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(54) Acidic disinfecting and cleaning compositions having improved cleaning performance

(57) The invention relates to an acidic disinfecting and cleaning composition which comprises one or more selected quaternary ammonium salts, one or more selected alcohol alkoxylates, one or more alcohols and one or more hydroxycarboxylic acids. By exact selection of the constituents, a composition is provided which can be formulated as concentrate and, as dilute aqueous ready-to-use solution, has a good cleaning performance in combination with good microbicidal activity.

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Description

[0001] The invention relates to acidic disinfecting and cleaning compositions for hard surfaces, in particular for apparatuses and working surfaces in the food industry and in the hospital sector. The invention further relates to the use of the compositions for removing fatty and calcareous fouling and for controlling listeriae and salmonellae.

[0002] Acidic disinfecting and cleaning compositions for apparatuses and working surfaces in the food industry and in the hospital sector are known. For example, there is a commercial product based on benzalconium chloride, phenoxypropanols and glyoxylic acid which exhibits good microbiological activity, but only a satisfactory cleaning capacity. Furthermore, there is on the market, inter alia, a product based on malic acid which exhibits good cleaning capacity, but only satisfactory microbiological activity. A good acidic disinfecting and cleaning composition, however, must:

- have a very good disinfecting action and a high cleaning performance and be able to be washed off readily,
- also remove calcareous or fatty impurities or residues and blood,
- be bactericidal, fungicidal and virucidal, in particular also towards salmonellae and listeriae,
- be active even at low temperatures (for example about 10°C) and in highly polluted areas, and
- leave no to virtually no residue behind after use and after washing with water.

[0003] WO 00/63337 describes an aqueous acidic cleaning and disinfecting composition in the form of a ready-to-use solution for hard surfaces that comprises one or more non-ionic surface-active substances, one or more quaternary ammonium compounds having germicidal properties, one or more water-soluble organic acids and water. However, no disinfecting composition and cleaning composition concentrates are disclosed. Furthermore, it relates particularly to the cleaning of toilet surfaces, which concerns neither the removal of fatty fouling, nor the activity against listeriae and salmonellae. In addition, in the examples, the aggressive volatile pungent formic acid which is corrosive via the gas phase and nonylphenolethoxylate which is poorly biodegradable are used which are no longer recommended for use owing to an undertaking by the industry.

[0004] It was an object of the present invention to provide an acidic composition which, as diluted ready-to-use solution, exhibits good cleaning activity and good disinfecting activity, may be formulated as a concentrate and, moreover, corresponds to the abovementioned requirements.

[0005] It has now surprisingly been found that this object is achieved by an acidic disinfecting and cleaning composition in the form of a concentrate which comprises

a) 1 to 50% by weight of one or more quaternary ammonium salts of the formula $[R^1R^2R^3(CH_3)N]^+[X]^-$, where R^1 to R^3 can be identical or different and are selected from the group consisting of C_1 to C_{30} alkyl, C_1 to C_{30} alkenyl and mixed groups which can have one or more atoms selected from O, S, N and P,

b) 0.5 to 30% by weight of one or more alcohols,

c) 0.5 to 15% by weight of one or more C_9 to C_{13} alcohol alkoxylates and

d) 1 to 30% by weight of one or more organic acids.

Quaternary ammonium salt

[0006] Inventively used quaternary ammonium salts are described by the formula $[R^1R^2R^3(CH_3)N]+[X]^-$, where R^1 to R^3 can be identical or different and are selected from the group consisting of C_1 to C_{30} alkyl, C_1 to C_{30} alkenyl and mixed groups which can have one or more atoms selected from O, S, N and P, where R^1 to R^3 are, for example, C_8 to C_{14} alkyl or methyl, preferably C_9 to C_{12} alkyl or methyl, such as C_{10} alkyl or methyl. X is an anion (of an inorganic or organic acid). Not only anion but also cation of the quaternary ammonium salt can be polyvalent ions, which gives a stoichiometry $[A^{\langle n+\rangle}]_m[K^{(m+\rangle}]_n$.

[0007] Quaternary ammonium salts preferably used according to the invention are compounds of the formulae $[R^1N(CH_3)_3]^+[X]^-$, $[R^1R^2N(CH_3)_2]^+[X]^-$ and $[R^1R^2R^3(CH_3)N]^+[X]^-$, where R^1 to R^3 independently of one another are selected from C_8 to C_{14} alkyl and $-(CH_2-CHR^4O)_n-R^5$, where n is a number from 1 to 20, preferably 1 to 5, and R^4 and R^5, which can be identical or different, are H and/or C_1 to C_4 alkyl, preferably H.

[0008] Suitable quaternary ammonium salts are, according to the invention, all quaternary ammonium salts of the

abovementioned formula which are known in the prior art as are disclosed, for example, in WO 00/63337, which is incorporated here by reference. Preferably, however, dialkyldimethylammonium salts are used, for example dialkyldimethylammonium chlorides, the alkyl chains of which independently of one another are selected from C_8 to C_{14} alkyl, preferably C_9 to C_{12} alkyl, such as C_{10} alkyl. In the dialkyldimethylammonium salts, one of the methyl groups can be an alkoxylated, for example ethoxylated, hydromethyl group, for example a dialkyl(poly)(oxyethyl)methyl)methylammonium salt having 1 to 5 EO groups, the alkyl groups of which are decyl groups and in which propionate is present as anion, which is obtainable from Lonza as Bardap® 26.

[0009] Exemplary anions and classes of anions of the inventively used quaternary ammonium salts are hydroxide, sulphate, hydrogen sulphate, methosulphate, ethosulphate, lauryl sulphate, lauryl ether sulphate, cellulose sulphate, sulphamate, halide (fluoride, chloride, bromide, iodide), nitrite, nitrate, carbonate, hydrogen carbonate, phosphate, alkyl phosphate, metaphosphate, polyphosphate, thiocyanate (rhodanide), carboxylic acid salt such as benzoate, lactate, acetate, propionate, citrate, succinate, glutarate, adipate, toluenesulphonate (tosylate) and salicylate. Particularly preferred anions are chloride and propionate.

[0010] Examples of preferred quaternary ammonium salts are the abovementioned didecylmethylpoly(oxyethyl)ammonium propionate and didecyldimethylammonium chloride. A particularly preferred quaternary ammonium compound is didecyldimethylammonium chloride which is available from Lonza as an approximately 40% strength aqueous solution as BARDAC® 2240. Commercial products can also be used which comprise the quaternary ammonium compound dissolved in a small amount of alcohol, such as BARDAC® 2250 having about 50% by weight of didecyldimethylammonium chloride and about 10% by weight of ethanol in aqueous solution, or BARDAC® 22 having about 50% by weight of didecyldimethylammonium chloride and 19.5 to 24.5% by weight of isopropanol in aqueous solution. This makes it possible to introduce the quaternary ammonium salt together with the alcohol into the inventive acidic disinfecting and cleaning composition. In a preferred embodiment, the alcohol content of the inventive composition is set (increased) however to the preferred weight ratio mentioned hereinafter of quaternary ammonium salt to alcohol by additional addition of alcohol.

[0011] In a preferred embodiment, the inventive composition comprises in the form of a concentrate 2 to 30% by weight, preferably 5 to 25% by weight, in particular 10 to 20% by weight, for instance 15% by weight, of the quaternary ammonium salt (or of the two, three, four etc. quaternary ammonium salts). The amount of quaternary ammonium salt here is recorded according to the invention as quaternary ammonium chloride.

[0012] Preferred compositions are free from benzalkonium compound (such as benzalkonium chloride). In a preferred embodiment, the invention relates to an acidic disinfecting and cleaning composition which, as quaternary ammonium salt, comprises dialkyldimethylammonium salt (such as dialkyldimethylammonium chloride, in particular didecyldimethylammonium chloride) and which is free from benzalkonium chloride. Preference is also given to compositions which, in addition to didecyldimethylammonium chloride (didecyl-dimonium chloride), comprise no further quaternary ammonium salt.

[0013] It has surprisingly been found that benzalkonium chloride, in the system quaternary ammonium compound/acid, is significantly weaker with respect to the cleaning performance towards fatty dirt than the quaternary ammonium salts used according to the invention, correspondingly, the required amount of quaternary ammonium compound which is necessary to remove fatty dirt, is less when the composition is free from benzalkonium compound (in particular benzalkonium chloride) and, as quaternary ammonium compound, only comprises the abovementioned quaternary ammonium salts.

C_9 to C_{13} alcohol alkoxylate

[0014] The inventively used C_9 to C_{13} alcohol alkoxylates (alkylalcohol alkoxylates) are nonionic surfactants and ensure that the mixture of quaternary ammonium salt with organic acid as concentrate is a homogeneous, liquid and clear mixture and, furthermore, the ready-to-use solutions are stabilized. In principle, the C_9 to C_{13} alcohol alkoxylates can be used which are disclosed in the abovementioned WO 00/63337 which is herewith incorporated by reference. Preferred alcohol alkoxylates are alcohol ethoxylates having 5 to 13 EO units, preferably C_{10} to C_{13} alcohol ethoxylates having 5 to 12 EO units, such as 7 to 12 EO units. Particular preference is given to isotridecanol-12EO (for example Marlipal® 013/120) and isodecanol-7EO (for example Lutensol® ON 70).

[0015] Generally, a good cleaning performance is known of alcohol alkoxylates as nonionic surfactants. It was therefore surprising that the cleaning performance in the system quat/organic acid is inhibited by a comparatively high amount of alcohol alkoxylate, as is shown in the examples. It has further surprisingly been found that the alcohol alkoxylates, when they are present in the system in a large amount, impair the disinfecting action of the dilute ready-to-use solution.

[0016] By the choice of an inventive concentration range, disinfecting activity and cleaning performance and also concentrate stability and stability of the ready-to-use solution (homogeneity, clarity) are ensured. The alcohol alkoxylate is (or the two, three, four etc. alcohol alkoxylates are) used in the concentrate, preferably in an amount of 0.75 to 10% by weight, more preferably 1 to 8% by weight, in particular 1.5 to 5% by weight, for instance 2.5% by weight. In a preferred

embodiment, the amount of alcohol alkoxylate in the concentrate is restricted, however, to < 7.5% by weight, preferably < 6% by weight, more preferably < 5% by weight.

Alcohol

[0017] Inventive compositions comprise one or more alcohols selected from ethanol, isopropanol, n-propanol, phenoxyethanol, phenoxypropanols and benzyl alcohol and mixtures thereof. Preferably, isopropanol is used as alcohol. The alcohol content of the composition supports the colour stability of the compositions when they are stored over a relatively long period in the form of a concentrate. In the dilute ready-to-use solution, the alcohol contributes (or the two, three, four etc. alcohols contribute) significantly to the cleaning performance.

[0018] The amount of the alcohol, or of the two, three, four etc. alcohols, used is preferably in the range from 1 to 25% by weight, more preferably 2 to 20% by weight, in particular 3 to 15% by weight, such as 5 to 10% by weight, for example 6 to 9% by weight. In a preferred embodiment the ratio of quaternary ammonium salt to alcohol is 5:1 or less, such as 5:1.1 or less, for example 5:1.2 to 1:2, preferably 5:1.5 to 1:1, for instance 2:1.

Hydroxycarboxylic acid

[0019] Preferred hydroxycarboxylic acids are selected from citric acid, lactic acid, malic acid and glycolic acid, citric acid being particularly preferred. The hydroxycarboxylic acid content ensures good lime dissolution behaviour. The amount of hydroxycarboxylic acid (for example citric acid), or of the two, three, four etc. hydroxycarboxylic acids, is preferably 2 to 25% by weight, more preferably 5 to 20% by weight, in particular 7 to 15% by weight, such as 8 to 10% by weight, for example about 9% by weight.

[0020] The inventive composition is preferably aldehyde-free, free of phenol and/or phenol derivatives and/or free from active oxygen compounds such as hydrogen peroxide. Inventive compositions can, furthermore, comprise one or more functional additives, for example buffers, cleaning intensifiers, solvents, hydrotropes, corrosion inhibitors, complexing agents, odour absorbers, stabilizers, foam inhibitors, care components, pH adjusters, perfumes and colorants. An inventive composition, however, need not be formulated with perfume and/or colorant, and is therefore preferably free from perfume and/or colorant.

[0021] A particularly preferred composition in the form of a concentrate is characterized in that it comprises

a) 10 to 20% by weight of dialkyldimethylammonium salt, such as didecyldimethylammonium dichloride,

b) 1.5 to 5% by weight of C_{10} to C_{13} isoalkylalcohol ethoxylate having 7 to 12 EO units,

c) 5 to 10% by weight of isopropanol and

d) 8 to 10% by weight of citric acid.

[0022] Furthermore the invention relates to an acidic disinfecting and cleaning composition in the form of an aqueous ready-to-use solution which comprises 0.1 to 10% by volume, preferably 0.25 to 5% by volume, for instance 2.5% by volume, of the abovementioned concentrate.

[0023] The invention further relates to the use of the concentrate or of the aqueous ready-to-use solution for removing fatty and calcareous fouling and blood, in particular from apparatuses and working surfaces in the food industry and in the hospital sector. Furthermore, the invention relates to the use of the concentrate or of the aqueous ready-to-use solution for controlling bacteria and fungi, in particular salmonellae and listeriae.

[0024] The inventive concentrates have the following advantages:

- The concentrates have a comparatively low content of quaternary ammonium compound as active compound compared with benzalkonium chloride-containing compositions which comprise additional active compounds. Therefore, the total active compound content of the (dilute) aqueous ready-to-use solution is lower for the same feed concentration of the concentrate, which results in cost and environmental advantages, while the bactericidal activity of the inventive concentration is retained and the fungicidal activity is even improved.

- Their bactericidal and fungicidal activity, for the same feed concentration of the concentrate in a ready-to-use solution, is not impaired compared with previously known concentrates comprising benzalkonium chloride.

- They can be formulated with a comparatively lower amount of nonionic surfactant (alcohol alkoxylate) to form clear solutions, while simultaneously an excellent cleaning performance using the aqueous ready-to-use solution is still

maintained.

- They exhibit good storage stability, in particular good colour stability.

[0025] These advantages are also achieved in the dilute aqueous ready-to-use solution.

Examples

[0026] Percentages, where not stated otherwise, are given in per cent by weight.

Method A Determination of cleaning activity using different test fouling

[0027] The method serves for determining the static and dynamic cleaning performance of solutions towards various types of test fouling. The method is especially suitable for evaluating the cleaning performance of cleaners and disinfectants. A microscope slide provided with the fouling is then held for a certain time in the possibly stirred solution.

1. Test fouling:

1.1 Beef blood:

[0028] Defibrinated beef blood obtainable from Fiebig-Nährstoff-technik. Amount about 10 mg per microscope slide.

1.2 Beef tallow:

[0029] 50 g of beef tallow are stained with 0.5 g of Fettrot, the beef tallow is melted before application. Amount about 25 mg per microscope slide.

1.3 Lard:

[0030] 50 g of lard are stained with 0.02 g of Fettrot. The lard is melted before application. Amount about 50 mg per microscope slide.

1.4 Egg yolk (on the basis of DIN 44990, part 2):

[0031] To provide 100 ml of egg yolk test fouling, about 15 eggs are warmed for 30 minutes in warm water at 20°C, and placed in boiling water for 4.5 minutes, then cooled for 5 minutes in warm water at 20°C, opened, and the still-liquid egg yolk is removed. The egg yolk is stored in the refrigerator in a screw-top glass. Amount about 50 mg per microscope slide.

1.5 Semolina paste:

[0032] To prepare 100 ml of semolina paste test fouling, 10 g of skimmed milk powder, 5 g of sugar, 4 g of butter and 4 g of hard wheat semolina are required. The skimmed milk powder is stirred into 100 ml of tap water. After dissolution of the milk powder, the sugar and the butter are added and the mixture is brought to boiling in the waterbath. The semolina is stirred into the boiling liquid and heated with occasional stirring for 20 minutes in the boiling waterbath. The semolina paste test fouling is stored in a refrigerator in a screw-topped glass. Amount about 20 mg per microscope slide.

2. Procedure:

[0033] Glass microscope slides (76 x 26 mm) are labelled by engraving or using a pencil for later identification. The microscope slides are successively washed with acetone, petroleum ether and petroleum ether again, and thereafter weighed.

[0034] The cleaned microscope slides are placed next to one another on a tray covered with a cellulose cloth. A 10 mm wide bristle brush is dipped into the test fouling and lightly wiped off on the vessel rim. A uniform test fouling layer is then applied with a rapid motion from top to bottom. A rim of at least 5 mm should remain free on all sides. After an initial drying time of about 1 hour at room temperature, the microscope slide is placed in a storage box. The open box is kept overnight in a desiccator over silica gel for complete drying of the sample bodies. Thereafter the microscope slides with the dried test fouling layer are weighed once more.

2.1 Static cleaning test

[0035] Glass beakers (100 ml, high type) are carefully filled with about 100 ml of the test solution, during which the surface of the solution should remain foam-free. The microscope slides are carefully placed into the solution using tweezers, with the test fouling layer upwards. After the end of the test time, the microscope slides are carefully removed from the solution by the tweezers and rinsed in demineralized water by careful immersion and tilting. The microscope slides are then dried in air vertically upright and after drying for about 1 hour are placed in the storage box. The open storage box is kept overnight in the desiccator over silica gel for drying. Thereafter, the third weighing follows. It is advisable to perform duplicate determination.

2.2 Dynamic cleaning test

[0036] Glass beakers (250 ml, high type) are filled with about 200 ml of the test solution, provided with a magnetic stirrer bar (diameter 30 mm) and positioned on a magnetic stirrer so that the course of stirring is centred. The microscope slides, held by a test tube chamber, are immersed in the solution. The magnetic stirrer is then started (about 430 rpm). After the end of the test period, the microscope slides are removed from the solution and rinsed in demineralized water by careful dipping and tilting. The microscope slides are then dried in air vertically upright and, after drying for 1 hour, placed in the storage box. For further drying, the open storage box is kept overnight over silica gel in the desiccator. Thereafter the third weighing follows. It is advisable to carry out the procedure in duplicate.

[0037] The cleaning performance is evaluated by reporting the percentage by weight of test fouling removed. The type of test fouling, testing time and testing temperature must be reported.

Method B: Test of a pink stain

[0038] The disinfecting and cleaning composition is measured as concentrate immediately after preparation in a spectrophotometer at a wavelength of 493 nm against demineralized water as blank. Care must be taken to ensure that no air bubbles are situated in the cuvettes. Rectangular cuvettes having a path length of 50 mm are used. Extinction is measured again after 72 hours, in which case the extinction measured after preparation and after 72 hours must not be higher than 0.030.

Method C: Fungicidal and bactericidal activity of the compositions

[0039] The fungicidal and bactericidal activity is tested as specified by DIN EN 1650 (1997), DIN EN 1276 (1997) and DIN EN 13697 (2001).

Method D: Activity against *Listeria monocytogenes*

[0040] The bactericidal activity with protein load was tested on the basis of the "Richtlinien für die Prüfung chemischer Desinfektionsmittel (Methoden zur Prüfung von Desinfektionsmitteln gegen Bakterien und Pilze in Bereichen des Herstellens, Inverkehrbringens und Behandelns von Tieren stammender Lebensmittel)" [Guidelines for testing chemical disinfectants (Methods for testing disinfectants against bacteria and fungi in the fields of production, putting into commerce and treating foods of animal origin] of the Deutsche Veterinärmedizinsche Gesellschaft, 3rd edition, 2000. The test microorganism used was ATCC 35152, and nutrient media used were (1) caseine-soyabean meal peptone-agar + 1% glucose + 1% defibrinated sheep's blood, (2) Brain-Heart-Infusion (difco 237400) and (3) Brain-Heart-Infusion Columbia-blood-agar (Bd 4007708). To dilute the test preparation for the control test, use was made of water of standardized hardness which had been boiled briefly before each use. All tests were carried out at 20 $\pm$ 1°C. The protein load was achieved by 10% sterile beef serum inactivated at 65°C in 30 minutes, from UNIPATH GmbH, Wesel. The bactericidal activity was determined in a quantitative suspension test in 10% beef serum as organic load. The inactivation medium used was 3% Tween 80 + 3.0% saponin + 0.1% histidine + 0.1% cysteine in Brain-Heart-Infusion (TSHC).

Method E: Activity against *Salmonella choleraesuis*

[0041] The test is performed as specified in DIN EN 1276 (1997) (ATCC 43974).

Formulations used

[0042] The following concentrates I to VII were studied (data in % by weight):

	I	II	III	IV	V	VI	VII
Didecyldimethylammonium chloride	15	15	15	15	15	15	
C_{10}-alcohol-7EO	5		5				5
C_{12}-alcohol-3EO			20				
C_{13}-alcohol-12EO		2.5		2.5	7.5	10	
Isopropanol	25	7.5	25				
Phenoxypropanols							5
Citric acid monohydrate	10	10	10	10	10	10	
Benzalkonium chloride							15
Glyoxylic acid							15
Demineralized water	45	65	25	72.5	67.5	65	60

Example 1: Cleaning performance

[0043] In a cleaning test under the conditions below:

- Test fouling: lard,
- Method: dynamic cleaning test at room temperature,
- 2.5% by volume of the concentrate in water

the following results were obtained:

Composition I	93%,
Composition II	76%,
Composition III	47%,
Composition IV	38%,
Composition V, VI	0%.

[0044] These results verify the advantageous cleaning performance with the use of inventive concentrates the constituents of which are matched to one another exactly. Whereas the inventive concentrate I exhibits a very good cleaning performance, the cleaning ability when the comparison concentrate III is used (having an excessive content of alcohol alkoxylate) is markedly poorer. The better cleaning performance of the concentrate I is also demonstrated when compared with the non-inventive concentrates IV to VI. This is a verification of the fact that, in addition to the presence of components a) to d) in the inventive composition, their respective amounts are also of importance.

Example 2: Bactericidal and fungicidal activity of concentrate II

2.1 Activity against *Listeria monocytogenes* (Method D):

[0045] The inventive concentrate II is fully active against *Listeria monocytogenes* (ATCC 35152) (reduction in microbial count by more than 4 log steps) at a test temperature of 20°C as 0.25% by volume ready-to-use solution for an exposure time of 2 minutes.

2.2 Activity against *Salmonella choleraesuis* (Method E):

[0046] The inventive concentrate II, as 0.125% by volume solution in dilution with hard water, has sufficient bactericidal activity against the bacterial strain *Salmonella choleraesuis* ATCC 43947 after 1 minute at high (3.0 g/l beef albumin) and low (0.3 g/l beef albumin) load.

2.3 Fungicidal and bactericidal activity

[0047]

High load = 3.0 g/l of beef albumin,
Low load = 0.3 g/l of beef albumin,
Fungicidal activity = activity against C. albicans and A. niger,
Bactericidal activity = activity against P. aeruginosa, E. coli, S. aureus and E. hirae.

Test	Result
EN 1650 (1997), high load, 20°C - 1.0% by volume - 1.5% by volume	Fungicidal activity in 60 min 30 min
EN 1650 (1997), high load, 10°C - 1.5% by volume - 2.5% by volume	Fungicidal activity in 60 min 30 min
EN 1276 (1997), high load, 20°C - 1.0% by volume - 1.5% by volume	Bactericidal activity in 60 min 30 min
EN 1650 (1997), high load, 10°C - 1.5% by volume - 2.5% by volume	Bactericidal activity in 60 min 30 min
EN 13697 (2001), low load, 20°C - 0.5% by volume	Bactericidal activity in 30 min
EN 13697 (2001), low load, 20°C - 0.5% by volume	Fungicidal activity in 30 min
EN 13697 (2001), low load, 10°C - 1.0% by volume - 1.5% by volume	Bactericidal activity in 30 min 60 min
EN 13697 (2001), low load, 10°C - 1.0% by volume - 1.5% by volume	Fungicidal activity in 60 min 30 min
EN 13697 (2001), high load, 10°C - 1.5% by volume - 2.5% by volume	Fungicidal activity in 60 min 30 min
EN 13697 (2001), high load, 20°C - 1.0% by volume - 1.5% by volume	Bactericidal activity in 30 min 60 min
EN 13697 (2001), high load, 10°C - 1.5% by volume - 2.5% by volume	Bactericidal activity in 30 min 60 min
EN 13697 (2001), high load, 20°C - 1.0% by volume - 1.5% by volume	Fungicidal activity in 60 min 30 min
EN 1276 (1997), low load, 20°C - 0.5% by volume	Bactericidal activity in 30 min
EN 1650 (1997), low load, 10°C - 1.0% by volume - 1.5% by volume	Fungicidal activity in 60 min 30 min

Table continued

Test	Result
EN 1650 (1997), low load, 20°C - 0.5% by volume	Fungicidal activity in 30 min
EN 1276 (1997), low load, 10°C - 1.0% by volume - 1.5% by volume	Bactericidal activity in 60 min 30 min

Example 3: Bactericidal and fungicidal activity of comparative concentrate VII

[0048] Comparative concentrate VII comprises a higher total concentration of active compound (in total 30% by weight of benzalkonium chloride and glyoxylic acid), compared with the inventive concentrate II (15% by weight of didecyldimethylammonium chloride). It was therefore surprising that the fungicidal activity of the comparative concentrate VII, despite a higher total concentration of active compound, is poorer than that of the inventive concentrate II. The bactericidal activity of comparative concentrate VII was, for the same feed amount, equal to the bactericidal activity of the inventive concentrate II.

Claims

1. Acidic disinfecting and cleaning composition in the form of a concentrate which comprises

a) 1 to 50% by weight of one or more quaternary ammonium salts of the formula $[R^1R^2R^3(CH_3)N]^+[X]^-$, where R^1 to R^3 can be identical or different and are selected from the group consisting of C_1 to C_{30} alkyl, C_1 to C_{30} alkenyl and mixed groups which can have one or more atoms selected from O, S, N and P,
b) 0.5 to 15% by weight of one or more C_9 to C_{13} alcohol alkoxylates,
c) 0.5 to 30% by weight of one or more alcohols and
d) 1 to 30% by weight of one or more hydroxycarboxylic acids.

2. Concentrate according to Claim 1, **characterized in that** the quaternary ammonium salt is selected from salts of the formulae $[R^1N(CH_3)_3]^+[X]^-$, $[R^1R^2N(CH_3)_2]^+[X]^-$ and $[R^1R^2R^3(CH_3)N]^+[X]^-$, where R^1 to R^3 independently of one another are selected from C_8 to C_{14} alkyl and $-(CH_2-CHR^4O)_n-R^5$, where n is a number from 1 to 20, preferably 1 to 5, and R^4 and R^5, which can be identical or different, are H and/or C_1 to C_4 alkyl, such as didecyldimethylammonium chloride.

3. Concentrate according to Claim 1 or 2, **characterized in that** the alcohol alkoxylate is alcohol ethoxylate having 5 to 13 EO units, preferably C_{10} to C_{13} alcohol ethoxylate having 5 to 12 EO units.

4. Concentrate according to one of the preceding claims, **characterized in that** the alcohol is selected from ethanol, isopropanol, n-propanol, phenoxyethanol, phenoxypropanols and benzyl alcohol, preferably isopropanol.

5. Concentrate according to one of the preceding claims, **characterized in that** the hydroxycarboxylic acid is selected from citric acid, lactic acid, malic acid and glycolic acid, citric acid being preferred.

6. Concentrate according to one of the preceding claims, **characterized in that** it is free from aldehyde, phenol or phenol derivative and/or active oxygen compound.

7. Concentrate according to one of the preceding claims, **characterized in that** it is free from benzalkonium compound (such as benzalkonium salt).

8. Concentrate according to one of the preceding claims, **characterized in that** it comprises

a) 10 to 20% by weight of dialkyldimethylammonium salt, such as didecyldimethylammonium dichloride,
b) 1.5 to 5% by weight of C_{10} to C_{13} isoalkylalcohol ethoxylate having 7 to 12 EO units,
c) 5 to 10% by weight of isopropanol and

d) 8 to 10% by weight of citric acid.

9. Concentrate according to one of the preceding claims, **characterized in that** it is free from perfume and/or colorant.

10. Concentrate according to one of the preceding claims, **characterized in that** it comprises didecyldimethylammonium chloride as sole quaternary ammonium compound.

11. Concentrate according to one of the preceding claims, **characterized in that** it comprises, in addition, one or more functional additives selected from perfumes, colorants, buffers, cleaning intensifiers, solvents, hydrotropes, corrosion inhibitors, complexing agents, odour absorbers, stabilizers, foam inhibitors, care components and pH adjusters.

12. Acidic disinfecting and cleaning composition in the form of an aqueous ready-to-use solution which comprises 0.5 to 10% by volume, preferably 1 to 5% by volume, for instance 2.5% by volume of the concentrate according to one of Claims 1 to 10.

13. Use of the concentrate according to one of Claims 1 to 11, or the aqueous ready-to-use solution according to Claim 12, for removing fatty and calcareous fouling and blood.

14. Use of the concentrate according to one of Claims 1 to 11 or the aqueous ready-to-use solution according to Claim 12 for controlling bacteria and fungi, in particular salmonellae and listeriae.

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EUROPEAN SEARCH REPORT

Application Number
EP 05 10 7188

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

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