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(54) **Hard surface cleaning compositions**

(57) The invention concerns liquid hard surface cleaning compositions comprising:

- a) a bleach system comprising a cationic nitrile and a peroxygen compound, and
- b) an anionic sulphate or sulphonate surfactant containing an alkyl group having no more than 15 carbon atoms,

and little or no surfactant, which interferes with the bleach system's capability to bleach mould stains. More

particularly they contain less than 0.1% of nonionic and/or cationic surfactant. The peroxygen compound is preferably hydrogen peroxide.

Usefully the compositions consist of at least two liquid partial compositions which are held separate from each other in a single container comprising at least two chambers.

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DescriptionField of the invention

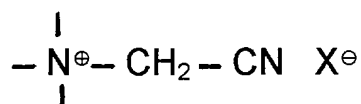
[0001] The invention relates to hard surface cleaning compositions comprising a peroxygen bleach compound and a cationic nitrile. The invention particularly relates to liquid hard surface cleaning compositions.

Background of the invention

[0002] In household and fabric cleaning and in other cleaning areas there is a need for agents which bleach unsightly stains on substrates such as surfaces or fabric, which help removing soil, remove mould stains and kill microorganisms. Common agents for this purpose are those which contain active chlorine, the most common being sodium hypochlorite, which is widely used in cleaning compositions.

[0003] A problem which is associated with hypochlorite is its unpleasant odour and, when accidentally mixed with an acidic product, the possibility that toxic amounts of chlorine gas are liberated. Therefore, alternative bleaching agents, particularly peroxygen compounds, such as peroxides and peracids and their salts, are gaining popularity. However, the bleaching power of peroxygen bleaching compounds as such generally falls short of that of hypochlorite and therefore they are often used in conjunction with oxygen transfer or bleach activator agents. Such agents generally operate by reacting with the peroxygen compound to form an oxidative bleaching species, which subsequently reacts with the substrate to be bleached, cleaned or disinfected.

[0004] Recently, various cationic nitriles, which contain the structural unit below, have been reported to be useful as bleach activator agents.



[0005] Typical examples of such compounds are disclosed in EP-A-0 303 520, EP-A-0 458 396 and EP-A-0 464 880 in which the organic groups attached to the positive nitrogen are alkyl groups. In WO 98/23532, WO 98/23533, WO96/40661 and EP-A-0 790 244 the positive nitrogen is part of a heterocyclic ring. In EP-A-0 897 974 the general formula comprises a large group of organic substituents on the positive nitrogen, but N-methylmorpholinium-acetonitrile methosulphate is the only compound actually disclosed.

[0006] These cationic nitriles have been disclosed to lead to good bleaching in combination with a peroxygen compound and particularly with hydrogen peroxide or precursors thereof. Without being bound by theory, the bleaching is believed to take place by a reactive peroxy species formed in situ by oxidation of the cationic nitrile by the peroxygen compound.

[0007] Although the cationic nitriles have been generally described as being useful in a large variety of cleaning products for laundry, hard surfaces, toilet bowl, machine dishwash and even dental applications, the practical examples described have so far been largely limited to application in laundry cleaning for most of them. Due to the general instability of these compounds at high pH, at which cleaning and bleaching results are expected to be best, the compounds have been described mostly for use in solid compositions or for separate addition to an alkaline wash liquor. The use in cleaning compositions packaged in dual compartment containers and the application thereof for hard surface cleaning has been mentioned for some heterocyclic cationic nitriles, particularly N-methyl-morpholinium-acetonitrile methosulphate (MMA) in WO 98/23533, WO 96/40661 and US 6,046,150. In the prior art mentioned above it is generally disclosed that the cationic nitriles can be combined with a large variety of anionic, nonionic, cationic, zwitterionic and amphoteric surfactants.

[0008] Bleach containing hard surface cleaning compositions are often used for bleaching black mould stains which regularly occur in enclosed spaces with a high humidity, such as bathrooms and shower cabins. In most cases black mould stains are caused by either of two species, i.e. *Aspergillus niger* or *Cladosporium cladosporoides*. The latter is most predominant and its stains are the most difficult ones to bleach. In US 6,046,150 combinations of MMA with hydrogen peroxide, have been described to be successful in bleaching *A. niger* stains when used in pure aqueous solution.

[0009] However, it was found that the ability to bleach black mould stains, particularly *Cl. cladosporoides* stains, strongly decreases in the presence of many surfactants. This severely hampers the application of cationic nitrile/peroxyoxygen bleach systems in many hard surface cleaning products since such products should be suitable for cleaning and removing a variety of soils and stains and therefore would also require the presence of a surfactant or combination of surfactants.

[0010] Thus, there is a need for hard surface cleaning compositions comprising a cationic nitrile/peroxygen compound bleach system as well as a surfactant, which compositions would be suitable for use against a variety of soils and stains, including black mould stains.

5 Brief description of the invention

[0011] It has now been found that certain sulphate and sulphonate anionic surfactants hardly influence the bleaching ability of cationic nitrile/peroxygen compound bleach systems.

[0012] It is therefore an object of the present invention to provide liquid hard surface cleaning compositions suitable for removing a variety of soils and stains including black mould stains. Therefore a hard surface composition is provided which comprise a cationic nitrile/peroxygen compound bleach system and an anionic sulphate or sulphonate surfactant containing an alkyl group having no more than 15 carbon atoms, and little or no surfactant which interferes with the bleaching capability of the bleach system

[0013] Furthermore, it is an object of the invention to provide a process for removing soil as well as black mould stains from hard surfaces, which process comprises treating the stained surface with a liquid cleaning composition comprising a cationic nitrile/peroxygen compound bleach system and an anionic sulphate or sulphonate surfactant containing an alkyl group having no more than 15 carbon atoms, and little or no surfactant which interferes with the bleaching capability of the bleach system.

20 Detailed description of the invention

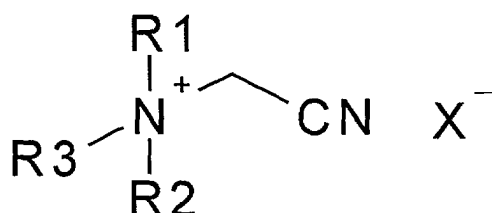
[0014] All amounts mentioned are in percent by weight based on the total composition unless specifically mentioned otherwise.

[0015] The invention concerns liquid hard surface cleaning compositions characterised in that they comprise:

- a) a bleach system comprising a cationic nitrile and a peroxygen compound, and
- b) an anionic sulphate or sulphonate surfactant containing an alkyl group having no more than 15 carbon atoms,

and which contains little or no surfactant, which interferes with the bleach system's capability to bleach mould stains.

[0016] The bleach system comprises a cationic nitrile of the type known in art to be useful as bleach activators. Particularly useful are the heterocyclic cationic nitriles described in WO 98/23533, WO 96/40661 and US 6,046,150, more specifically N-methylmorpholinium-acetonitrile salts. Another class of particularly suitable cationic nitriles is the group having the general formula:



wherein R_1 is an alkyl group of 3-10 carbon atoms, a phenyl-substituted alkyl group with a total of 7-12 carbon atoms, or a (alkyl-substituted) phenyl group of 6-10 carbon atoms, R_2 and R_3 are independently methyl or ethyl groups and X^\ominus is a counterion.

[0017] Preferably, if R_1 is an alkyl group it is linear and most preferably has 3-6 carbon atoms. If R_1 is a phenyl-substituted alkyl group it preferably has the structure $\text{R}_4 - \text{C}_6\text{H}_4 - (\text{CH}_2)_n -$ wherein R_4 is hydrogen, methyl or ethyl, most preferably hydrogen, and n is 1-4. Preferably R_2 and R_3 are methyl.

[0018] The concentration of cationic nitrile in the total, ready-to-use cleaning composition according to the invention is preferably between 1 and 200mmol/l, more preferably 2-100mmol/l, even more preferably 5-50mmol/l.

[0019] The peroxygen bleach compound may be any peroxide or peroxide generating system known in the art such as dihydrocarbon peroxides, diacyl peroxides, hydrocarbon hydroperoxides, organic and inorganic peracids and per-salts and in particular hydrogen peroxide.

[0020] Preferred peroxygen bleach compounds are hydrogen peroxide, peracetic acid, PAP and alkali metal or alkaline earth metal monoperoxosulphate salts. Hydrogen peroxide is particularly suitable. The amount of peroxygen compound in the total composition is preferably chosen such that the composition will contain 0.1-10% active oxygen,

more preferably 0.5-5%, most preferably 1-3%.

[0021] The molar ratio between peroxygen compound and cationic nitrile is preferably between 100:1 and 1:5, more preferably between 50:1 and 1:1, most preferably above 3:1, or even 10:1.

[0022] The cleaning compositions according to the invention comprise a sulphate or sulphonate anionic surfactant containing an alkyl group of at most 15 carbon atoms. Suitable surfactants are the alkali or alkaline earth metal or ammonium alkylbenzene sulphonates, alkyl sulphates and ethoxylated alkyl sulphates in which the alkyl group has at most 15 carbon atoms, more preferably at most 13 carbon atoms, most preferably 6-12 carbon atoms. The alkyl group may be linear (primary or secondary) or branched. The amount of sulphate or sulphonate anionic surfactant with alkyl $\leq C15$ is preferably 0.1-10% of the total composition, more preferably 0.2-5%, most preferably at most 2% or even 1%.

[0023] The sulphate/sulphonate anionic surfactant defined above is preferably at least 80% of the total surfactant content of the total composition, more preferably at least 90% or even 99%. Various surfactants have been found to interfere with the bleaching ability of cationic nitrile/peroxygen compound bleach systems. Therefore, the amount of such surfactants, if present at all, is preferably less than 0.1% of the composition, more preferably less than 0.05%, even more preferably they should be totally absent. Nonionic and cationic surfactants are particularly detrimental to the bleaching ability of cationic nitrile/peroxygen compound bleach systems.

[0024] Thus, a preferred composition according to the present invention is characterised in that it comprises:

- a) a bleach system comprising a cationic nitrile in a concentration of 1-200mmol/l and a peroxygen compound in an amount sufficient to provide 0.1-10% of active oxygen, and
- b) 0.1-10% of an anionic sulphate or sulphonate surfactant containing an alkyl group having no more than 15 carbon atoms,

and which contains less than 0.1% of nonionic and/or cationic surfactants.

[0025] The third essential component for a liquid cleaning composition according to the invention is a solvent for the surfactant and the bleach system. This solvent may be water or an organic solvent or a combination thereof. Preferably at least 50% of the total solvent is water, more preferably at least 70%. Preferred organic solvents, if present, are those, which are miscible with water in the amount used. Suitable solvents are those which are well known for use in hard surface cleaning and include e.g. C1-C6 aliphatic alcohols, ethylene and propylene mono- and diglycols and mixed ethylene/propylene glycols and the C1-C6 aliphatic monoethers thereof. Suitable examples of such solvents are diethylene glycol mono-butyl ether, monoethylene glycol mono-butyl ether, propylene glycol butyl ether, isopropanol, ethanol, butanol and mixtures thereof. Typically, the level of organic solvent in cleaning compositions is 1-10%, preferably 1-5%.

[0026] Compositions according to the invention are suitable for a wide variety of hard surfaces cleaning and bleaching purposes. They are particularly suitable for cleaning bathrooms and similar spaces where black mould stains may be a problem. For efficient cleaning the compositions preferably have a pH between 6 and 10, more preferably 7-9. For bathroom cleaning a pH between 7.5 and 8.5 is particularly suitable.

[0027] The compositions according to the invention preferably also contain a sequestering agent to bind transition metal ions, which could otherwise destabilise the peroxygen compound.

[0028] Suitable sequestering agents are e.g. ethylenediamine tetraacetate, amino-polyphosphonates (such as those in the DEQUEST™ range). Phosphates and a wide variety of other poly-functional organic acids and salts can also optionally be employed. Preferred sequestering agents are selected from dipicolinic acid, ethylenediamine tetra acetic acid (EDTA) and its salts, hydroxyethylidene diphosphonic acid (Dequest 2010), ethylenediamine tetra(methylene-phosphonic acid) (Dequest 2040), diethylene-triamine penta(methylene-phosphonic acid) (Dequest 2060) and their salts. Sequestering agents are generally used in an amount of 0.01-5%, preferably 0.01-2%.

[0029] Apart from sequestering agents particularly suitable for binding transition metal ions, as mentioned above, the cleaning compositions according to the invention may also usefully contain a sequestering agent suitable for binding Ca ions. Suitable sequestering agents for this purpose are well known in the art and include compounds such as: alkali metal tripolyphosphate, pyrophosphate and ortho-phosphate, sodium nitrilotriacetic acid salt, sodium methylglycine-diacetic acid salt, alkali metal citrate, carboxymethyl malonate, carboxymethyloxysuccinate, tartrate, mono- and di-succinate and oxydisuccinate. Ca sequestering agents are preferably used in an amount of 0.05-6% of the composition. For most sequestering agents an amount of up to 1% is suitable, more preferably up to 0.5%. The inorganic phosphate sequestering agents are suitably used in an amount of up to 6%.

[0030] For certain cleaning applications it is most useful if the composition contains a thickening system which will improve the composition's ability to cling to a non-horizontal surface, thus increasing the contact time of the composition with the soiled surface. Many thickening systems are known from the art of thickening hypochlorite bleach compositions. Such systems often consist of one or more detergent surfactants in combination with an electrolyte such as an inorganic salt. Examples of such thickening systems are described in EP-A-079697, EP-A-110544, EP-A-137551, EP-A-145084, EP-A-244611, EP-A-635568, WO95/08611, DE-A-19621048 and the literature cited therein.

[0031] Other suitable thickening systems comprise various polymeric substances such as natural and chemically modified polysaccharides and synthetic polymers such as those of (meth)acrylic acid or maleic acid or copolymers thereof with other monomers. Such synthetic polymers are e.g. sold under the trademarks: ACUSOL, CARBOPOL, POLYGEL, RHEOVIS, STRUCTURE and ALCOGUM.

[0032] Another way to improve cling of the final composition to a non-horizontal surface is to cause it to foam on dispensing through the addition of a foaming surfactant and the use of an appropriate dispensing device such as foaming trigger sprays known in the art.

[0033] Many peroxygen compounds have limited stability in strongly alkaline solutions and are therefore stored preferably at mildly alkaline, neutral or acid pH. Hydrogen peroxide is reasonably stable up to pH 10.

[0034] To improve long term stability of the cleaning compositions it may be advisable to keep various ingredients of the composition apart until the moment of use. Thus, it may be preferred to keep the cationic nitrile separate from the peroxygen compound and/or from a pH adjusting compound which is present in the total composition to adjust the pH of the end product to the desired value suitable for adequate cleaning. A suitable arrangement for this is to provide separate "partial" compositions which together contain all the required ingredients of the total composition and which are mixed just before use.

[0035] Accordingly, the invention also provides liquid cleaning compositions consisting of at least two liquid partial compositions which are held separate from each other in a single container comprising at least two chambers or reservoirs or compartments (hereinafter referred to as 'chambers') wherein at least one partial composition comprises a peroxygen compound, at least one partial composition comprises a cationic nitrile and at least one partial composition comprises a pH adjusting compound which on mixing of the partial compositions is able to set the pH of the final composition to a value between 6 and 10, preferably between 7 and 9. Each partial composition has a pH such that the components of that partial composition are adequately stable on storage. Preferably the partial composition containing the cationic nitrile has pH of at most 6, more preferably at most 5. Also, the cationic nitrile and the peroxygen compound are preferably not contained in the same partial composition.

[0036] The invention also provides liquid cleaning compositions obtained through mixing of the above mentioned liquid partial compositions. Furthermore, the invention provides a container comprising two or more chambers holding the liquid partial compositions.

[0037] For the purposes of this invention a 'partial composition' is defined as a solution of a component, or a mixture of more, but not all, components of the final composition, which solution is held in a separate chamber of the container containing the total composition. Two or more partial compositions together make up the final composition according to this aspect of the invention.

[0038] A container suitable for holding the hard surface cleaning compositions according to this aspect of the invention has at least as many separate chambers as the number of partial compositions making up the total composition. Such container may have one outer wall embracing all chambers which are separated from each other by partition walls inside the container or, alternatively, it may be made up of a plurality of separate containers, equivalent to the chambers, which are held together by some external means, such as a connecting part of the walls or a sleeve surrounding them, in such a way that they can be held and handled as one container. A dispensing system is provided in that each chamber is provided with an outlet opening through which the partial composition is dispensed. These outlet openings may all lead to a separate mixing chamber in which the dispensed amounts of the partial compositions mix just before being applied to the substrate through a dispensing opening in the mixing chamber. Alternatively, the outlet openings may all lead to the outside of the container in such a way that the dispensed amounts of the partial compositions are all applied simultaneously to the same area of the substrate so as to mix while being applied to the substrate or immediately after application onto the substrate. To this end the outlet openings will generally be positioned in close proximity to each other such that all partial compositions are poured, squirted or sprayed onto the same area of the substrate in one action. The outlet openings may be provided with a nozzle system designed to further improve the mixing of the partial components on leaving the container. Alternatively, the container may be provided with a multiple spray system able to either produce a single spray of a mixture of all the partial compositions or simultaneous sprays of each partial composition directed to the same area of a substrate whereafter the partial compositions mix on the substrate.

[0039] For practical reasons, such as ease of construction and handling, the container preferably comprises no more than two chambers each holding a partial composition which compositions together make up the final composition. This implies that for the same reasons the compositions according to this aspect of the invention are preferably made up of two partial compositions. Additionally the container may comprise a mixing chamber as outlined above.

[0040] The amounts of the partial compositions making up the final composition need not necessarily all be equal as long as care is taken that the concentration of each component in each of the partial compositions is chosen such that on mixing of the envisaged amounts of the partial compositions the right concentration of each component is present in the final composition. The volume of each chamber of the container is adapted to the amount of the partial composition contained in that chamber which is required to make up the total amount of the final composition. The

total liquid volume of the final composition to be obtained from the container in general will be determined by the total volume of the container, excluding the volume of the mixing chamber, if present.

[0041] The dispensing or outlet openings or other dispensing means of the various chambers in the container are dimensioned such that one single dispensing action dispenses the right amounts of all partial compositions necessary to properly make up the final in which each component is present in the required concentration. The dispensing or spray system may be so dimensioned that the final composition is dispensed as a foam.

[0042] Although there is no theoretical limitation as to the size and shape of the containers, for practical purposes, such as ease of handling and dispensing, the containers will generally have a total volume of 0.1 - 2 litres, preferably at least 0.25 l, but preferably not more than 1.5 l. Also for practical purposes two-chamber containers preferably have chambers of about equal volume, holding about equal amounts of each of the two partial compositions.

[0043] Other minor components may be present in the compositions according to the invention, such as hydrotropes, antimicrobially active compounds or components to improve their consumer appeal such as perfumes and dyes. Many other optional components customary in the art of cleaning compositions may be present as well.

[0044] The compositions according to the invention give excellent cleaning on a variety of soils, such as common kitchen soils. They are able to bleach the well-known stains of black mould often occurring in damp spaces and are therefore very suitable for bathroom cleaners. Furthermore, at pH 6.5 or above the cationic nitriles according to the invention effectively boost the antimicrobial properties of peroxides, particularly hydrogen peroxide, thus giving the compositions according to the invention improved hygienic properties. For this purpose a peroxide/nitile ratio of between 2:1 and 1:5 is preferred. The combination is active against gram-negative as well as gram-positive bacteria.

[0045] The process of removing soil as well as black mould stains, according to the invention, comprises the step of applying a cleaning composition as described above to the surface to be cleaned. Preferably the cleaning compositions are freshly prepared just before being applied to the surface. A conveniently procedure for this comprises the application of the composition from a multi-chamber container as described above.

[0046] The compositions may be applied to the surface in any convenient way. They are preferably applied directly to the surface, such as by spraying, pouring or any similar operation, but they may also first be applied to a cleaning implement, such as a wipe, cloth or towel, whereafter the surface is cleaned with the implement.

Examples

Testing of cleaning compositions on mould stain removal

[0047] Compositions comprising the N-methylmorpholinium-acetonitrile methosulphate (MMA)/hydrogen peroxide bleach system and various surfactants were tested on their ability to bleach black mould. The hydrogen peroxide solutions were all freshly prepared just before testing so as to mimic compositions obtained by mixing appropriate partial compositions on dispensing. In order to obtain reproducible results an autoclaved mould paste was used for the testing.

[0048] Cultures of hyphal *Aspergillus niger* and *Cladosporium cladosporoides* were prepared on agar jelly. Warm water was used to dissolve the jelly and separate it from the mould hyphae, which were then autoclaved. A little distilled water was added to the hyphae which were crushed to a 'paste' using a pestle and mortar. The 'paste' consists of a mixture of fine particles of hyphal cell wall together with a dark black mould ink. Once prepared the mould paste can be stored for several weeks at 5°C.

[0049] A small amount of the 'mould paste' was applied to the surface of large porous ceramic tiles and a small amount of distilled water added. This mixture was evenly spread across and rubbed into the surface of the tiles using a flexible plastic spatula. The final appearance of the soiled tiles was a uniform dark grey. The tiles were left to dry overnight in the dark and then the large tiles were cut into smaller test pieces using a standard 'tile cutter'.

[0050] A fixed quantity of the test solution was allowed to drop onto the surface and allowed to soak into the tile. The test solution was allowed to remain in contact with the soil for a fixed contact time, i.e. 3 minutes or 20 minutes at ambient temperature, after which the test pieces were immersed in 1.0M sodium thiosulphate solution for 10 minutes (to quench the reaction and prevent further bleaching). The test pieces were then immersed in distilled water for 10 minutes before rinsing with further distilled water and air-drying.

[0051] Test pieces were assessed for the level of mould bleaching by an expert panel, using an integer scale running from 0 (no decolorisation) to 6 (complete bleaching). Panel test data for each system was collated and analysed statistically to provide mean scores for each test system. Each test (bleaching) system was tested using at least 3 replicate tiles.

[0052] Within each test run bleach system/surfactant combinations were compared with the same bleach system without the surfactant. Because of small variations in the application of the mould to the tiles results may only be compared within each test run.

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Test Run 1

[0053] The aqueous compositions A-F were tested on *A. niger* and *C. cladosporoides*. The composition contents and the bleach scores are set out in table 1 below. The pH of the compositions was adjusted to 8.0 using NaOH.

Table 1

Compositions	A	B	C	D	E	F
H ₂ O ₂	3%	3%	3%	3%	3%	3%
MMA	0.5%	0.5%	0.5%	1.0%	1.0%	1.0%
Admox 10 *	-	1.0%	-	-	1.0%	-
Sodium octyl sulphate	-	-	0.5%	-	-	0.5%
Sodium tripolyphosphate	-	4.0%	3.0%	-	4.0%	3.0%
n-Butyl propylene glycol ether	-	2.0%	0.5%	-	2.0%	0.5%
Dequest 2047**		0.02%	0.02%		0.02%	0.02%
Bleach score for <i>A. niger</i> (95% Confidence)	5.3 (0.2)	3.4 (0.4)	5.0 (0.2)	5.4 (0.2)	3.7 (0.3)	4.8 (0.3)
Bleach score for <i>C. clad.</i> (95% Confidence)	4.3 (0.2)	1.0 (0.1)	2.9 (0.2)	4.5 (0.3)	2.7 (0.3)	3.3 (0.3)

* decyl-dimethylamine oxide

** TM (Monsanto) for ethylenediamine-tetra(methylenephosphonic acid sodium salt)

[0054] As can be seen from the bleach scores, the compositions containing amineoxide surfactant scored worse than the compositions containing octyl sulphate in bleaching both molds. It is also clear from the results that *C. cladosporoides* is most difficult to bleach and compositions containing amine oxide hardly give an acceptable bleach result on this mould.

Test Run 2

[0055] The aqueous compositions G-L containing 0.5% or 1% MMA were tested on *C. cladosporoides*. The composition contents and the bleach scores are set out in tables 2A and 2B below. The pH of the compositions was adjusted to 8.0.

Table 2A

Compositions	G	H	I	J	K
H ₂ O ₂	3%	3%	3%	3%	3%
MMA	0.5%	0.5%	0.5%	0.5%	0.5%
Admox 10	-	1.0%	-	-	-
Sodium octyl sulphate	-	-	1.0%	-	-
Dodecyl trimethyl ammonium chloride	-	-	-	1.0%	-
Neodol 91-8	-	-	-	-	1.0%
Bleach score (95% Confidence)	4.3 (0.2)	2.3 (0.4)	4.3 (0.2)	0.5 (0.1)	0.8 (0.1)

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Table 2B

Compositions	L	M	N	O	P
H ₂ O ₂	3%	3%	3%	3%	3%
MMA	1.0%	1.0%	1.0%	1.0%	1.0%
Admox 10	-	1.0%	-	-	-
Sodium octyl sulphate	-	-	1.0%	-	-
Dodecyl trimethyl ammonium chloride	-	-	-	1.0%	-
Neodol 91-8*	-	-	-	-	1.0%
Bleach score (95% Confidence)	4.5 (0.3)	2.7 (0.2)	4.1 (0.3)	0.9 (0.2)	1.5 (0.3)

* C9-C11 ethoxylated alcohol (8EO)

[0056] Again it can be seen from the bleach scores that the compositions containing amine oxide or ethoxylated alcohol nonionic surfactants or the cationic surfactant scored significantly worse than the compositions containing octyl sulphate in bleaching *C. cladosporoides*.

Test Run 3.

[0057] The aqueous compositions Q-U were tested on *C. cladosporoides*. The composition contents and the bleach scores are set out in table 3 below. The pH of the compositions was adjusted to 8.0.

Table 3

Compositions	Q	R	S	T	U
H ₂ O ₂	3%	3%	3%	3%	3%
MMA	1.0%	1.0%	1.0%	1.0%	1.0%
Admox 10	-	1.0%	-	-	-
Sodium dodecyl sulphate	-	-	1.0%	-	-
Sodium lauryl(ethoxy) _n sulphate*				1.0%	
Sodium dodecylbenzene sulphonate					1.0%
Bleach score (95% Confidence)	4.5 (0.3)	2.7 (0.2)	3.4 (0.4)	3.0 (0.3)	4.4 (0.2)

* n = 1-4 (mixture)

[0058] As can be seen from the bleach scores the composition containing the amine oxide surfactant has inferior bleaching properties compared to the sulphate and sulphonate surfactants.

Claims

1. Liquid hard surface cleaning compositions **characterised in that** they comprise:

- a bleach system comprising a cationic nitrile and a peroxygen compound, and
- an anionic sulphate or sulphonate surfactant containing an alkyl group having no more than 15 carbon atoms,

and which contains little or no surfactant, which interferes with the bleach system's capability to bleach mould stains.

2. Compositions according to claim 1 **characterised in that** the cationic nitrile concentration is 1-200mmol/l and the amount of active oxygen is 0.1-10%.
3. Compositions according to claims 1 and 2 **characterised in that** the peroxygen compound is hydrogen peroxide.
4. Compositions according to claims 1-3 **characterized in that** the anionic surfactant is chosen from alkali or alkaline earth metal or ammonium alkylbenzene sulphonates, alkyl sulphates and ethoxylated alkyl sulphates.
5. Compositions according to claims 1-4 **characterized in that** the amount of sulphate or sulphonate anionic surfactant with alkyl \leq C15 is 0.1-10% of the total composition
6. Compositions according to claims 1-5 **characterised in that** they contain less than 0.1% of nonionic and/or cationic surfactants.
7. Compositions according to claims 1-6 **characterised in that** the solvent of the composition consists for at least 50% of water.
8. Compositions according to claims 7 **characterised in that** they comprise 1-10% of an organic solvent chosen from C1-C6 aliphatic alcohols, ethylene and propylene mono- and diglycols and mixed ethylene/propylene glycols and the C1-C6 aliphatic monoethers thereof.
9. Compositions according to claims 1-8 **characterised in that** they contain a sequestering agent for Ca ions.
10. Compositions according to claims 1-9 **characterized in that** they have pH between 6 and 10.
11. Hard surface cleaning compositions according to claim 10 consisting of at least two liquid partial compositions which are held separate from each other in a single container comprising at least two chambers wherein at least one partial composition comprises the peroxygen compound, at least one partial composition comprises the cationic nitrile and at least one partial composition comprises a pH adjusting compound which on mixing of the partial compositions is able to set the pH of the final composition to a value between 6 and 10.
12. Process for removing soil as well as black mould stains from hard surfaces comprising the step of applying to the surface a cleaning composition according to any one of claims 1-11.
13. Process according to claim 12 wherein the liquid composition is freshly prepared just before being applied to the surface.



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 01 30 3808

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		27 September 2001	Neys, P
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

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