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(54) **Thickened alkaline aqueous hydrogen peroxide solutions.**

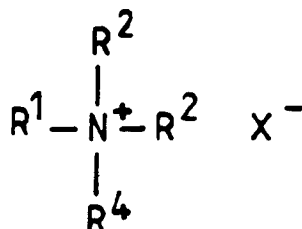
(57) A thickened bleach comprises an alkaline aqueous solution of hydrogen peroxide containing, as thickening system, a mixture of a quarternary long chain alkyl ammonium compound together with a water-soluble salt of an aromatic sulphonic acid hydrotrope

This invention is concerned with improvements in and relating to bleaches. More particularly the invention is concerned with peroxide bleaches containing hydrogen peroxide as active bleaching agent.

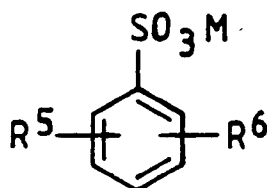
Aqueous solutions of hydrogen peroxide have been used as bleaching/cleaning agents for many years and for a wide variety of purposes, both industrial and domestic. It is an object of the present invention to provide an improved bleaching composition, which composition has an alkaline pH and is thickened (has an increased viscosity) so that its contact time with vertical or inclined surfaces to which it may be applied is increased (as compared with an un-thickened composition) whereby to allow for improved bleaching.

According to the invention there is provided a bleach composition comprising an alkaline aqueous solution of hydrogen peroxide containing, as thickening system, a mixture of a quarternary long chain alkyl ammonium compound together with a water-soluble salt of an aromatic sulphonic acid hydrotrope.

Suitable quarternary ammonium compounds for use in the compositions of the invention have the formula:



in which R¹ is a C₁₂-C₂₀ alkyl group; R², R³ and R⁴ are each C₁-C₄ alkyl groups, typically a methyl group; and X⁻ is an anion such as a chloride ion. A particularly useful compound of the above formula is that sold under the trade name "Arquad 16" which is hexadecyltrimethyl ammonium chloride. The aromatic sulphonate hydrotrope is suitably one represented by the formula:



in which R⁵ and R⁶ are each a hydrogen atom or a lower (C₁-C₆) alkyl group, typically a methyl or ethyl group, and M is a cation typically an alkali metal, especially sodium, cation. The quarternary ammonium compound and hydrotrope should be present in the composition in an amount to afford the desired elevated viscosity, typically up to 400 centipoises, and we have found that such viscosities may be provided by 0.1 to 10% by weight, preferably 0.9 to 1.8% by weight of quarternary ammonium compound and from 0.05 to 5%, preferably 0.4 to 0.9% by weight of aromatic sulphonate hydrotrope, the weight ratio of the quaternary ammonium compound to the hydrotrope preferably being from 10:1 to 1:10.

The amount of hydrogen peroxide present in the composition should suitably be such as to give 0.1 to 10% preferably 3 to 6%, available oxygen. In order to stabilise the composition a suitable stabiliser should be provided and an example of such is that sold under the trade name "Mykon CIX" which is phosphonic acid [1,2-cyclohexane diylbis-(nitrilobis)methylene]-tetrakis-sodium salt. This is suitably present in the bleach composition in an amount of from 0.01 to 5%, preferably 0.05 to 0.2% by weight.

In order to maintain the composition at the desired pH, e.g. a pH of about 8.5, there should be present an alkali, typically sodium hydroxide, and an alkaline buffer such as sodium borate.

In order that the invention may be well understood the following Examples are given by way of example. In the Examples all percentages are by weight unless otherwise stated.

Examples

The following formulations were prepared and storage tested for 28 days at elevated temperatures. As controls, an acidic thin hydrogen peroxide bleach and an alkaline thin peroxide bleach were used. Cleaning tests were carried out comparing the thickened alkaline hydrogen peroxide bleach to thin, acidic and thin, alkaline

hydrogen peroxide bleaches.

5		A	B	C
	Soft Water	to 100.00	to 100.00	to 100.00
	35% Hydrogen peroxideto give 5% available oxygen.....		
	Sodium Borate.10H ₂ O	0.50	0.50	0.50
10	Mykon CIX	0.10	0.10	0.10
	Sodium hydroxideto give pH 8.5.....		
	Perfume	0.10	0.10	0.10
	Arquad 16-29 *	4.00	4.50	5.00
15	Eltesol 5 x 30	2.25	2.53	2.81

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*Arquad 16-29 = hexadecyltrimethylammonium chloride,
25 29% active.

**Eltesol SX30 = sodium xylene sulphonate, 30%
solution.

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Formulation A was compared to a thin acidic peroxide bleach and a thin alkaline peroxide bleach to determine stain removal. The following test was employed:

Ceramic tiles were prepared in the following manner:

35 A solution of 50 grams per litre of PG tea granules was prepared in tap water. The solution was heated to near boiling (98°C). This concentrated tea solution was used to prepare the stains.

Four inch square, white ceramic tiles were cleaned using soapy water and rinsed with distilled water and allowed to air dry. Prior to use, tiles were wiped over with acetone to remove any traces of grease.

40 5 cm³ of the hot tea solution was pipetted onto the centre of each tile and a clean, 200 cm³ glass beaker placed on the tile so as to create a "ring" mark. The tea stain was allowed to air dry for 4 hours at room temperature and then transferred to a 105°C oven. The tiles and beakers were baked at 105°C overnight to fix the stain onto the ceramic surface. The tiles and beakers were removed from the oven and allowed to cool. The beakers were then removed from the surface of the tile, leaving a baked on deposit of tea in the form of a ring.

45 Each tile was placed at a 45° angle to allow adequate drainage and rinsing of the tile. 20 cm³ of the neat product was poured across the top of the tile and allowed to run down and drain for a total of 30 seconds. Using a wash bottle, the tile was rinsed with distilled water to remove any dislodged stain and allowed to air dry.

50 Once dry, each tile was marked with a consecutive letter of the alphabet. A panel of a minimum of 10 people were asked to rate the tiles in terms of stain removal. The results were recorded and the average scores calculated.

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	Score
Thick Alkaline Peroxide Bleach	5
Thin Alkaline Peroxide Bleach	3.3
Thin Acidic Peroxide Bleach	2
Tap Water	1

The following storage data was obtained for the three formulations. A thin, acidic and thin alkaline formulation were tested for comparison. The results are after 28 days at 37°C:

D = Thin, alkaline peroxide bleach

E = Thin, acidic peroxide bleach

The following results were obtained for the tannin removal tests:

FORMULA REF	INITIAL VISCOSITY	FINAL VISCOSITY	INITIAL pH	FINAL pH	INITIAL AV OX	FINAL AV OX
A	190	230	8.7	8.2	4.94	4.75
B	293	315	8.6	8.0	5.09	4.77
C	360	395	8.7	7.8	5.10	4.29
D	THIN	THIN	8.6	8.2	5.05	4.56
E	THIN	THIN	n/a	n/a	6.06	5.65

Claims

1. A bleach composition comprising an aqueous alkaline solution of hydrogen peroxide containing, as thickening system, a mixture of a quarternary long chain ammonium compound together with a water-soluble salt of an aromatic sulphonic acid hydrotrope.
2. A composition as claimed in claim 1 containing sufficient hydrogen peroxide to give 0.1 to 10% available oxygen, and containing from 0.1 to 10% by weight of quarternary ammonium compound and from 0.05 to 5% by weight of aromatic sulphonate hydrotrope.