups on adjacent carbon atoms of said substance, and

B. acetic acid ester of polyhydric alcohol having a melting point not higher than about 30°C, the weight ratio of A:B being from 1:9 to 9:1.

2. A composition according to claim 1, in which ingredient A is an acetic acid ester of substance selected from the group consisting of glucose, mannose, galactose, fructose, arabinose, xylose, sucrose, lactose, maltose, sorbitol, mannitol, sorbitan, mannitan, xylitol, arabitol, and xylitan and mixtures thereof.

3. A composition according to claim 1, in which ingredient A is selected from the group consisting of glucose pentacetate, glucose tetracetate, fructose pentacetate, sucrose octacetate, sorbitol hexacetate, sorbitan tetracetate, mannitol hexacetate, mannitan tetracetate, xylitol pentacetate, xylitan triacetate and erythritol tetracetate.

4. A composition according to claim 1, in which in-

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redient B is an acetic acid ester of polyhydric alcohol selected from the group consisting of ethylene glycol, propylene glycol, butylene glycol, glycerin and diglycerin.

5 5. A composition according to claim 1, in which ingredient B is selected from the group consisting of triacetin and ethylene glycol diacetate.

6. A bleaching composition comprising (1) an inorganic peroxide bleaching agent capable of releasing hydrogen peroxide in an aqueous solution, and (2) an activating agent composition as defined in claim 1, in which the weight ratio of (1):(2) is from 1:9 to 9:1.

7. A bleaching composition according to claim 6, in which ingredient (1) is selected from the group consisting of hydrogen peroxide, sodium perborate, sodium percarbonate, sodium peroxyphosphosphate and sodium peroxydicarbonate.

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