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(54) Abstract Title

# Hard surface cleaning and disinfecting compositions

(57) Provided are aqueous hard surface cleaning and disinfecting compositions which comprise the following constituents: (a) at least one cationic surfactant having germicidal properties; and (b) a fluorosurfactant selected from the group of nonionic fluorosurfactant, cationic fluorosurfactant, and mixtures thereof.

Optionally, the compositions may further include (c) one or more detersive surfactants particularly selected from carboxylate surfactants, as well as nonionic, cationic, amphoteric surfactants, and mixtures thereof; (d) one or more organic solvents; (e) one or more alkanolamines; and further conventional additives.

GB 2 340 504 A

# HARD SURFACE CLEANING AND DISINFECTING COMPOSITIONS

The present invention generally relates to hard surface treatment compositions which impart a cleaning and sanitizing effect, as well as processes for their use.

Cleaning compositions are commercially important products and enjoy a wide field of utility in assisting in the removal of dirt and grime from surfaces, especially those characterized as useful with "hard surfaces". Hard surfaces are those which are frequently encountered in lavatories such as lavatory fixtures such as toilets, shower stalls, bathtubs, bidets, sinks, etc., as well as in kitchen and food preparation facilities, such as countertops, cabinet and appliance surfaces, as well as walls, floors, etc.

The prior art has suggested many aqueous compositions which are directed to provide a cleaning or disinfecting benefit to such hard surfaces. Certain of the provide both effective cleaning and disinfection of a treated surfaces. These compositions predominantly are aqueous preparations which include one or more detersive surfactants, one or more organic solvents and in minor amounts, conventional additives included enhance the attractiveness of the product, typically fragrances and coloring agents.

While these known-art compositions may provide advantages, there is a continuing need in the art for such hard surface treatment compositions which include reduced amounts of active constituents, and which minimize or eliminate the amounts of organic solvents which need be present in such compositions.

It is yet a further object of the invention to provide a readily pourable and readily pumpable cleaning composition which features the benefits described above.

It is a further object of the invention to provide a process for cleaning or sanitization of hard surfaces, which process comprises the step of: providing the composition as outlined above, and applying an effective amount to a hard surface requiring such treatment.

These and other objects of the invention shall be more apparent from a reading of the specification and of the claims attached.

According to a first aspect of the invention there is provided a hard surface cleaning and disinfecting composition which comprises (preferably, consisting essentially of) the following constituents:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of nonionic fluorosurfactants, cationic fluorosurfactants and mixtures thereof;

(c) optionally, one or more detersive surfactants particularly selected from carboxylate surfactants, nonionic, cationic and amphoteric surfactants and mixtures thereof;

(d) optionally, one or more organic solvents;

(e) optionally, one or more alkanolamines;

(f) a major proportion of water.

The compositions described above may further include: (g) one or more further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers, colorants, hydrotropes, germicides, fungicides, anti-oxidants, anti-corrosion agents, and the like.

Preferred compositions according to the invention are largely aqueous, and are readily pourable and pumpable when packaged from a manually operable pump, such as a 'trigger spray' dispenser. The preferred compositions of the invention feature good cleaning, disinfection of hard surfaces and little or not buildup of residue on treated hard surfaces.

According to a second aspect of the invention, there is provided a hard surface cleaning and disinfecting composition which comprises (preferably, consisting essentially of) the following constituents:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of carboxylate surfactants, as well as nonionic fluorosurfactants, cationic fluorosurfactants and mixtures thereof;

(c) one or more detersive surfactants particularly selected from nonionic, cationic and amphoteric surfactants and mixtures thereof;

(f) a major proportion of water;

characterized in that the composition is essentially free of (d) one or more organic solvents, such as water soluble alcohols, ethers, and glycol ethers, and further is essentially free of (e) one or more alkanolamines. These compositions may include (g) one or more further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers, colorants, hydrotropes, germicides, fungicides, anti-oxidants, anti-corrosion agents, and the like.

According to a third aspect of the invention, there is provided a hard surface cleaning and disinfecting composition which comprises (preferably, consisting essentially of) the following constituents:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of nonionic fluorosurfactants, cationic fluorosurfactants and mixtures thereof;

(d) one or more organic solvents;

(f) a major proportion of water.

characterized in that the composition is essentially free of (c) one or more detersive surfactants particularly selected from carboxylate surfactants, nonionic, cationic and amphoteric surfactants as well as being essentially free of (e) one or more alkanolamines. The compositions may optionally include (g) one or more further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers, colorants, hydrotropes, germicides, fungicides, anti-oxidants, anti-corrosion agents, and the like.

In accordance with a fourth aspect of the invention there is provided a hard surface cleaning and disinfecting composition which comprises (preferably, consisting essentially of) the following constituents:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of nonionic fluorosurfactants, cationic fluorosurfactants and mixtures thereof;

(f) a major proportion of water;

wherein the compositions are essentially free of (c) detersive surfactants, particularly carboxylate surfactants, as well as nonionic, cationic and amphoteric surfactants, of (d) organic solvents, as well as being essentially free of (e) one or more alkanolamines. These compositions may optionally include (g) one or more

further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers, colorants, hydrotropes, germicides, fungicides, anti-oxidants, anti-corrosion agents, and the like.

In accordance with a fifth aspect of the invention there is provided a hard surface cleaning and disinfecting composition which comprises (preferably, consisting essentially of) the following constituents:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of nonionic fluorosurfactants, cationic fluorosurfactants and mixtures thereof;

(d) one or more organic solvents;

(e) an alkanolamine;

(f) a major proportion of water;

wherein the compositions are essentially free of (c) detersive surfactants, particularly carboxylate surfactants, as well as nonionic, cationic and amphoteric surfactants. These compositions may optionally include (g) one or more further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers, colorants, hydrotropes, germicides, fungicides, anti-oxidants, anti-corrosion agents, and the like.

A sixth aspect of the present invention provides for a hard surface cleaning and disinfecting composition which comprises (preferably, consisting essentially of) the following constituents:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of nonionic fluorosurfactant, cationic fluorosurfactant, and mixtures thereof;

(c) one or more detersive surfactants particularly selected from carboxylate surfactants, as well as nonionic, cationic, amphoteric surfactants, and mixtures thereof;

(e) an alkanolamine;

(f) a major portion of water;

characterized in that the compositions are essentially free of (d) one or more organic solvents.

The compositions described above may further include: (g) one or more further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers. colorants. hydrotropes, viscosity modifying agents, further germicides, fungicides, anti-oxidants, anti-corrosion agents, and the like.

A seventh aspect of the present invention provides for a hard surface cleaning and disinfecting composition which comprises (preferably, consisting essentially of) the following constituents:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of nonionic fluorosurfactant, cationic fluorosurfactant, and mixtures thereof;

(c) one or more detersive surfactants particularly selected from carboxylate surfactants, as well as nonionic, cationic, amphoteric surfactants, and mixtures thereof;

(d) one or more organic solvents; and

(f) a major portion of water;

characterized in that the compositions are essentially free of (e) alkanolamines.

The compositions described above may further include: (g) one or more further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers. colorants, hydrotropes, viscosity modifying agents, further germicides, fungicides, anti-oxidants, anti-corrosion agents, and the like.

In accordance with an eighth aspect of the invention there is provided a hard surface cleaning and disinfecting composition which comprises (preferably, consisting essentially of) the following constituents:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of nonionic fluorosurfactants, cationic fluorosurfactants and mixtures thereof;

(e) an alkanolamine;

(f) a major proportion of water;

wherein the compositions are essentially free of (c) detersive surfactants, particularly carboxylate surfactants, nonionic, cationic and amphoteric surfactants, as well as being essentially free of (d) one or more organic solvents. These compositions may

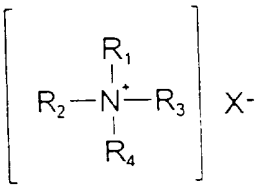
optionally include (g) one or more further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers, colorants, hydrotropes, germicides, fungicides, anti-oxidants, anti-corrosion agents, and the like.

The aqueous compositions taught herein provide surprisingly good cleaning and disinfection of hard surfaces merely with the inclusion of the preferred germicidal constituents and the fluorosurfactant constituents. These excellent results are surprisingly obtained without the inclusion of certain further constituents as described in the second, third, fourth, fifth, sixth and seventh aspects of the invention discussed previously. It is particularly surprising that excellent cleaning and disinfecting results are obtained with the various aspects of the invention.

The inventive compositions necessarily include (a) at least one cationic surfactant having germicidal properties.

Particularly preferred for use as the (a) at least one cationic surfactant having germicidal properties are those which provide a broad antibacterial or sanitizing function. Any cationic surfactant which satisfies these requirements may be used and are considered to be within the scope of the present invention. and mixtures of two or more cationic surface active agents, *viz.*, cationic surfactants may also be used. Cationic surfactants are well known. and useful cationic surfactants may be one or more of those known to the art.

Examples of preferred cationic surfactant compositions useful in the practice of the instant invention are those which provide a germicidal effect to the concentrate compositions, and especially preferred, are quaternary ammonium compounds and salts thereof, which may be characterized by the general structural formula:

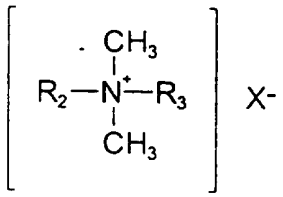


where at least one of $R_1$, $R_2$, $R_3$ and $R_4$ is a alkyl, aryl or alkylaryl substituent of from 6 to 26 carbon atoms, and the entire cation portion of the molecule has a molecular weight of at least 165. The alkyl substituents may be long-chain alkyl, long-chain alkoxyaryl, long-chain alkylaryl, halogen-substituted long-chain alkylaryl, long-chain alkylphenoxyalkyl, arylalkyl, etc. The remaining substituents on the nitrogen atoms

other than the abovementioned alkyl substituents are hydrocarbons usually containing no more than 12 carbon atoms. The substituents $R_1$, $R_2$, $R_3$ and $R_4$ may be straight-chained or may be branched, but are preferably straight-chained, and may include one or more amide, ether or ester linkages. The counterion X may be any salt-forming anion which permits water solubility of the quaternary ammonium complex.

Exemplary quaternary ammonium salts within the above description include the alkyl ammonium halides such as cetyl trimethyl ammonium bromide, alkyl aryl ammonium halides such as octadecyl dimethyl benzyl ammonium bromide, N-alkyl pyridinium halides such as N-cetyl pyridinium bromide, and the like. Other suitable types of quaternary ammonium salts include those in which the molecule contains either amide, ether or ester linkages such as octyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride, N-(laurylcocoaminoformylmethyl)-pyridinium chloride, and the like. Other very effective types of quaternary ammonium compounds which are useful as germicides include those in which the hydrophobic radical is characterized by a substituted aromatic nucleus as in the case of lauryloxyphenyltrimethyl ammonium chloride, cetylaminophenyltrimethyl ammonium methosulfate, dodecylphenyltrimethyl ammonium methosulfate, dodecylbenzyltrimethyl ammonium chloride, chlorinated dodecylbenzyltrimethyl ammonium chloride, and the like.

Preferred quaternary ammonium compounds which act as germicides and which are be found useful in the practice of the present invention include those which have the structural formula:



wherein $R_2$ and $R_3$ are the same or different $C_8$-$C_{12}$alkyl, or $R_2$ is $C_{12-16}$alkyl, $C_{8-18}$alkylethoxy, $C_{8-18}$alkylphenoxyethoxy and $R_3$ is benzyl, and X is a halide, for example chloride, bromide or iodide, or is a methosulfate anion. The alkyl groups recited in $R_2$ and $R_3$ may be straight-chained or branched, but are preferably substantially linear.

Particularly useful quaternary germicides include commercially available preparations which include a single quaternary compound, as well as mixtures of two or more different quaternary compounds. Particularly useful quaternary germicides include those which are presently commercially available under the tradenames BARDAC®, BARQUAT®, BTC®, LONZABAC®, ONYXIDE® and HYAMINE® such as are presently marketed by Stepan Co. (Chicago, IL) or Lonza Inc. (Basle, CH). Exemplary useful commercial preparations containing such quaternary compounds are more fully described in the literature, for example, in *McCutcheons's Functional Materials* (Vol.2) North American Edition, 1998 and in the respective product literature from the supplies identified herein. These commercial preparations are predominantly based on aqueous or aqueous/alcohol mixtures which function as carriers for the active constituents. By way of non-limiting example useful commercial preparations include: BARDAC® 205M (50% active) and BARDAC® 208M (80% active) are described as being a liquid preparation containing alkyl dimethyl benzyl ammonium chloride, octyl decyl dimethyl ammonium chloride, didecyl dimethyl ammonium chloride and dioctyl dimethyl ammonium chloride; BARDAC® 2050 (50% active) and BARDAC® 2080M described to be a combination of octyl decyl dimethyl ammonium chloride, didecyl dimethyl ammonium chloride, and dioctyl dimethyl ammonium chloride; BARDAC® 2250 (50% active) described to be didecyl dimethyl ammonium chloride; BARQUAT® MB-50, BARQUAT® MX-50 and BARQUAT® OJ-50 each a liquid preparation (50% actives) described to be an alkyl dimethyl benzyl ammonium chloride; BARQUAT® MB-80 or BARQUAT®MX-80 each a liquid preparation (80% actives) each of which is described to be an alkyl dimethyl benzyl ammonium chloride; BARDAC® 4250, BARQUAT® 4250Z (each 50% actives) or BARQUAT® 4280, BARQUAT® 4280Z (each 80% actives) each of which is described as being alkyl dimethyl benzyl ammonium chloride/alkyl dimethyl ethyl benzyl ammonium chloride. Also useful is HYAMINE® 1622 described to be a liquid preparation diisobutyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride (available either as 100% actives or a 50% actives solution); HYAMINE® 3500 (50% active) and HYAMINE® 3500-80 (80% active) each described as being alkyl dimethyl benzyl ammonium chloride. Further useful are BTC® 50 NF or BTC® 65 NF each

described as a liquid preparation containing alkyl dimethyl benzyl ammonium chloride (50% active); BTC® 776 described as alkyl dimethyl benzyl ammonium chloride/dialkyl methyl benzyl ammonium chloride (50% active); BTC® 818 (50% active) as well as BTC® 818-80 (80% actives) each described to be octyl decyl dimethyl ammonium chloride, didecyl dimethyl ammonium chloride and dioctyl dimethyl ammonium chloride; BTC® 824 and BTC® 835 each described as being alkyl dimethyl benzyl ammonium chloride (50% actives); BTC® 885 (50% actives) and BTC® 888 (80% actives) each described as being alkyl dimethyl benzyl ammonium chloride, octyl decyl dimethyl ammonium chloride, didecyl dimethyl ammonium chloride and dioctyl dimethyl ammonium chloride; BTC® 1010 (50% active) as well as BTC® 1010-80 (80% active) each described to be didecyl dimethyl ammonium chloride; BTC® 2125 (50% active) and BTC® 2125M (50% active), and BTC® 2125-80 (80% active) each described to be alkyl dimethyl benzyl ammonium chloride and alkyl dimethyl ethylbenzyl ammonium chloride; BTC® 2565 (50% active) and BTC® 2568 (80% active) each described to be alkyl dimethyl benzyl ammonium chlorides; BTC® 8248 (80% active), BTC® 8358 (80% active) or BTC® 8249 (90% active) each described to be alkyl dimethyl benzyl ammonium chloride, as well as ONYXIDE® 3300 (95% active) described to be an n-alkyldimethyl benzyl ammonium saccharinate.

The germicidal constituent may be present in any effective amount, but generally need not be present in amounts in excess of about 10%wt. based on the total weight of the composition. The preferred germicidal cationic surfactant(s) may be present in the concentrated liquid disinfectant compositions in amounts of from about 0.001 % by weight to up to about 10% by weight. preferably about 0.01-8% by weight, most preferably in amount of between 0.5-6 % by weight. It is particularly advantageous that the preferred germicidal cationic surfactant(s) are present in amounts of at least 200 parts per million (ppm), preferably in amounts of 200 - 700 ppm, more preferably in amounts of from 250 - 500 ppm.

The inventive compositions necessarily include (b) at least a fluorosurfactant selected from the group of nonionic fluorosurfactant, cationic fluorosurfactant, and mixtures thereof which compounds are soluble or miscible in the aqueous compositions being taught herein, particularly compositions which do not include

further detersive surfactants, or compositions which do not include further organic solvents, or compositions where both further detersive surfactants and further organic solvents are absent.

Particularly useful nonionic fluorosurfactant compounds are found among the materials presently commercially marketed under the tradename Fluorad® (ex. 3M Corp.)

Especially useful nonionic fluorosurfactant compounds include those which are believed to conform to the following structural formula:

$$C_nF2_{n+1}SO_2N(C_2H_5)(CH_2CH_2O)_xCH_3$$

wherein: n has a value of from 1-12, preferably from 4-12, most preferably 8;

x has a value of from 4-18, preferably from 4-10, most preferably 7;

which is described to be a nonionic fluorinated alkyl alkoxylate and which is sold as Fluorad® FC-171 (ex. 3M Corp., formerly Minnesota Mining and Manufacturing Co.). Further useful nonionic fluorosurfactant compounds are certain materials marketed under the tradename ZONYL® (ex. DuPont Corp.) Particularly useful examples include ZONYL® FSO and ZONYL® FSN each of which is believed to be represented by the following structural formula:

$$F(CF_2CF_2)_yCH_2CH_2O(CH_2CH_2O)_xH$$

wherein for ZONYL® FSO;

x has a value of from 0 to about 15. and

y has a value of from 1 to about 7,

wherein for ZONYL® FSN;

x has a value of from 0 to about 25. and

y has a value of from 1 to about 9.

An example of a useful cationic fluorosurfactant compound is one according to the following structural formula:

$$C_nF_{2n+1}SO_2NHC_3H_6N^+(CH_3)_3I^-$$

where n~8.

This cationic fluorosurfactant is available under the tradename Fluorad® FC-135 (ex. 3M Corp.)

A further example of a useful cationic fluorosurfactant is one according to the following structural formula:

$$F_3\text{-}(CF_2)_n\text{-}(CH_2)_mSCH_2CHOH\text{-}CH_2\text{-}N^+R_1R_2R_3Cl^-$$

where:

n is 5-9;

m is 2; and,

$R_1$, $R_2$ and $R_3$ are $-CH_3$. This cationic fluorosurfactant is available under the tradename ZONYL® FSD (available from DuPont, and is described as 2-hydroxy-3-((gamma-omega-perfluoro-$C_{6-20}$-alkyl)thio)-N,N,N-trimethyl-1-propyl ammonium chloride).

Other cationic fluorosurfactants suitable for use in the present invention are also described in EP 866 115. as well as in US _____ the contents of which are incorporated by reference.

The amount of fluorosurfactant present in the inventive formulations range in amounts of from about 0.001 to about 5%wt, preferably from about 0.001 to about 5%wt, and more preferably from about 0.01 to about 2.5%wt.

According to the certain aspects of the invention , the compositions necessarily include (c) one or more surfactants which provide a further detersive benefit to the compositions, ( but it is to be understood that according to further certain specific particularly embodiments these one or more surfactants are specifically absent.)

Useful surfactants which provide a further detersive benefit which may be present in the inventive compositions include detersive surfactants particularly selected from carboxylate surfactants, as well as nonionic, cationic and amphoteric surfactants as well as mixtures of two or more thereof.

Suitable nonionic surfactants include, inter alia, condensation products of alkylene oxide groups with an organic hydrophobic compound, such as an aliphatic compound or with an alkyl aromatic compound. The nonionic synthetic organic detergents generally are the condensation products of an organic aliphatic or alkyl aromatic hydrophobic compound and hydrophilic ethylene oxide groups. Practically any hydrophobic compound having a carboxy, hydroxy, amido, or amino group with a free hydrogen attached to the nitrogen can be condensed with ethylene oxide or with the polyhydration product thereof, polyethylene glycol, to form a water soluble

nonionic detergent. Further, the length of the polyethenoxy hydrophobic and hydrophilic elements may be varied to adjust these properties.

One example of such a nonionic surfactant is the condensation product of one mole of an alkyl phenol having an alkyl group containing from 6 to 12 carbon atoms with from about 5 to 25 moles of an alkylene oxide. Another example of such a nonionic surfactant is the condensation product of one mole of an aliphatic alcohol which may be a primary, secondary or tertiary alcohol having from 6 to 18 carbon atoms with from 1 to about 10 moles of alkylene oxide. Preferred alkylene oxides are ethylene oxides or propylene oxides which may be present singly, or may be both present.

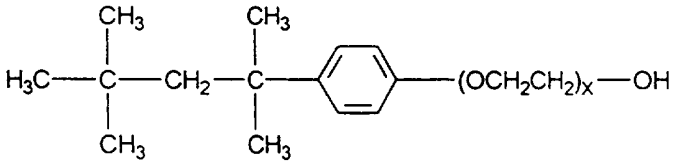
Preferred nonionic surfactants include primary and secondary linear and branched alcohol ethoxylates, such as those based on $C_6$ to $C_{18}$ alcohols which further include an average of from 2 to 80 moles of ethoxylation per mol of alcohol Particularly preferred nonionic surfactants are $C_{11}$ linear primary alcohol ethoxylates averaging about 9 moles of ethylene oxide per mole of alcohol. These surfactants are available, for example, under the commercial name of Neodol 1-9, (from Shell Chemical Company, Houston, TX) , or in the Genapol® series of linear alcohol ethoxylates, particularly Genapol® 26-L-60 or Genapol® 26-L-80 (from Clariant Corp., Charlotte, NC). A further class of nonionic surfactants which are advantageously present in the inventive compositions are those presently marketed under the Genapol® tradename.

Particularly useful are those in the Genapol® "26-L" series which include for example: $C_{12}$-$C_{16}$ linear alcohols condensed with 1 mole of ethylene oxide (Genapol® 24-L-3); $C_{12}$-$C_{16}$ linear alcohols condensed with 1.6 moles of ethylene oxide (Genapol® 26-L-1.6); $C_{12}$-$C_{16}$ linear alcohols condensed with 2 moles of ethylene oxide (Genapol® 26-L-2); $C_{12}$-$C_{16}$ linear alcohols condensed with 3 moles of ethylene oxide (Genapol® 26-L-3); $C_{12}$-$C_{16}$ linear alcohols condensed with 5 moles of ethylene oxide (Genapol® 26-L-5); as well as $C_{12}$-$C_{16}$ linear alcohols condensed with varying amounts of ethylene oxide to provide specific cloud points of the surfactant (i.e., Genapol® 26-L-60, Genapol® 26-L-60N, and Genapol® 26-L-98N). These materials are commercially available from a variety of sources, including Clariant Corp. (Charlotte, N.C.).

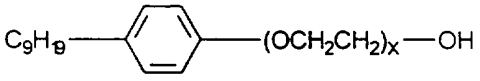
A further particularly useful and preferred alcohol ethoxylate is Genapol® UD-079 which is described to be a $C_{11}$ linear alcohol condensed with 7 moles of ethylene oxide to form a nonionic surfactant.

It is to be understood that other nonionic surfactants other than those described above may also be used. By way of illustration, and not by way of limitation, examples include secondary $C_{12}$ to $C_{15}$ alcohol ethoxylates, including those which have from about 3 to about 10 moles of ethoxylation. Such are available in the Tergitol® series of nonionic surfactants (Union Carbide Corp., Danbury, CT), particularly those in the Tergitol® "15-S-" series. Further exemplary nonionic surfactants include linear primary C11 to C15 alcohol ethoxylates, including those which have from about 3 to about 10 moles of ethoxylation. Such are available in the Neodol® series of nonionic surfactants (Shell Chemical Co.)

A further class of nonionic surfactants which may find use in the present inventive compositions include ethoxylated octyl and nonyl phenols include those having one of the following general structural formulas:



or,



in which the $C_9H_{19}$ group in the latter formula is a mixture of branched chained isomers, and x indicates an average number of ethoxy units in the side chain. Particularly suitable non-ionic ethoxylated octyl and nonyl phenols include those having from about 7 to about 13 ethoxy units. Such compounds are commercially available under the trade name Triton® X (Union Carbide, Danbury CT), as well as under the tradename Igepal® (Rhodia Inc., Princeton, NJ). One exemplary and particularly preferred nonylphenol ethoxylate is Igepal® CO-630.

A further useful class of surfactants include amine oxide compounds. Exemplary useful amine oxide compounds may be defined as one or more of the following of the four general classes:

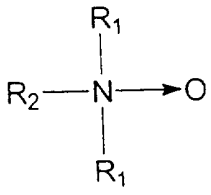
(1) Alkyl di (lower alkyl) amine oxides in which the alkyl group has about 6-24, and preferably 8-18 carbon atoms, and can be straight or branched chain, saturated or unsaturated. The lower alkyl groups include between 1 and 7 carbon atoms, but preferably each include 1 – 3 carbon atoms. Examples include octyl dimethyl amine oxide, lauryl dimethyl amine oxide, myristyl dimethyl amine oxide, and those in which the alkyl group is a mixture of different amine oxides, such as dimethyl cocoamine oxide, dimethyl (hydrogenated tallow) amine oxide, and myristyl/palmityl dimethyl amine oxide;

(2) Alkyl di (hydroxy lower alkyl) amine oxides in which the alkyl group has about 6-22, and preferably 8-18 carbon atoms, and can be straight or branched chain, saturated or unsaturated. Examples include bis-(2-hydroxyethyl) cocoamine oxide, bis-(2-hydroxyethyl) tallowamine oxide; and bis-(2-hydroxyethyl) stearylamine oxide;

(3) Alkylamidopropyl di(lower alkyl) amine oxides in which the alkyl group has about 10-20, and preferably 12-16 carbon atoms, and can be straight or branched chain, saturated or unsaturated. Examples are cocoamidopropyl dimethyl amine oxide and tallowamidopropyl dimethyl amine oxide; and

(4) Alkylmorpholine oxides in which the alkyl group has about 10-20, and preferably 12-16 carbon atoms, and can be straight or branched chain, saturated or unsaturated.

While these amine oxides recited above may be used, preferred are amine oxides which may be represented by the following structural representation:




wherein

each $R_1$ independently is a straight chained $C_1$-$C_3$ alkyl group, preferably both $R_1$ groups are methyl groups; and,

$R_2$ is a straight chained $C_6$-$C_{22}$ alkyl group, preferably is $C_6$-$C_{16}$ alkyl

group, most preferably is a $C_{8-10}$ alkyl group, especially a $C_8$ alkyl group;

Each of the alkyl groups may be linear or branched, but most preferably are linear. Most preferably the amine oxide constituent is lauryl dimethyl amine oxide. Technical grade mixtures of two or more amine oxides may be used, wherein amine oxides of varying chains of the $R_2$ group are present. Preferably, the amine oxides used in the present invention include $R_2$ groups which comprise at least 50%wt., preferably at least 75%wt. of $C_8$ alkyl group.

Exemplary and preferred amine oxide compounds include N-alkyl dimethyl amine oxides, particularly octyl dimethyl amine oxides as well as lauryl dimethyl amine oxide. These amine oxide compounds are available as surfactants from McIntyre Group Ltd. under the name Mackamine® C-8 which is described as a 40% by weight active solution of octyl dimethyl amine oxide, as well as from Stepan Co., under the tradename Ammonyx® LO which is described to be as a 30%wt. active solution of lauryl dimethyl amine oxide.

A further class of materials surfactants which may be advantageously included in the inventive compositions are alkoxy block copolymers, and in particular, compounds based on ethoxy/propoxy block copolymers. Polymeric alkylene oxide block copolymers include nonionic surfactants in which the major portion of the molecule is made up of block polymeric $C_2$-$C_4$ alkylene oxides. Such nonionic surfactants, while preferably built up from an alkylene oxide chain starting group, and can have as a starting nucleus almost any active hydrogen containing group including, without limitation, amides, phenols, thiols and secondary alcohols.

One group of such useful nonionic surfactants containing the characteristic alkylene oxide blocks are those which may be generally represented by the formula (A):

$$HO—(EO)_x(PO)_y(EO)_z—H \qquad (A)$$

where EO represents ethylene oxide,

PO represents propylene oxide,

y equals at least 15,

$(EO)_{x+z}$ equals 20 to 50% of the total weight of said compounds, and,

the total molecular weight is preferably in the range of about 2000 to 15,000.

Another group of nonionic surfactants appropriate for use in the new compositions can be represented by the formula (B):

$$R—(EO,PO)_a(EO,PO)_b—H \qquad (B)$$

wherein R is an alkyl, aryl or aralkyl group, where the R group contains 1 to 20 carbon atoms, the weight percent of EO is within the range of 0 to 45% in one of the blocks a, b, and within the range of 60 to 100% in the other of the blocks a, b, and the total number of moles of combined EO and PO is in the range of 6 to 125 moles, with 1 to 50 moles in the PO rich block and 5 to 100 moles in the EO rich block.

Further nonionic surfactants which in general are encompassed by Formula B include butoxy derivatives of propylene oxide/ethylene oxide block polymers having molecular weights within the range of about 2000-5000.

Still further useful nonionic surfactants containing polymeric butoxy (BO) groups can be represented by formula (C) as follows:

$$RO—(BO)_n(EO)_x—H \qquad (C)$$

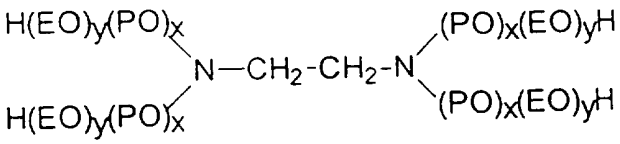
wherein R is an alkyl group containing 1 to 20 carbon atoms,
n is about 5-15, and
x is about 5-15.

Also useful as the nonionic block copolymer surfactants, which also include polymeric butoxy groups, are those which may be represented by the following formula (D):

$$HO—(EO)_x(BO)_n(EO)_y—H \qquad (D)$$

wherein n is about 5-15, preferably about 15,
x is about 5-15, preferably about 15, and
y is about 5-15, preferably about 15.

Still further useful nonionic block copolymer surfactants include ethoxylated derivatives of propoxylated ethylene diamine, which may be represented by the following formula:




(E)

where (EO) represents ethoxy.

(PO) represents propoxy,

the amount of $(PO)_x$ is such as to provide a molecular weight prior to ethoxylation of about 300 to 7500, and the amount of $(EO)_y$ is such as to provide about 20% to 90% of the total weight of said compound.

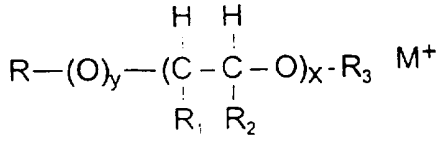
Of these, the most preferred are those which are represented by formula (A) above; specific examples of which include those materials presently commercially available under the tradename PLURONIC®, and in particular the PLURONIC® F series, PLURONIC® L series, PLURONIC® P series, as well as in the PLURONIC® R series, each of which are generally described to be block copolymers of propylene oxide and ethylene oxide. Generally those of the PLURONIC® L series and the PLURONIC® R series are preferred as these are supplied in liquid form by the manufacturer and are readily formulated into the present inventive compositions. These are also available in a wide range of HLB values, and those having HLB values in the range of 1.0 - 23.0 may be used, although those with intermediate HLB values such as from about 12.0 - 18.0 are found to be particularly advantageous. These materials are presently commercially available from BASF AG (Ludwigshafen, Germany) as well as from BASF Corp. (Mt. Olive Township, New Jersey).

A further class of surfactants which may be advantageously included in the inventive compositions are carboxylates, particularly one or more alkylpolyoxycarboxylates including alkyletherpolyoxycarboxylates, or alkylarylpolycarboxylates. Exemplary alkylpolyoxycarboxylates and alkylarylpolycarboxylates include alkyl- and alkylaryl-carboxylates which include those which may be represented by the general formula:

$$R\text{-}COO^- M^+$$

wherein R is a straight or branched hydrocarbon chain containing from about 9 to 21 carbon atoms, and which may also include an aromatic ring. especially a phenyl group as part of the hydrocarbon chain, and M is a metal or ammonium ion.

Further examples of particularly useful carboxylate surfactants include compounds according to the formula:



where:

R is a $C_4$-$C_{22}$ linear or branched alkyl group which may optionally include at least one aryl group, preferably $C_8$-$C_{15}$ linear or branched alkyl group which may include at least one aryl group, and yet more preferably a $C_{12-15}$ linear or branched alkyl group which may include at least one aryl group:

x is an integer from 1 to 24.

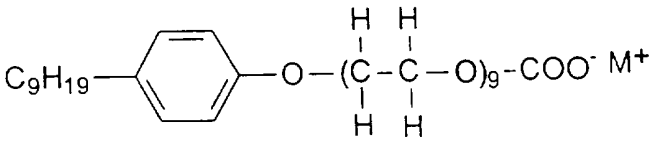
y is 0 or 1,

$R_1$, $R_2$ and $R_3$ is a group selected from H, lower alkyl radicals including methyl and ethyl radicals, carboxylate radicals including acetate and propionate radicals, succinate radicals, hydroxysuccinate radicals, or mixtures thereof wherein at least one $R_1$, $R_2$ or $R_3$ is a carboxylate radical; and.

$M^+$ is a counterion including an alkali metal counterion (i.e., sodium, potassium) or ammonium counterion.

Free acid forms of the alkylethercarboxylate compounds noted above may also be used.

Examples of such presently available commercial preparations include SURFINE® WLG (ex. Finetex Inc., Elmwood Park NJ), SANDOPAN® DTC (Clariant Chem.Co., Charlotte NC) in salt forms, and in free acid forms include those marketed under the tradename NEODOX® (Shell Chemical Co., Houston TX). One particularly preferred carboxylate is one which is represented by the formula:



Such a material is presently commercially available under the tradename EMCOL®, and specifically as EMCOL® CNP-110.

Other useful exemplary nonionic block copolymers based on a polymeric ethoxy/propoxy units which may also be used include those presently commercially available in the POLYTERGENT® E, and POLYTERGENT® P series of materials from Olin Chemicals Corp., (Stamford CT). These are described to be nonionic surfactants based on ethoxy/propoxy block copolymers, conveniently available in a liquid form from its supplier.

It is to be understood that these nonionic surfactants based on polymeric alkylene oxide block copolymers may be used singly or in mixtures of two or more such compounds.

When the compositions of the present invention contain one or more further detersive surfactants, these may be present in any amount which is found to provide a beneficial detersive effect. Generally, these one or more further detersive surfactants do not comprise more than 12%wt. (on an actives weight basis) of the inventive compositions. When included such one or more further detersive surfactants are advantageously present in an amount from 0.001 - 10%wt., preferably are present from 0.01 - 8%wt., but still more preferably are included in amounts of from 0.1 - 8%wt.

According to the first. third, fifth and seventh aspects of the invention, the compositions necessarily include (d) one or more organic solvents. ( but it is to be understood that according to further certain specific particularly embodiments these one or more surfactants are specifically absent).

Exemplary organic solvents which may be included in the inventive compositions include those which are at least partially water-miscible such as alcohols particularly $C_1$-$C_6$ alcohols such as ethanol, n-propanol. isopropanol. water-miscible ethers (e.g. diethylene glycol diethylether, diethylene glycol dimethylether. propylene glycol dimethylether), water-miscible glycol ethers (e.g. propylene glycol monomethylether, propylene glycol mono ethylether, propylene glycol monopropylether, propylene glycol monobutylether. ethylene glycol monobutylether, dipropylene glycol monomethylether, diethyleneglycol monobutylether. dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether), lower esters of monoalkylethers of ethyleneglycol or propylene glycol (e.g. propylene glycol monomethyl ether acetate) all commercially available such as from Union Carbide

(Danbury, CT), Dow Chemical Co. (Midland, MI) or Hoechst (Germany). Mixtures of several organic solvents can also be used.

Useful glycol ethers include those having the general structure $R_a$-O-$R_b$-OH, wherein $R_a$ is an alkyl of 1 to 20 carbon atoms, or an aryl of at least 6 carbon atoms, and $R_b$ is an alkylene of 1 to 8 carbons or is an ether or polyether containing from 2 to 20 carbon atoms. Examples of certain preferred glycol ether solvents include propylene glycol methyl ether, dipropylene glycol methyl ether, tripropylene glycol methyl ether, propylene glycol isobutyl ether, ethylene glycol methyl ether, ethylene glycol ethyl ether, ethylene glycol butyl ether, diethylene glycol phenyl ether, propylene glycol phenol ether, dipropylene glycol monobutyl ether and mixtures thereof.

In certain embodiments of the invention the use of mixtures of organic solvents is contemplated. For example a mixture of an alcohol (e.g., isopropanol) and a glycol ether (e.g., dipropylene glycol monobutyl ether) is contemplated as one such mixture. Further exemplary organic solvent mixtures having similar characteristics (e.g., solubility, evaporation rate. etc.) are also contemplated.

When included. the (d) organic solvent constituent is advantageously present in amounts of from 0.001 – 10%wt., more preferably from 0.01%wt. to not more than 7%wt., but still more preferably is included in amounts of from 0.1 – 5%wt.

Certain embodiments of the invention may include (e) one or more alkanolamines. Such alkanolamines include mono-, di- and tri-alkanolamines. Such alkanolamines include monoethanolamine, diethanolamine, triethanolamine, isopropanolamine and the like. Of these, monoethanolamine is particularly preferred. When present, the (e) one or more alkanolamines comprise from 0.001 – 3%wt., of the inventive compositions. More preferably, when present, the one or more alkanolamines comprise from 0.1 – 1.0%wt., of the inventive compositions of which they form a part.

The compositions are largely aqueous in nature, and comprise as a further necessary constituent (f) water. Water is added to order to provide to 100% by weight of the compositions of the invention. The water may be tap water, but is preferably distilled and is most preferably deionized water. If the water is tap water, it is preferably substantially free of any undesirable impurities such as organics or

inorganics, especially minerals salts which are present in hard water which may thus undesirably interfere with the operation of the constituents present in the aqueous compositions according to the invention.

As discussed previously, the inventive compositions may comprise (g) one or more conventional optional additives. By way of non-limiting example, these include: pH adjusting agents and pH buffers including organic and inorganic salts; non-aqueous solvents, perfumes, perfume carriers, optical brighteners, coloring agents such as dyes and pigments, opacifying agents, hydrotropes, antifoaming agents, viscosity modifying agents such as thickeners, enzymes, anti-spotting agents, anti-oxidants, anti-corrosion agents as well as others not specifically elucidated here. These ingredients may be present in any combinations and in any suitable amount that is sufficient for imparting the desired properties to the compositions. These one or more conventional additives, when present, should be present in minor amounts, preferably in total comprise less than about 5% by weight (on an active weight basis) of the compositions, and desirably less than about 3%wt.

Such materials described above are known to the art, including those described in *McCutcheon's Emulsifiers and Detergents (Vol.1)*, *McCutcheon's Functional Materials (Vol. 2)*, North American Edition, 1991; *Kirk-Othmer, Encyclopedia of Chemical Technology*, 4th Ed., Vol. 22, pages 478-541 the contents of which are herein incorporated by reference For any particular composition, any optional constituents should be compatible with the other ingredients present.

The aqueous compositions according to the invention are desirably provided as a ready to use product which may be directly applied to a hard surface. Hard surfaces which are to be particularly denoted are lavatory fixtures, lavatory appliances (toilets, bidets, shower stalls, bathtubs and bathing appliances), wall and flooring surfaces especially those which include refractory materials and the like. Further hard surfaces which are particularly denoted are those associated with kitchen environments and other environments associated with food preparation. Hard surfaces which are those associated with hospital environments, medical laboratories and medical treatment environments. Such hard surfaces described above are to be understood as being recited by way of illustration and not be way of limitation.

The composition provided according to the invention can be desirably provided as a ready to use product in a manually operated spray dispensing container, or may be supplied in aerosolized product wherein it is discharged from a pressurized aerosol container. Known art propellants such as liquid propellants based on chloroflurocarbons or propellants of the non-liquid form, i.e., pressurized gases, including carbon dioxide, air, nitrogen, as well as others, may be used, even though it is realized that the former chlorofluorocarbons are not generally further used due to environmental considerations.

The composition according to the invention is ideally suited for use in a consumer "spray and wipe" application. In such an application, the consumer generally applies an effective amount of the cleaning composition using the pump and within a few moments thereafter, wipes off the treated area with a rag, towel, or sponge, usually a disposable paper towel or sponge. In certain applications, however, especially where undesirable stain deposits are heavy, the cleaning composition according to the invention may be left on the stained area until it has effectively loosened the stain deposits after which it may then be wiped off, rinsed off, or otherwise removed. For particularly heavy deposits of such undesired stains, multiple applications may also be used. It is also to be understood that longer residence time of the inventive compositions on a hard surface may be required in order to attain greater degrees of disinfection. Where thorough disinfection is a primary consideration, it may be desired to apply the inventive compositions to the hard surface being treated and to permit the composition to remain on the hard surface for several minutes (2-10 min.) prior to rinsing or wiping the composition from the hard surface. It is also contemplated that the inventive compositions be applied to a hard surface without subsequently wiping or rinsing the treated hard surface.

In a yet a further embodiment, the product according to the invention may be formulated so that it may be useful in conjunction with a "aerosol" type product wherein it is discharged from a pressurized aerosol container. Known art propellants such as liquid propellants based on chloroflurocarbons or propellants of the non-liquid form, i.e., pressurized gases, including carbon dioxide, air, nitrogen, as well as others, may be used, even though it is realized that the former chlorofluorocarbons are not generally further used due to environmental considerations. In such an application,

the cleaning composition is dispensed by activating the release nozzle of said aerosol type container onto the stain and/or stain area, and in accordance with a manner as above-described a stain is treated and removed.

Whereas the compositions of the present invention are intended to be used in the types of liquid forms described, nothing in this specification shall be understood as to limit the use of the composition according to the invention with a further amount of water to form a cleaning solution therefrom. In such a proposed diluted cleaning solution, the greater the proportion of water added to form said cleaning dilution will, the greater may be the reduction of the rate and/or efficacy of the thus formed cleaning solution. Accordingly, longer residence times upon the stain to effect their loosening and/or the usage of greater amounts may be necessitated. Conversely, nothing in the specification shall be also understood to limit the forming of a "super-concentrated" cleaning composition based upon the composition described above. Such a super-concentrated ingredient composition is essentially the same as the cleaning compositions described above except in that they include a lesser amount of water.

The composition of the present invention, whether as described herein or in a concentrate or super-concentrate form can also be applied to a hard surface by using a wet wipe. The wipe can be of a woven or non-woven nature. Fabric substrates can be used to form the wipe. Exemplary fabric substrates can include non-woven and woven pouches, sponges, in the form of abrasive or non-abrasive cleaning pads. Such fabrics are known commercially in this field and are often referred to as wipes. Such substrates can be resin bonded, hydroentangled, thermally bonded, meltblown, needlepunched or any combination of the former.

The non-woven fabrics may be a combination of wood pulp fibers and textile length synthetic fibers formed by well known dry-form or wet-lay processes. Synthetic fibers such as Rayon, Nylon, Orlon and Polyester as well as blends thereof can be employed.

The wood pulp fibers should comprise about 30 to about 60 percent by weight of the non-woven fabric, preferably about 55 to about 60 percent by weight, the remainder being synthetic fibers. The wood pulp fibers provide for absorbency,

abrasion and soil retention whereas the synthetic fibers provide for substrate strength and resiliency.

The substrate of the wipe may also be a film forming material such as a water soluble polymer. Such substrates include self-supporting film substrates including those which may be sandwiched between layers of fabric substrates and head sealed to form a useful substrate. The free standing films can be extruded utilizing standard equipment to devolatilize the blend. Casting technology can also be used to form and dry films or a liquid blend can be saturated into a carrier and then dried via any of a variety of known methods.

The compositions of the present invention are absorbed onto the wipe to form a saturated wipe. The wipe can then be sealed in individually into a pouch which can then be opened when needed or a multitude of wipes can be placed in a container for use on an as needed basis. The container, when closed. sufficiently seals to prevent evaporation of any components from the compositions.

The following examples below illustrate exemplary and preferred formulations of the concentrate composition according to the instant invention. It is to be understood that these examples are presented by means of illustration only and that further useful formulations fall within the scope of this invention and the claims may be readily produced by one skilled in the art and not deviate from the scope and spirit of the invention.

Throughout this specification and in the accompanying claims, weight percents of any constituent are to be understood as the weight percent of the active portion of the referenced constituent, unless otherwise indicated.

Examples:

The following examples illustrate the formulation and performance of various compositions of the invention, as well as certain particularly preferred embodiments of the invention.

Exemplary formulations illustrating certain preferred embodiments of the inventive compositions and described in more detail in Tables 1A, 1B, 2 and 3 below were formulated generally in accordance with the following protocol. The weight percentages indicated the "as supplied" weights of the named constituent. The

formulations of Table 1A illustrate embodiments wherein alkanolamines are not present, while the formulations of Table 1B illustrate embodiments wherein alkanolamines are necessarily present.

Into a suitably sized vessel, a measured amount of water was provided after which the constituents were added in no specific or uniform sequence, which indicated that the order of addition of the constituents was not critical. All of the constituents were supplied at room temperature, and any remaining amount of water was added thereafter. Certain of the nonionic surfactants if gels at room temperature were first preheated to render them pourable liquids prior to addition and mixing. Mixing of the constituents was achieved by the use of a mechanical stirrer with a small diameter propeller at the end of its rotating shaft. Mixing, which generally lasted from 5 minutes to 120 minutes was maintained until the particular exemplary formulation appeared to be homogeneous. The exemplary compositions were readily pourable, and retained well mixed characteristics (i.e., stable mixtures) upon standing for extend periods.

**TABLE 1A**

| | Ex.1 | Ex.2 | Ex.3 | Ex.4 | Ex.5 | Ex.7 | Ex.8 | Ex.9 | Ex.10 |
|---|---|---|---|---|---|---|---|---|---|
| BTC® 8358 | 3.6 | 3.6 | 3.6 | 4.0 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| Fluorad® FC-171 | 0.64 | 2.02 | 0.51 | 1.28 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 |
| Genapol® UD-079 | -- | -- | -- | -- | 1.0 | -- | -- | -- | -- |
| Emcol® CNP-110 | -- | -- | -- | -- | -- | 1.0 | -- | -- | -- |
| Igepal®CO-630 | -- | -- | -- | -- | -- | -- | 1.0 | -- | -- |
| Pluronic® L-64 | -- | -- | -- | -- | -- | -- | -- | 1.0 | -- |
| Mackamine® C8 | -- | -- | -- | -- | -- | -- | -- | -- | 1.0 |
| di water | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. |

**TABLE 1B**

| | Ex.11 | Ex.12 | Ex.13 | Ex.14 | Ex.15 | Ex.16 | Ex.17 | Ex.18 | Ex.19 | Ex.20 |
|---|---|---|---|---|---|---|---|---|---|---|
| BTC® 8358 | 0.027 | 0.027 | 0.027 | 0.027 | 0.027 | 0.027 | 0.027 | 0.027 | 0.027 | 0.027 |
| BTC® 65NF | 0.172 | 0.172 | 0.172 | 0.172 | 0.172 | 0.172 | 0.172 | 0.172 | 0.172 | 0.172 |
| Fluorad® FC-171 | 0.9 | 0.1 | 0.05 | 0.05 | 0.04 | 0.02 | 0.04 | 0.02 | -- | -- |
| Zonyl® FSN 100 | -- | -- | -- | -- | -- | -- | -- | -- | 0.04 | -- |
| Zonyl® FSO 100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.04 |
| Dowanol® PnB | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| isopropanol | -- | -- | -- | 2.0 | -- | -- | 2.0 | 2.0 | -- | -- |
| n-decanol | 0.04 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| monoethanolamine | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| di water | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. | q.s. |

As is indicated, to all of the formulations of Tables 1A and 1B was added sufficient deionized water in "quantum sufficient" to provide 100 parts by weight of a particular formulation.

The identity of the constituents used to produce various formulations described herein are described in Table 2, below, including the "actives" percentage of each were a constituent was not 100%wt. "actives".

| TABLE 2 | |
|---|---|
| BTC® 8358 | alkyl dimethyl benzyl ammonium chloride (80%wt. actives) from Stepan Co. |
| BTC® 65NF | alkyl dimethyl benzyl ammonium chloride (50%wt. actives) from Stepan Co. |
| Fluorad® FC-171 | fluorinated alkyl alkoxylate ( 100%wt. actives) from 3M Corp. |
| Zonyl® FSN 100 | alkoxylated nonionic fluorosurfactant (100%wt. actives) from DuPont Corp. |
| Zonyl® FSO 100 | alkoxylated nonionic fluorosurfactant (100%wt. actives) from DuPont Corp. |
| Genapol® UD-079 | nonionic, C11 alcohol ethoxylate, with 7 moles of EO (ethoxy) groups (90%wt. actives) from Hoechst Celanese |
| Emcol® CNP-110 | anionic, alkylaryl polyoxycarboxylate (100%wt. actives) from Witco Co. |
| Igepal®CO-630 | nonionic, nonylphenol ethoxylate with 9 moles of EO groups (100%wt. actives) from Rhone-Poulenc |
| Pluronic® L-64 | nonionic, polypropylene-polyethylene block copolymer (100%wt. actives) from BASF Inc. |
| Mackamine® C8 | nonionic, octamine oxide (40%wt. actives) from McIntyre Co. |
| Tergitol® 15-S-9 | nonionic, polyethylene glycol ether (100%wt. actives) from Union Carbide Co. |
| Dowanol® DPnB | dipropylene glycol n-butyl ether (100%wt. actives) from Dow Chemical Co. |
| isopropanol | isopropanol, technical grade (95%+ actives) from Aldrich Chem. Co. or Eastman Chem. Co. |
| n-decanol | n-decanol, technical grade (95%+ actives) from Aldrich Chem. Co or other commercial source |
| monoethanolamine | monoethanolamine (100%wt. actives) from Dow Chemical Co. |
| Na4EDTA | tetrasodium salt of ethylenediamine tetraacetic acid (Dow Chem. Co.) |
| di water | deionized water |

Additional formulations, namely aqueous dilutions of the concentrate compositions exemplified by the formulations described in Table 1A were produced, and these are described on Table 3, following:

TABLE 3

| | Ex.21 | Ex.22 | Ex.23 |
|---|---|---|---|
| BTC-8358® | 0.05625 | 0.05625 | 0.05625 |
| Fluorad® FC-171 | 0.01 | 0.03156 | 0.00795 |
| di water | q.s. | q.s. | q.s. |

These exemplary aqueous dilutions were prepared by dilution of one part by weight of a concentrated formulation described on Table 1A, with 64 parts by weight of deionized water. Ex. 21 is a 1:64 dilution of the formulation of Ex.1 with water. Ex. 22 is a 1:64 dilution of the formulation of Ex.2 with water. Ex. 23 is a 1:64 dilution of the formulation of Ex.3 with water.

A comparative formulation which did not include the nonionic fluorosurfactant or quaternary ammonium compound was also produced, and this formulation included of Table 4, from the indicated constituents:

TABLE 4

| Comparative Formulation: (C1) | %wt. |
|---|---|
| Tergitol® 15-S-9 | 5.0 |
| Pluronic® L-64 | 2.0 |
| Na4EDTA | 0.25 |
| di water | balance to 100 |

Certain of the formulations described on Table 1A and Table 4, as well as the comparative formulation ('C1') were subjected to one or more of the following evaluations.

Cleaning Efficacy

Certain of the compositions indicated above were diluted with water at a respective weight ratio of composition:water of 1:64. These diluted compositions were then subjected to the protocol of ASTM D-4488-89 Annex A5 for particulate soil, which evaluated the efficacy of the cleaning compositions on vinyl tile samples. The soil applied was a particulate soil sample containing natural humus, paraffin oil, used crankcase motor oil, Portland cement, silica, lampblack carbon, iron oxide, bandy black clay, stearic acid, and oleic acid. produced according to the protocol.

Each of the soiled test vinyl tile samples were placed into the apparatus and the center of each tile was wetted with a 20 milliliter sample of a test formulation and allowed to stand for 1 minute. When approximately 30 seconds had elapsed, a further 50 milliliter sample was applied to the sponge (water dampened, then wrung to remove excess water) of a Gardner Abrasion Tester apparatus. Thereafter the apparatus was cycled 10 times, which provided 20 strokes of the sponge across the face of each of the vinyl test tiles. Each test was replicated three times using three vinyl tile samples. The reflectance values of the cleaned samples were evaluated utilizing a Minolta Chroma Meter CF-110, with Data Processor DP-100, which evaluated spectrophotomic characteristics of the sample. The averaged results of the three readings are reported on Table 5, following.

**Table 5**

| | percentage reflectance (%) |
|---|---|
| Comparative Formulation | 37.1% |
| Ex.1 | 54.8% |
| Ex.2 | 54.9% |
| Ex.3 | 58.2% |

With respect to the results reported in Table 5 a value of "100" is indicative of a white (unsoiled) background, and a "0" value is indicative of a black background. As can be seen from the results of Table 3. the cleaning efficacy of the composition according to the invention generally provided superior results or were on parity with those of known art cleaning products.

Antimicrobial Efficacy

Several of the exemplary formulations described in more detail on Table 1A above were evaluated in order to evaluate their antimicrobial efficacy against *Staphylococcus aureus* (gram positive type pathogenic bacteria) (ATCC 6538), *Salmonella choleraesuis* (gram negative type pathogenic bacteria) (ATCC 10708), and *Pseudomonas aeruginosa* (ATCC 15442). The testing was performed in accordance with the protocols outlined in "Use-Dilution Method", Protocols 955.14, 955.15 and 964.02 described in Chapter 6 of "Official Methods of Analysis", 16$^{th}$ Edition, of the Association of Official Analytical Chemists; "Germicidal and Detergent Sanitizing Action of Disinfectants", 960.09 described in Chapter 6 of

"Official Methods of Analysis", 15th Edition, of the Association of Official Analytical Chemists; or American Society for Testing and Materials ("ASTM") E 1054-91 the contents of which are herein incorporated by reference. This test is also commonly referred to as the "AOAC Use-Dilution Test Method".

As is appreciated by the skilled practitioner in the art, the results of the AOAC Use-Dilution Test Method indicates the number of test substrates wherein the tested organism remains viable after contact for 10 minutes with at test disinfecting composition / total number of tested substrates (cylinders) evaluated in accordance with the AOAC Use-Dilution Test. Thus, a result of "0/60" indicates that of 60 test substrates bearing the test organism and contacted for 10 minutes in a test disinfecting composition, 0 test substrates had viable (live) test organisms at the conclusion of the test. Such a result is excellent. illustrating the excellent disinfecting efficacy of the tested composition.

Results of the antimicrobial testing are indicated on Table 6, below. The reported results indicate the number of test cylinders with live test organisms/number of test cylinders tested for each example formulation and organism tested.

TABLE 6

| Example Formulation | *Staphylococcus aureus* | *Salmonella choleraesuis* |
|---|---|---|
| Ex. 1 | 0/60 | 0/60 |
| Ex. 2 | 0/60 | 0/60 |

As may be seen from the results indicated above, the compositions according to the invention provide excellent cleaning benefits to hard surfaces, including hard surfaces with difficult to remove stains notwithstanding the low solids content of the inventive compositions. These advantages are further supplemented by the excellent antimicrobial efficacy of these compositions against known bacteria commonly found in bathroom, kitchen and other. Such advantages clearly illustrate the superior characteristics of the compositions, the cleaning and antimicrobial benefits attending its use which is not before known to the art.

Evaporation and Drying Characteristics

The compositions according to formulations 11 through 20 described on Table 1B were evaluated for their evaporation and drying characteristics. These compositions were used "as is" (and as described on Table 1B) and not further diluted with additional water. As a further comparative example a commercially available product, LYSOL® antibacterial kitchen cleaner was used as supplied by its manufacturer.

As test substrates were used glazed black ceramic tile, and a polished stainless steel tile. Immediately prior to the test the tiles were horizontally positioned with their glazed or polished surfaces facing upwards on a laboratory tabletop. Onto the surface of each was deposited a drop of an example formulation, and immediately thereafter the drop was spread into a roughly circular pattern to form a generally uniform thin film on the substrate via the use of a clean. crumpled sheet of a lint free paper wipe (Kimwipe®, ex. Kimberly-Clark Corp.) after which the paper wipe was removed and discarded. The thin film was approximately 1 inch in diameter. The test was repeated for each formulation tested.

Immediately thereafter the drying behavior of the example formulation was visually observed. Each formulation according to Examples 11 through 20 were tested, and each was observed to initiate evaporation at the periphery of the thin film, and to in a generally uniform manner advancing towards the center of the thin film. The typical drying time was from approx. 1 to 1.5 minutes. During drying, no discrete rivulets or droplets were observed to form, and at the conclusion of drying the surface was dry and appeared to be streak free. Little or no residue was observed to remain on the glazed black tile substrate for any of the formulations according to Examples 11 through 20. In contrast, the comparative example was observed to deposit a readily visible, hazy whitish residue subsequent to its drying on the black tile substrate. On the polished stainless steel tile substrate, it was observed that subsequent to drying each of the tested formulations were observed a very faint, dark color cast where the thin film was previously present, but this color cast was readily removed by subsequently wiping with a clean dry lint free paper wipe.

Claims:

1. A hard surface cleaning and disinfecting composition which comprises:

(a) at least one cationic surfactant having germicidal properties;

(b) a fluorosurfactant selected from the group of nonionic fluorosurfactant, cationic fluorosurfactant, and mixtures thereof;

(c) optionally, one or more detersive surfactants particularly selected from carboxylate surfactants, as well as nonionic, cationic, amphoteric surfactants, and mixtures thereof;

(d) optionally, one or more organic solvents;

(e) optionally, one or more alkanolamines;

(f) a major portion of water; and

(g) optionally, one or more further conventional optional constituents such as: pH buffering agents, perfumes, perfume carriers, colorants, hydrotropes, viscosity modifying agents, further germicides, fungicides, anti-oxidants, and anti-corrosion agents, and the like.

2. A hard surface cleaning and disinfecting composition of claim 1 wherein the (b) nonionic fluorosurfactant is a compound selected from a compound of the formula

$$C_nF_{2n+1}SO_2N(C_2H_5)(CH_2CH_2)_xCH_3$$

where n has a value of from 4 to 12 and x has a value of from 4 to 18;

$$F(CF_2CF_2)_yCH_2CH_2CH_2O(CH_2CH_2O)_xH$$

where x is 0 to about 15 and y is 1 to about 7, or x is 0 to about 25 and y is 1 to about 9;

$$C_nF_{2n+1}SO_2NHC_3H_6N^+(CH_3)_3I^-$$

where n~8;

$$F_3\text{-}(CF_2)_n\text{-}(CH_2)_mSCH_2CHOH\text{-}CH_2\text{-}N^+R_1R_2R_3Cl^-$$

where n is 5-9 and m is 2, and $R_1$, $R_2$ and $R_3$ are $-CH_3$; as well as mixtures thereof.

3. The hard surface cleaning and disinfecting compositions according to claim 1 or 2 which is characterized as containing (c) one or more detersive surfactants particularly selected from carboxylate surfactants as well as nonionic, cationic, amphoteric surfactants, and mixtures thereof; (d) one or more organic solvents; and (e) one or more alkanolamines.

4. The hard surface cleaning and disinfecting composition according to claim 1 or 2 which is characterized as being essentially free of (d) one or more organic solvents.

5. The hard surface cleaning and disinfecting composition according to claim 1 or 2 which is characterized as being essentially free of (c) one or more detersive surfactants.

6. The hard surface cleaning and disinfecting composition according to claim 1 or 2 which is characterized as being essentially free of both (c) one or more detersive surfactants and (d) one or more organic solvents.

7. The hard surface cleaning and disinfecting compositions according to claim 1 or 2 which is characterized as being essentially free of (e) one or more alkanolamines.

8. The hard surface cleaning and disinfecting compositions according to claim 1 or 2 which is characterized as being essentially free of (c) one or more detersive surfactants. (d) one or more organic solvents, and (e) one or more alkanolamines.

9. The hard surface cleaning and disinfecting compositions according to claim 1 or 2 which is characterized as being essentially free of (d) one or more organic solvents and (e) one or more alkanolamines.

10. The hard surface cleaning and disinfecting compositions according to claim 1 or 2 which is characterized as being essentially free of (c) one or more detersive surfactants and (e) one or more alkanolamines.

11. A hard surface cleaning and disinfecting composition according to claim 1 or 2 wherein the (d) one or more organic solvents are selected from: alcohols, ethers, glycol ethers, lower esters of monoalkylethers of ethylene glycol or propylene glycol, as well as mixtures thereof.

12. A process for the cleaning and sanitizing of a hard surface which comprises the step of providing the composition as outlined above, and applying an effective amount of the composition according to any of the preceding claims to a hard surface requiring such treatment.

**Application No:** GB 9918890.6 **Examiner:** J. P. Bellia
**Claims searched:** 1-12 **Date of search:** 6 December 1999

# Patents Act 1977
# Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): C5D (DHX, DGA, DHZ)

Int Cl (Ed.6): C11D 1/00, 1/38, 1/62, 3/00, 3/16, 3/24

Other: ONLINE: EPODOC, WPI, JAPIO

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| X | GB 1487811 | (WILSON) See whole document | 1,4-12 |
| X | US 5514301 | (BIL *et al*) See column 2 line 11-67 & Examples | 1, 7 |
| X | US 5110868 | (BELLIS *et al*) See column 2 line 57- column 3 line 4; column 4 line 38-51; Examples 3 & 5 | 1, 2, 7 |
| X | US 4584196 | (VANLERBERGHE *et al*) See Examples A8, A9 & A10 | 1, 3, 5-9 |
| X | US 4443364 | (KLINGER *et al*) See Examples 4-8 | 1, 4, 7, 9 |
| X | US 4416787 | (MARSHALL *et al*) See column 1 line 33 - column 2 line 9, column 5 line 10-20 & Examples | 1, 4-11 |
| X | US 4020016 | (SOKOL) See column 6 line 30 - column 7 line 15 | 1-3, 11, 12 |
| X | US 3681441 | (ROBERTSON) See Example 7 | 1, 5, 7, 10 |

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|---|---|---|---|
| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention. |
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