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(54) **Method of carpet cleaning.**

(57) The present invention relates to the use of stable aqueous compositions for the cleaning of carpets which comprise a source of active oxygen. Said composition has a pH of from 1 to 6.

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Technical Field

The present invention relates to the use of aqueous compositions for carpet cleaning.

Background of the Invention

Carpets produced from synthetic or natural fibres and mixtures thereof are commonly used in residential and commercial applications as a floor covering. Various types of fibres can be used in making carpets such as polyamide and wool.

However, carpets irrespective of whether they are made from natural or synthetic fibres are all prone to soiling and staining when contacted with many household items. Beverages in particular such as coffee, tea and soft drinks especially those containing acidic dyes can cause unsightly, often dark stains on carpets. In addition fibres may become soiled as a result of dirt particles, grease, oils, foods, pet stains and other solid materials which may be inorganic or organic coming into contact with and adhering to the fibres of the carpet.

Stains or soils are often not readily removed from the carpets, especially if not treated immediately after the spillage has occurred. Indeed, if the stain or soil has become dry the difficulty of removing the stain or soil effectively is significantly increased. As a result of soiling and staining the carpets become unsightly, often malodorous and unhygienic.

Carpets may often also be inhabited by microinsects such as house lice and mites. The presence of microinsects is considered unhygienic and thus it is desirable that such insects can be exterminated and removed from the carpet.

There are a number of carpet cleaning compositions described in the art for removing stains and soils. For example volatile solvent dry cleaning fluids. However, these compositions are not effective on water-soluble stains or soils. Aqueous compositions comprising synthetic detergents have also been described, but are also not satisfactory, especially on colour stains such as coffee, fruit juices and beverages.

Other aqueous compositions which have been disclosed in the art are compositions comprising hydrogen peroxide having an alkaline pH. However, these compositions are not stable. The pH must be adjusted just prior to use. This is inconvenient both to the manufacturer, who must supply the ingredients separately and the consumer, who must regulate the pH of the composition before applying it to the area to be treated.

The present invention is the use of a stable aqueous composition comprising hydrogen peroxide or sources thereof having an acidic pH for the cleaning of carpets.

An advantage of the present invention is that the composition is stable and does not require pH adjustment prior to use and can be stored for long periods of time prior to use.

A further advantage of the present invention is that it is applicable to all carpet types, especially delicate natural fibres and is also safe to all carpet dye types, particularly sensitive natural dyes used therein.

Another advantage of the present invention is that it may be applied directly on the carpet without causing damage to the carpet. In addition the cleaning action of the invention commences as soon as the carpet cleaner has been applied to the surface. The use of the carpet cleaner of the present invention does not necessarily require rubbing or rinsing or washing of the carpet.

Aqueous acidic hydrogen peroxide compositions are known in the art. However their use as carpet cleaner has not been previously disclosed.

EP 346 835 discloses an aqueous carpet cleaning composition for synthetic carpets comprising hydrogen peroxide, a water soluble alcohol at pH 7-12 and a method for removing soils from carpets using said composition.

US 3 607 760 discloses an aqueous carpet cleaning composition and the use thereof which comprises hydrocarbon ethers of ethylene glycol, hydrogen peroxide and EDTA. There is no disclosure of pH values.

Melliand Textüber. Int. 57(6), 473-5 discloses the oxidation of wool carpets with aqueous hydrogen peroxide to reduce electrostatic charge build-up. The compositions further comprise tetra sodium-diphosphate hydrate and are at pH 9.

Tenside, Surfactants, Detrg., 23(2), 80-4 discloses an aqueous carpet cleaning and bleaching composition for synthetic and natural fibre carpets comprising hydrogen peroxide and acetic acid or magnesium perphthalate. The article discloses the results of a test to determine the pH dependency of the bleaching effect. From this test it was concluded that the optimum pH value is from 9 to 10.

Summary of the Invention

The present invention is the use of a stable aqueous composition comprising a source of active oxygen having a pH of from 1 to 6 for the cleaning of carpets.

All amounts, percentages and ratios are given by weight of the total composition unless otherwise stated.

Detailed Description of the Invention

The present invention is the use of a stable acidic aqueous composition comprising a source of active oxygen.

The term stable as used herein refers to compositions which will not undergo any chemical or physical interactions, thus the compositions will remain constant and active even when stored for long periods of time. As a result the ingredients of the compositions according to the present invention do not require mixing just prior to said compositions' use or pH regulating. Thus, the amount of available oxygen in the composition during the products lifetime, which is typically 12 months, cannot be less than 85% of the amount of available oxygen present when the composition is formulated.

Thus according to the present invention an essential ingredient is a source of active oxygen. A preferred source according to the present invention is hydrogen peroxide or sources thereof. As used herein a hydrogen peroxide source refers to any compound which produces hydrogen peroxide when said compound is in contact with water. Suitable water-soluble sources of hydrogen peroxide for use herein include percarbonates, metal peroxides and perborates.

In addition other classes of peroxides can be used as an alternative to hydrogen peroxide and sources thereof or in combination with hydrogen peroxide and sources thereof. Suitable classes include dialkyl-peroxides, diacylperoxide preformed percarboxylic acids, persulphates and organic and inorganic peroxides.

Hydrogen peroxide or sources thereof provide from 0.1% to 15%, preferably from 0.5% to 10%, most preferably from 1% to 5% by weight of the total composition of active oxygen in said composition.

As used herein active oxygen concentration refers to the percentage concentration of elemental oxygen, with an oxidation number zero, that being reduced to water would be stoichiometrically equivalent to a given percentage concentration of a given peroxide compound, when the peroxide functionality of the peroxide compound is completely reduced to oxides. The active oxygen sources according to the present invention increase the ability of the compositions to remove coloured stains, to destroy malodourous molecules and to kill germs.

The concentration of available oxygen can be determined by methods known in the art, such as the iodimetric method, the permanganometric method and the cerimetric method. Said methods and the criteria for the choice of the appropriate method are described for example in "Hydrogen Peroxide", W. C. Schumo, C. N. Satterfield and R. L. Wentworth, Reinhold Publishing Corporation, New York, 1955 and "Organic Peroxides", Daniel Swern, Editor Wiley Int. Science, 1970.

Suitable organic and inorganic peroxides for use in the compositions according to the present invention include diacyl and dialkyl peroxides such as dibenzoyl peroxide, dilauroyl peroxide, dicumyl peroxide, persulphuric acid and mixtures thereof. The compositions according to the present invention comprise from 0% to 15%, preferably from 0.005% to 10% of said organic peroxides.

Suitable preformed peroxyacids for use in the compositions according to the present invention include diperoxydodecandioic acid DPDA, magnesium perphthalatic acid, perlauric acid, perbenzoic acid, diperoxyazelaic acid and mixtures thereof. The compositions according to the present invention comprise from 0% to 15%, preferably from 0.005% to 10% of said preformed peroxyacids.

Optionally, the compositions may additionally comprise from 0% to 30%, preferably from 2% to 20% of peracid precursors, i.e. compounds that upon reaction with hydrogen peroxide produce peroxyacids. Examples of peracid precursors suitable for use in the present invention can be found among the classes of anhydrides, amides, imides and esters such as acetyl triethyl citrate (ATC) described for instance in EP 91 87 0207, tetra acetyl ethylene diamine (TAED), succinic or maleic anhydrides. Preferably said peracid precursors can be used in an emulsion form as described in unpublished European Patent Application No.: 92870188.7.

The pH of the carpet cleaners as used according to the present invention is from 1 to 6. Therefore, a second essential component of the compositions according to the present invention is an acid. The acid is used to ensure that the pH of the composition is from pH 1 to 6, preferably between pH 2 and 6, more preferably between pH 2 and 5, most preferably between pH 3 and 4.5. In addition some acids can have the advantage that they can form small concentrations of the corresponding peracids by reaction with

hydrogen peroxide in-situ, thus enhancing the overall performance of the composition. These acids can be further selected so as to have chelating and/or building properties. The acids of the present invention that may be used for these purposes can be organic or inorganic acids, preferably organic acids such as citric, maleic, oxalic succinic, and tartaric acids.

According to the present invention the compositions may comprise a number of additional compounds such as surfactants, solvents, chelants and perfumes. The optional ingredients are selected so that they are compatible with hydrogen peroxide and sources thereof.

Surfactants suitable for use herein are well known in the art and include anionic, nonionic, zwitterionic and cationic surfactants and mixtures thereof. The surfactants suitable for use herein are compatible with hydrogen peroxide and sources thereof.

The anionic surfactants which may be used in the present invention include for example alkali metal salts of alkyl substituted benzene sulphonates, alkali metal alkyl sulphonates, alkali metal alkyl sulphates and alkali metal alkyl ether sulphates derived from for example fatty alcohols and alkyl phenols, alkali metal alkane sulphonates, alkali metal olefin sulphonates and alkali metal sulphosuccinates and alkyl succinates, whereby the sodium salts are preferred, alkyl carboxylates and alkyl ether carboxylates.

The nonionic surfactants which may be used include any liquid or solid ethoxylated C_6-C_{24} fatty alcohol nonionic surfactant, alkyl propoxylates and mixtures thereof, fatty acid C_6-C_{24} alkanolamides, C_6-C_{20} polyethylglycol ethers, polyethylene glycol with molecular weight 1000 to 80000 and C_6-C_{24} amine oxides, glucose amides, alkyl pyrrolidones, betaines.

Suitable cationic surfactants for use herein include quaternary ammonium compounds of the formula $R_1R_2R_3R_4N^+$ where R_1,R_2 and R_3 are methyl groups, and R_4 is a C_{12-15} alkyl group, or where R_1 is an ethyl or hydroxy ethyl group, R_2 and R_3 are methyl groups and R_4 is a C_{12-15} alkyl group.

Another optional ingredient are zwitterionic surfactants. Suitable zwitterionic surfactants include derivatives of aliphatic quaternary ammonium, phosphonium, and sulphonium compounds in which the aliphatic moiety can be straight or branched chain and wherein one of the aliphatic substituents contains from about 8 to about 24 carbon atoms and another substituent contains, at least, an anionic water-solubilizing group. Particularly preferred zwitterionic materials are the ethoxylated ammonium sulphonates and sulfates disclosed in U.S. Patents 3,925,262, Laughlin et al., issued December 9, 1975 and 3,929,678, Laughlin et al., issued December 30, 1975. The compositions according to the present invention contain from 0% to 20% of zwitterionic surfactants.

The composition according to the present invention comprise from 0.5% to 70%, preferably from 3% to 50% of said surfactants.

The compositions according to the present invention may further comprise a builder system. Any conventional builder system is suitable for use herein including polycarboxylates and fatty acids, materials such as ethylenediamine tetraacetate, metal ion sequestrants such as aminopolyphosphonates, particularly ethylenediamine tetramethylene phosphonic acid and diethylene triamine pentamethylenephosphonic acid. Though less preferred for obvious environmental reasons, phosphate builders can also be used herein.

Suitable polycarboxylates builders for use herein include citric acid, preferably in the form of a water-soluble salt, derivatives of succinic acid of the formula R__CH(COOH)CH_2(COOH) wherein R is C_{10-20} alkyl or alkenyl, preferably C_{12-16}, or wherein R can be substituted with hydroxyl, sulpho sulphoxyl or sulphone substituents. Specific examples include lauryl succinate, myristyl succinate, palmityl succinate, 2-dodecenylsuccinate, 2-tetradecenyl succinate. Succinate builders are preferably used in the form of their water-soluble salts, including sodium, potassium. ammonium and alkanolammonium salts.

Other suitable polycarboxylates are oxodisuccinates and mixtures of tartrate monosuccinic and tartrate disuccinic acid such as described in US 4,663,071.

Suitable fatty acid builders for use herein are saturated or unsaturated C_{10-18} fatty acids, as well as the corresponding soaps. Preferred saturated species have from 12 to 16 carbon atoms in the alkyl chain. The preferred unsaturated fatty acid is oleic acid.

A preferred builder system for use herein consists of a mixture of citric acid, fatty acids and succinic acid derivatives described herein above. The builder system according to the present invention preferably represents from 0% to 10%, preferably from 1% to 7% by weight of the total composition.

Another optional ingredient is a chelant system. The chelant system may improve the stability of the hydrogen peroxide in the formulation and improve the ability of the compositions to remove metal pigments from the stains and soils. Suitable chelants may be chosen from EDTA, NTA or preferably from biodegradable chelants such as s,s-ethylene diamino disuccinate and dipicolinic acid.

The compositions according to the present invention may also comprise perfumes, solvents, dyes, sud suppressing agents, enzymes, photobleaching and other minors. Solvents suitable for use herein may be selected from octyl alcohol, isopropyl alcohol, propyl alcohol and furfuryl alcohol. Dyes and perfumes are

selected from those which are compatible with sources of active oxygen. In particular dyes are used at low concentrations to prevent staining. The compositions according to the present invention may additionally comprise soil release polymers to delay soil build up and facilitate cleaning, antistatic agents to reduce static build up and sunscreening agents to protect the carpet or upholstery treated from ultrviolet radiation.

According to the present invention the method of using the cleaning compositions comprises the step of applying the area to be treated with the aqueous composition and allowing the composition to dry.

The composition may be applied directly onto the area to be treated or applied using a cloth or piece of material. In a preferred embodiment of the invention the composition is applied to the area to be treated by using a spraying device. Such a device may be trigger operated or pump operated. The latter is a particularly preferable embodiment if a large area is to be treated as it facilitates the ease of use for the consumer. The spray devices ensure uniform coverage of the area to be treated and maximizes the advantage of the using liquid compositions containing peroxides. This is because the application of product by spray best allows the product to be left to dry on the area treated, without rubbing or washing. This optimises the action time of the composition and allows the best exploitation of the bleaching action of peroxides.

The area to be treated using the composition according to the present invention may be any size. In addition a complete section or even a whole carpet may be applied with the composition according to the present invention. For such purposes a spray device with a pump to allow prolonged spraying is particularly useful.

The amount of the composition applied will depend on the severity of the stain or soil. In the case of stubborn stains more than one application may be required to ensure complete removal of the stain. The carpet cleaning compositions may also be used in order to deodourise the carpet and remove the dinginess of the carpet resulting from a diffused layer of soil which results from general wear.

According to the present invention the compositions may be used for manual carpet cleaning and commercial carpet cleaning machines. For carpet cleaning machines the compositions according to the present invention can be diluted according to the machine operating instructions. Furthermore, compositions to be used in such machines should be formulated to prevent high sudsing. Preferably the ratio of nonionic surfactant to other surfactants should be higher. More preferably such compositions comprise suds suppressing agents.

According to the present invention the compositions may be used for the removal of odours, stains and soils from carpets or upholstery. In addition the composition may be used to hygenise or disinfect carpets and exterminate microinsects from the carpet or upholstery.

Examples

The following compositions are made by combining the following ingredients in the listed proportions.

EXAMPLE 1	
Hydrogen peroxide	5.0
Sodium Dodecyl sulphate	1.5
Poly ethoxy propoxy alcohol (C_{13}-C_{15}, E04, P02)	2.0
BHT (di t-butyl hydroxy toluene	0.08
Perfume, dyes	0.2
Sulphuric acid	up to pH 4
Water	Balance

EXAMPLE 2	
Hydrogen peroxide	8.5
Ethoxylated alcohol (Dobanol^{R} 91-10)	1.5
Ethoxylated alcohol (Dobanol^{R} 23-3)	1.0
Citric acid	4.0
NaOH	up to pH 4
Perfume, dyes	0.2
Water	Balance

EXAMPLE 3	
Hydrogen peroxide	7.0
Ethoxylated alcohol (Dobanol^{R} 91-10)	9.0
Ethoxylated alcohol (Dobanol^{R} 23-2)	6.0
Acetyl triethyl citrate	5.0
Citric acid	up to pH 4
Perfume, dyes	0.2
Water	Balance

Examples 1 and 2 are preferably to be used for compositions for manual cleaning.

Example 3 is preferably to be used for compositions for carpet cleaning machines.

Example 3 is prepared by mixing together in two separate premixes all the water soluble ingredients on one side, and all the water insoluble ingredients on the other side, such that;

Premix 1 : Water, H_2O_2, Dob. 91-10, citric acid, dye.

Premix 2 : Dob. 23-2, Acetyl triethyl citrate, perfume.

Premix 1 is poured into premix 2 (or viceversa) and vigorously stirred until a stable emulsion is obtained, typically for 30 minutes to 1 hour.

Claims

1. The use of a stable aqueous composition comprising a source of active oxygen having a pH of from 1 to 6 for the cleaning of carpets.

2. The use of a stable aqueous composition according to claim 1, wherein the pH is from 2 to 5.

3. The use of a stable aqueous composition according to any of the preceding claims wherein the sources of active oxygen are hydrogen peroxide and sources thereof.

4. The use of a stable aqueous composition according to any of the preceding claims wherein said composition comprises from 0.1% to 15% of said active oxygen.

5. The use of a stable aqueous composition according to any of the preceding claims wherein the source of active oxygen is a mixture of peracid precursors and hydrogen peroxide.

6. The use of a stable aqueous composition according to any of the preceding claims wherein said composition further comprises a surfactant or mixtures thereof.

7. The use of a stable aqueous composition according to any of the preceding claims wherein said composition further comprises a chelant.

8. The use of a stable aqueous composition according to any of the preceding claims wherein said composition further comprises a solvent.

9. The use of a stable aqueous composition according to any of the preceding claims in carpet cleaning machines.

10. The use of a stable aqueous composition according to claims 1 to 6 in a spray device for the cleaning of carpets.

11. The use of a stable aqueous composition according to claim 8, wherein said spray device is pump operated.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 87 0161

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)
X	AU-D-17 266 (B. MEISTER HULSCH) * page 9, line 3 - line 6; claims 1,3 * * page 9, last paragraph - page 10, paragraph 3 *	1,3,4,6, 8	C11D3/39 C11D3/00
E	DATABASE WPI Week 9417, Derwent Publications Ltd., London, GB; AN 94-144704 & ZA-A-9 303 155 (EXPLOCHEM. WATER TREATMENT PTY.) 23 February 1994 * abstract *	1-3,9	
D,A	EP-A-0 346 835 (BASF)		
D,A	US-A-3 607 760 (E. M. MCINTYRE) * claims 1-7 *	1,3,4, 6-8	
A	WO-A-92 17634 (INTERFACE) * claims 1-4,6 *	1,3,5,6	TECHNICAL FIELDS SEARCHED (Int.Cl.5) C11D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 August 1994	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

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