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(54) **Titre : COMPOSITION ANTIMICROBIENNE**
(54) **Title: ANTIMICROBIAL COMPOSITION**

(57) **Abrégé/Abstract:**
The present disclosure relates to compositions containing an acid system comprising octanoic acid, an anionic surfactant system comprising octyl sulfate and 2-phenoxyethanol and/or a fragrance, and methods of using the compositions.

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Abstract:

The present disclosure relates to compositions containing an acid system comprising octanoic acid, an anionic surfactant system comprising octyl sulfate and 2-phenoxyethanol and/or a fragrance, and methods of using the compositions.

ANTIMICROBIAL COMPOSITION

FIELD OF THE INVENTION

The present invention is in the field of antimicrobial compositions. In particular, it relates to a composition containing a surfactant system, an acid system comprising octanoic acid, and methods of using the composition to provide fast disinfection on hard surfaces.

BACKGROUND OF THE INVENTION

There is an ever-increasing demand for antimicrobial products. The prior art describes a great variety of antimicrobial products, see for example WO2020/210789 A1 and WO2001/094513 A1. Still there is a need for easy-to-use, fast-acting antimicrobial products with a broad-spectrum of biocidal activity. Some of the antimicrobial products have a malodour associated to them. One of the objectives of the present invention is to provide a fast-acting broad-spectrum antimicrobial product which has pleasant smell associated to it.

Sometimes it is desirable to have the compositions in concentrated form to reduce packaging and transport costs and to reduce environmental impact. The formulation of antimicrobial concentrated compositions is not straight forward, not only the concentrate should be stable on storage but it should also be stable and not lose its biocidal properties when diluted in water of different hardness. Thus, another objective of the present invention is to provide a composition with biocidal properties that is stable as a concentrate (physical & chemical stability) and does not become unstable when diluted. Another objective is to provide an antimicrobial composition that is effective when sprayed from a variety of spraying devices, including sprayers that deliver small droplet sizes.

SUMMARY OF THE INVENTION

According to the first aspect of the invention, there is provided an antimicrobial composition. The composition comprises an anionic surfactant system, an acid system and 2-phenoxyethanol and/or a fragrance. The composition has a pH of from about 1.5 to about 5, preferably from about 2 to about 4 as measured at 20°C.

The composition of the invention comprises:

a) an acid system, the acid system comprises at least 30% by weight of the acid system of octanoic acid. It also comprises a secondary acid preferably selected from C_1-C_{10} mono-, di- and triprotic organic acids and inorganic acids, and polymeric acids;

b) an anionic surfactant system, the anionic surfactant system comprises at least 60% by weight of the surfactant system of octyl sulfate and a secondary surfactant having a moiety comprising a carbon chain with at least ten carbon atoms preferably at least 5% by weight of the surfactant system comprises dodecyl sulfate; and

c) a fragrance and/or 2-phenoxyethanol;

wherein the composition has a pH from about 1.5 to about 5 as measured at 20°C.

The composition is suitable to be in the form of a concentrate to be diluted before use or in ready-to-use form.

According to the second and third aspects of the invention, there are provided methods to clean an inanimate surface, preferably a hard surface with the composition of the invention. Lastly, there is provided the use of the composition to provide fast disinfection.

The elements of the invention described in relation to the first aspect of the invention apply *mutatis mutandis* to the other aspects of the invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention envisages an antimicrobial composition that can be used in the form of a concentrate to be diluted before use or in ready-to-use form. The composition presents fast biocidal action over a broad spectrum of microorganisms. The concentrate is stable in store and upon dilution.

As used herein, the articles including "the," "a" and "an" when used in a claim or in the specification, are understood to mean one or more of what is claimed or described.

As used herein, the terms "include," "includes" and "including" are meant to be non-limiting.

The terms "microorganism" or "microbe" as used herein are intended to include cellular organisms, both unicellular and multicellular that are less than 5 mm in length; this includes but is not limited to bacteria including spore forming bacteria, fungi, prions, enveloped and non-enveloped viruses, archaea, protists, protozoa or oocysts formed by protozoa, green algae, plankton, planarian, amoebas and yeasts, or spores formed by any of these. The terms "microorganism" or "microbe" include the single or planktonic microbes that may contaminate surfaces, as well as communities of microbes that grow as biofilms on surfaces.

The term "antimicrobial" as used herein refers to a compound that exhibits microbicide or microbiostatic properties that enables the compound to kill, destroy, inactivate, or neutralize a microorganism; or to mitigate, prevent, or reduce the growth, ability to survive, or propagation of a microorganism. In the context of antimicrobial, the term "treat" means to kill, destroy, inactivate,

or neutralize a microorganism; or to prevent or reduce the growth, ability to survive, or propagation of a microorganism

The term "substantially free of" or "substantially free from" as used herein refers to either the complete absence of an ingredient or a minimal amount thereof merely as impurity or unintended byproduct of another ingredient. A composition that is "substantially free" of/from a component means that the composition comprises less than about 0.01%, or less than about 0.001%, or even 0%, by weight of the composition, of the component.

In this description, all concentrations and ratios are on a weight basis of the composition unless otherwise specified.

Unless otherwise noted, all component or composition levels are in reference to the active portion of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources of such components or compositions.

All measurements are performed at 20°C unless otherwise specified.

Composition

The composition of the present invention may be formulated as a concentrate or ready-to-use composition. The composition of the present invention may deliver cleaning and shine benefits on inanimate surfaces, both hard and soft surfaces. The composition of the present invention is an antimicrobial composition and delivers improved antimicrobial activity on hard and soft surfaces. The composition of the present invention may deliver cleaning benefits and shine benefits as well as antimicrobial benefits on hard and soft surfaces. Preferably, the composition of the invention is a liquid composition, more preferably an aqueous liquid composition. As a concentrate execution, the composition comprises less than 80% by weight of the composition of water, preferably from 40% to 60% by weight of the composition of water. As a ready-to-use execution, the composition comprises more than 80% by weight of the composition of water, preferably from 90% to 99% by weight of the composition of water.

Concentrates may be diluted with water in order to provide an in-use solution having a desired level of detersive properties or other properties, including antimicrobial properties. The desired antimicrobial properties may depend on the challenge posed by the target microorganism; for example, enveloped viruses are more susceptible to inactivation than non-enveloped viruses, and spore-forming organisms are very resistant to chemical inactivation. Each organism type presents a different challenge and may call for a different level of dilution (or none) in order to achieve the desired antimicrobial activity.

The water used to dilute the concentrate (water of dilution) can be available at the locale or site of dilution. The water of dilution may contain varying levels of hardness depending upon the locale. Service waters available from various municipalities have varying levels of hardness. It is desirable to provide a concentrate that can handle the hardness levels found in the service water of various municipalities. The water of dilution may have a hardness ranging from about zero to at least about 400 ppm hardness (as $CaCO_3$).

Concentrated solutions may provide for improved economics to the manufacturer and to the user as they may comprise less water and may use less packaging material on a per-use basis, as compared to ready-to-use compositions. A concentrated composition may be diluted with water at a weight ratio of composition to water ranging from about 1:1.5 to about 1:250, or from about 1:4 to about 1:100. The terms "in-use composition" or "in-use diluted composition" refer to concentrated compositions that have been diluted with water prior to use.

Alternatively, the compositions may be in a ready-to-use form, preferably to be delivery in spray form. Ready-to-use compositions provide additional degrees of freedom to further enhance cidal activity via solvents, especially glycol ethers including ethylene glycol *n*-hexyl ether and 2-phenoxyethanol. Enhanced cidal activity can be manifested via a reduction in contact time needed to achieve complete kill/inactivation versus specific microorganisms or via a broadening of scope of microorganisms that can be killed/ inactivated, or via reduction of the amount of actives or via all of them.

The compositions disclosed herein provide short-contact-time antimicrobial benefits, e.g., from about 5 seconds to about 5 minutes or from about 10 seconds to about 3 minutes, or from 15 seconds to about 2 minutes or from 15 to 30 seconds.

The composition may comprise other antimicrobial agents or be free of other antimicrobial agents. Other antimicrobial agents include ionic silver salts (e.g., silver dihydrogen citrate and silver nitrate), hydrogen peroxide, C12-16 benzalkonium salts (e.g., chloride, bromide and saccharinate salts), dialkyldimethylammonium salts (e.g., C8-C8, C8-C10 & C10-C10 chain lengths, chloride, bromide, bicarbonate and carbonate salts), benzethonium chloride (or bromide), cetyl trimethyl ammonium chloride (or bromide), and mixtures thereof. Other antimicrobial agents include glutaraldehyde, zinc 2-pyridinethiol-1-oxide, copper sulfate pentahydrate, iodine, iodine salts, butoxypolypropoxypolyethoxyethanol iodine complex, polyvinylpyrrolidone-iodine complex, polyvinylpyrrolidone-hydrogen peroxide complex and mixtures thereof. Hydrogen peroxide and ionic silver salts are the most preferred added antimicrobial agents for use herein. However, the composition of the invention provides fast, broad spectrum antimicrobial activity

even in the absence of additional antimicrobial agents. Thus compositions free of other antimicrobial agents are preferred for use herein.

Acid system

The composition of the invention comprises an acid system. The acid system adjusts the pH of the composition to the following range: from about 1.5 to about 5, preferably from about 2 to about 4, more preferably from about 2.1 to about 3.5, as measured at 20°C. The acid system comprises octanoic acid as a primary acid and also comprises a secondary acid. Without being bound by theory is believed that octanoic acid provides for the fast kinetics, broad spectrum biocidal activity. The main role of the secondary acid is to reduce the pH of the composition below the pKa of octanoic acid (pKa = 4.9). The lower pH ensures that octanoic acid remains almost fully protonated as deprotonation results in reduced cidal activity. The secondary acid system may provide buffering capacity and sequester transition metals, including iron, copper, manganese and the like. The secondary acid may comprise acids that are a US EPA/Health Canada registered active or a European notified antimicrobial substance.

The secondary acid comprises an organic acid, an inorganic acid, or a mixture thereof. The acid system may be substantially free of trace transition metal impurities. Preferably, the secondary acid has at least one moiety with a pKa of 4 or below at 20°C. Suitable inorganic acids include phosphoric acid, sulfuric acid, urea-sulfuric acid, hydrochloric acid, sulfamic acid, methyl sulfuric acid, hypochlorous acid, and the like. Suitable organic acids include polymeric acids comprising at least 3 carboxylic acid groups, C_1-C_{10}- organic acids comprising at least one carboxylic acid group, and organic acids that do not comprise carboxylic acid functional groups (such as imidazole derivatives or phenolic or polyphenolic compounds). Non-limiting examples of polymeric acids include polymers of acrylic acid, methacrylic acid, maleic acid, itaconic acid, and copolymers comprising acrylic acid, methacrylic acid, maleic acid, itaconic acid, and mixtures thereof. Polymeric acids may be homopolymers or copolymers having a molecular weight of about 500 g/mol or greater. The polymeric acid may have a molecular weight ranging from about 500 g/mol to about 1,000,000 g/mol, or from about 500 g/mol to about 100,000 g/mol, or from about 1,000 g/mol to about 20,000 g/mol. In one embodiment, the polymeric acids have an average molecular weight from about 800 g/ mole to about 5,000 g/ mol. Copolymers may be random copolymers or block copolymers. In addition to monomer units comprising carboxylic acid groups, the copolymers may also include one or more other monomers, such as styrene, styrene sulfonate, acrylic ester, acrylamide, olefin sulfonate, and olefin acetate.

Non-limiting examples of C_1-C_{10} organic acids include formic acid, acetic acid, benzoic acid, malonic acid, citric acid, maleic acid, fumaric acid, succinic acid, lactic acid, malic acid,

tartaric acid, gluconic acid, glutaric acid, adipic acid, butane tetracarboxylic acid, and the like. The organic acid may be derived from a renewable, plant-based feedstock and may be produced using natural processes, such as fermentation; examples include bio-based acetic acid, bio-based citric acid, bio-based lactic acid and bio-based succinic acid, and the like. The organic acid may have food-use pedigree or be Generally Regarded As Safe (GRAS) or as a food additive by the US Food & Drug Administration (FDA). The organic acid is preferably approved as a food use inert by the US EPA and by European regulatory agencies.

The acid system comprises at least 30% by weight thereof of octanoic acid. In the case of the concentrate, the composition comprises from about 10% to about 30%, preferably from about 12% to about 22% by weight of the composition of the acid system. The acid system comprises from about 30% to about 50%, preferably from about 30% to about 45% by weight thereof of octanoic acid. The secondary acid preferably has a pKa of 4 or below at 20°C, and for food-use disinfection applications is preferably selected from citric acid, lactic acid and mixtures thereof.

In the case of the ready-to-use composition, the composition comprises from about 0.3% to about 6%, preferably from about 0.5% to about 4% by weight of the composition of the acid system. The acid system comprises from about 30% to about 45%, preferably from about 30% to about 35% by weight thereof of octanoic acid. The secondary acid preferably has a pKa of 4 or below at 20°C, preferably, the secondary acid is selected from citric acid, lactic acid and mixtures thereof.

Anionic surfactant system

The compositions of the present disclosure comprise an anionic surfactant system. By "anionic surfactant system" is herein meant a system comprising at least two different anionic surfactants. The surfactant system comprises octyl sulfate, preferably in the form of sodium octyl sulfate, as a main surfactant and a secondary anionic surfactant having a hydrophobic moiety comprising a carbon chain length with at least ten carbon atoms, preferably with at least eleven carbon atoms and more preferably with twelve carbon atoms. Preferably the surfactant system comprises sodium dodecyl sulfate (e.g., Na C12 AS) or sodium lauryl sulfate (e.g., Na C12-14 AS) as a secondary surfactant. Specific ratios of octyl sulfate to dodecyl sulfate/lauryl sulfate are used to provide phase and chemical stability, in both concentrated and diluted form. Additionally, the combination of octyl sulfate and dodecyl sulfate at ratios disclosed herein also helps drive cidal activity of the concentrates upon dilution.

Without wishing to be bound by theory, it is believed that octyl sulfate provides fast biocidal kinetics and also acts as a hydrotrope driving enhanced dissolution of octanoic acid in the concentrate. The role of the secondary anionic surfactant is to provide solubility to the concentrate

upon dilution in water. It has been found that sodium octyl sulfate readily solubilizes octanoic acid (solubility in water = 0.07 g/ 100 ml at 25°C in absence of sodium octyl sulfate) in the concentrated form. However, sodium octyl sulfate is less effective in solubilizing octanoic acid following a significant dilution in water. The higher the water content, the more difficult it is to solubilize octanoic acid with octyl sulfate. Longer chain length surfactants are effective to improve solubility at high water dilutions. Sodium dodecyl sulfate and sodium lauryl sulfate are particularly effective in this respect. Other optional long-chain (C12 chain length or greater) secondary surfactants can also be used; examples include but are not limited to, sodium C14-17 paraffin sulfonate (14 to 17 carbon atoms in the hydrophobic moiety), sodium dodecyl benzene sulfonate (18 carbon atoms in the hydrophobic moiety), sodium dodecyl diphenyl ether disulfonate (24 carbon atoms in the hydrophobic moiety), sodium lauryl ether sulfate (12-14 carbon atoms in the hydrophobic moiety), and the like. So as to comply with regulations associated with cleaning and disinfecting products on food contact surfaces, the second surfactant is preferably an approved food use inert (https://iaspub.epa.gov/apex/pesticides/f?p=INERTFINDER:1:0::NO:1). Sodium dodecyl sulfate/ sodium lauryl sulfate is preferred for use herein.

The anionic surfactant system comprises at least 60% by weight of the system of octyl sulfate. More specifically, concentrate and ready-to-use compositions herein comprise from about 60% to about 90%, preferably from about 75% to about 90% by weight of the anionic surfactant system of octyl sulfate salt. Preferably, the anionic system also comprises at least 5% by weight of the anionic system of sodium dodecyl sulfate or sodium lauryl sulfate (lauryl sulfate generally comprises ~65-75% C12 chain length + ~25-35% C14 chain length with minor or negligible levels of C10 and C16 chain length). Preferably, concentrate compositions herein comprise from about 5% to about 40%, preferably from about 10% to about 25% by weight of the anionic surfactant system of either dodecyl sulfate salt or lauryl sulfate salt. The weight ratio of octyl sulfate to dodecyl sulfate is preferably from about 4:1 to about 10:1. Preferably, ready-to-use compositions herein comprise from about 5% to about 40%, preferably from about 10% to about 25% by weight of the anionic surfactant system of either dodecyl sulfate salt or lauryl sulfate salt. The ratio of octyl sulfate to dodecyl sulfate is preferably from about 2:1 to about 10:1.

Fragrance

The composition comprises a fragrance. The fragrance is a mixture of odorant raw materials, such as aromatic natural oils and aromatic chemicals, which taken together form a complex scent that delivers a number of benefits. These benefits may include the coverage of product base odor, scenting the product itself, and lingering scent radiating from the surface into the air after cleaning. When the composition is sprayed, the benefit may also include the delivery

of scent to the air when spraying the composition on a surface, and the delivery of scent to the air while wiping the composition on the surface. The fragrance may comprise at least 3, at least 5, at least 7, at least 11, or at least 15 fragrance raw materials.

The fragrance may comprise at most 50%, or at most 40%, or at most 30%, for example from 0% to 20%, or from 0.01% to 10%, or from 0.02% to 5%, per weight of raw materials comprising an α, β-unsaturated aldehyde function, an α, β-unsaturated ketone function, and/or an ester function.

For the purpose of the invention, an aromatic aldehyde/ketone wherein the aromatic ring is adjacent to the aldehyde or ketone group (e.g. anisic aldehyde or methyl β-naphthyl ketone) is considered as an α, β-unsaturated aldehyde/ketone.

The fragrance raw materials of the fragrance of the composition of the invention may comprise at most 50%, or at most 40%, or at most 30% for example from 0% to 20%, or from 0.01% to 10%, or from 0.02% to 5% per weight of fragrance raw materials selected from benzyl acetate, methyl salicylate, allyl amyl glycolate, benzyl propionate, pomarose, methyl dihydrojasmonate, heliotropin, anisic aldehyde, delta damascone, amyl butyrate, iso-amyl iso-butyrate, b-ionone, carvone, iso-butyl iso butanoate, methyl b-naphtyl ketone, citronellyl butyrate, iso-propyl miristate.

The fragrance of the composition of the invention may comprise at least 20% per weight, in particular at least 30%, or at least 40%, or at least 50%, or at least 60%, or at least 70% for example from 80% to 100%, or from 90% to 99.9% per weight of raw materials comprising an α, β-saturated aldehyde function, an α, β-saturated ketone function, an alcohol function, an ether function, a nitrile function, and/or being a terpene.

For the purpose of the invention an α, β-saturated aldehyde function is an aldehyde function without unsaturation in the α or β position.

For the purpose of the invention an α, β-saturated ketone function is a ketone function without unsaturation in the α or β position.

The fragrance of the composition of the invention may comprise at least 20% per weight, in particular at least 30%, or at least 40%, or at least 50%, or at least 60%, or at least 70% for example from 80% to 100%, or from 90% to 99.9% per weight of raw materials which do not comprise α, β-unsaturated aldehyde function, an α, β-unsaturated ketone function, and/or an ester function.

The fragrance of the composition of the invention may comprise at least 20% per weight, in particular at least 30%, or at least 40%, or at least 50%, or at least 60%, or at least 70% for example from 80% to 100%, or from 90% to 99.9% per weight of raw materials which comprise

α, β-saturated aldehyde function, an α, β-saturated ketone function, an alcohol function, an ether function, a nitrile function, and/or are a terpene and which do not comprise an α, β-unsaturated aldehyde function, an α, β-unsaturated ketone function, and/or an ester function.

The fragrance of the composition of the invention may comprise at least 20% per weight, in particular at least 30%, or at least 40%, or at least 50%, or at least 60%, or at least 70% for example from 80% to 100%, or from 90% to 99.9% per weight of raw materials selected from d-muscenone 1, ambrox, polysantol, phenylethyl dimethyl carbinol, hydroxycitronellal, undecavertol, citronellol, linalool, p-cresyl methyl ether, cis-3-hexenol, clonal, limonene, tobacarol 2, tobacarol 3, tobacarol 1, b-naphthyl methyl ether. Other fragrances suitable for use in the composition of the invention are described in EP 1 493 803 A1 and WO 2002/06437 A1.

The composition may comprise from 0.1% to 5%, or from 0.2% to 4%, or even from 0.3 % to 4% of fragrance by weight of the composition.

Especially preferred fragrance raw materials to be used in the compositions of the inventions are those listed in Tables 1 and 2.

Table 1- Exemplary Fragrance Raw Materials

CAS Number I **Chemical Name**	**I OtherName**	
Aliphatic, linear alpha, beta-unstaurated aldehydes, acids, and related alcohols		
3913-71-1	I 2-Decenal	**I** 2-Decenal
6728-26-3	Hexen-2-al	2-Hexenal, (2E)-
111-79-5	Methyl 2-nonenoate	2-Nonenoic acid, methyl ester
111-80-8	Methyl 2-nonynoate	2-Nonenoic acid, methyl ester
111-12-6	Methyl 2-octynoate	
Aliphatic acyclic acetals		
28069-74-1	Acetaldehyde ethyl cis-3-hexenyl acetal	3-Hexene, 1-(1-ethoxyethoxy)-, (3Z)-
7492-66-2	**1,** l-diethoxy-3, 7-dimethylocta-2,6-diene	2,6-Octadiene, **1,** l-diethoxy-3,7-dimethyl-
10022-28-3	Octanal dimethyl acetal	Octane, 1,1-dimethoxy-
Aliphatic acyclic and alicyclic terpenoid tertiary alcohols and structurally related substances		
151-05-3	Alpha,alpha-Dimethylphenethyl acetate	Benzeneethanol,alpha.,.alpha.-dimethyl-, acetate

10094-34-5	Alpha,alpha-Dimethylphenethyl butyrate	Butanoic acid, 1,1-dimethyl-2-phenylethyl ester
78-70-6	Linalool	1,6-Octadien-3-ol, 3,7-dimethyl-
115-95-7	Linalyl acetate	1,6-Octadien-3-ol, 3,7-dimethyl-, acetate
7212-44-4	Nerolidol (isomer unspecified)	1,6,10-Dodecatrien-3-ol, 3,7,11-trimethyl-
98-55-5	Alpha-Terpineol	3-Cyclohexene-a-methanol, .alpha.,.alpha.,4-trimethyl-
8007-35-0	Terpinyl acetate (Isomer mixture)	Terpineol, acetate
78-69-3	Tetrahydrolinalool	3-Octanol, 3,7-dimethyl-
Aliphatic acyclic diols, triols, and related agents		
102-76-1	(tri-)Acetin	1,2,3-Propanetriol, triacetate
Aliphatic and alicyclic hydrocarbons		
87-44-5	Beta-Caryophyllene	Bicyclo[7.2.0]undec-4-ene,4,11,11-trimethyl-8-methylene-, (1R,4E,9S)-
98-85-4	p-Mentha-1,4-diene	1,4-Cyclohexadiene, 1-methyl-4-(1-methylethyl)-
80-56-8	Alpha-Pinene	Bicyclo[3.1.1]hept-2-ene,2,6,6-trimethyl-
127-91-3	Beta-Pinene	Bicyclo[3.1.1]hept-2-ene, 2,6,6-trimethyl-
586-62-9	Terpinolene	Cyclohexene, 1-methyl-4-(1-methylethylidene)-
Aliphatic and aromatic ethers		
101-84-8	Diphenyl ether	Benzene, 1,1'-oxybis-
470-82-6	Eucalyptol	2-Oxabicyclo[2.2.2]octane, 1,3,3-trimethyl-
104-98-8	p-Methylanisole	Benzene, 1-methoxy-4-methyl-
16409-43-1	Tetrahydro-4-methyl-2-(2-methylpropen-1-yl)pyran	2H-Pyran, tetrahydro-4-methyl-2-(2-methyl-1-propenyl)-

Aliphatic branched-chain unsaturated alcohols, aldehydes, acids, and related esters		
106-23-0	Citronellal	6-Octenal, 3,7-dimethyl-
106-25-2	Nerol	2,6-Octadien-l-ol, 3,7-dimethyl-, (2Z)-
Aliphatic di-and trienals and related alcohols, acids, and esters		
3025-30-7	Ethyl (2E,4Z)-2,4-decadienoate	2,4-Decadienoic acid, ethyl ester, (2E,4Z)-
557-48-2	Nona-2-trans-6-cis-dienal	2,6-Nonadienal, (2E,6Z)-
Aliphatic lactones		
706-14-9	gamrna-Decalactone	2(3H)-Furanone, 5-hexvldihydro-
105-21-5	gamrna-Heptalactone	2(3H)-Furanone, dihydro-5-propyl-
695-06-7	gamma- Hexalactone	(3H)-Furanone, 5-ethyldihydro-
3301-94-8	Hydroxynonanoic acid, delta lactone	
710-04-3	5-Hydroxyundecanoic acid lactone	2H-Pyran-2-one, 6-hexyltetrahydro-
28645-51-4	Oxacycloheptadec-10-ene-2-one	Oxacycloheptadec-10-en-2-one
104-61-0	gamrna-Nonalactone	2(3H)-Furanone, dihydro-5-pentyl-
104-50-7	gamrna-Octalactone	2(3H)-Furanone, 5-butyldihydro-
106-02-5	omega-Pentadecalactone	Oxacyclohexadecan-2-one
104-67-6	gamma-Undecalactone	2(3H)-Furanone, 5-heptyldihydro-
Aliphatic secondary alcohols, ketones and related esters and acetals		
81925-81-7	5-Methyl-2-hepten-4-one	
110-93-0	6-Methyl-5-hepten-2-one	5-Hepten-2-one, 6-methyl-
Allyl esters		
123-68-2	Ally hexanoate	Hexanoic acid, 2-propenyl ester
Alphatic primary alcohols, aldehydes, carboxylic acids, acetals and esters		
105-53-3	Diethyl rnalonate	Propanedioic acid, diethyl ester
141-97-9	Ethyl acetoacetate	Butanoic acid, 3-oxo-, ethyl ester
105-95-3	Ethylene brassylate	1,4-Dioxacycloheptadecane-5,17-dione
107-75-5	Hydroxycitronellal	Octanal, 7-hydroxy-3,7-dimethyl-
107-74-4	Hydroxycitronellol	1,7-Octanediol, 3,7-dimethyl-

705-86-2	delta-Decalactone	2H-Pvran-2-one, tetrahydro-6-pentv1-
77-93-0	Triethy1citrate	1,2,3-Propanetricarboxylic acid, 2-hydroxy-, triethyl ester
Anthranilate derivatives		
134-20-3	Methy1 anthranilate	Benzoic acid, 2-amino-, methyl ester
85-91-6	Methyl N-methylanthranilate	Benzoic acid, 2-(methylamino)-, methyl ester
Aromatic hydrocarbons		
99-87-6	p-Cymene	Benzene, 1-methyl-4-(1-methylethyl)-
Aromatic substituted secondary alcohols, ketones, and related ester		
98-86-2	Acetophenone	Ethanone, 1-phenyl-
122-00-9	4' -Methylacetophenone	Ethanone, 1(4-methylpheny1)-
93-92-5	alpha-Methylbenzvl acetate	Benzenemethanol, alpha.-methyl-, acetate
98-85-1	alpha-Methylbenzyl alcohol	Benzenemethanol, alpha.-methy1-
93-08-3	Methyl beta-naphthyl ketone	Ethanone, 1-(2-naphthaleny1)-
Benzy1 derivatives		
100-52-7	Benzaldehyde	Benzaldehyde
140-11-4	Benzvl acetate	Acetic acid, phenylmethy1 ester
100-51-6	Benzyl alcohol	Benzenemethanol
103-37-7	Benzyl butyrate	Butanoic acid, phenylmethyl ester
103-28-6	Benzyl isobutyrate	Propanoic acid, 2-methyl-, phenylmethyl ester
122-63-4	Benzvl propionate	Propanoic acid, phenylmethyl ester
122-03-2	Curninaldchydc	Bcnzaldchydc, 4-(1-mcthy lcthy1)-
93-89-0	Ethyl benzoate	Benzoic acid, ethyl ester
93-58-3	Methy1 benzoate	Benzoic acid, methyl ester
Carvone and structurally related substances		
20777-49-5	Dihydrocarvvl acetate	
Cinnamy1derivatives		
104-55-2	Cinnarnaldehyde	2 Propenal, 3-phenyl-
104-54-1	Cinnamyl alcohol	2-Propen-1-ol, 3-phenyl-
101-86-0	alpha-Hexy lcinnarnaldehyde	Octanal, 2-(pheny lmethylene)-
101-39-3	alpha-Methy lcinnamaldehyde	2-Propenal, 2-methyl-3-phenyl-
103-26-4	Methy1 cinnarnate	2 Propenoic acid, 3-phenyl-, methyl ester

122-97-4	3-Phenyl 1-propanol	Benzenepropanol
Esters of aliphatic acyclic primary alcohols with aliphatic linear saturated carboxylie acids		
16491-36-4	cis-3-Hexenyl butyrate	Butanoic acid, (3Z)-3-hexenyl ester
31501-11-8	cis-3-Hexenyl hexanoate	Hexanoic acid, (3Z)-3-hexenyl ester
2639-63-6	Hexyl butyrate	Butanoic acid, hexyl ester
6378-65-0	Hexyl hexanoate	Hexanoic acid, hexyl ester
2445-76-3	Hexyl propionate	
110-19-0	Ixobutyl acetate	
112-19-6	10-Undecen-l-yl acetate	

Table 2

CAS Number	Chemical Name
100-06-1	Acetanisole
10032-15-2	Hexyl 2-methylbutanoate
100-86-7	*alpha,alpha*-Dimethylphenethyl alcohol
10094-41-4	3-Hexenyl 2-methylbutanoate
101-41-7	Methyl phenylacetate
101-84-8	Diphenyl ether
101-86-0	alpha-Hexylcinnamaldehyde
101-94-0	p-Tolyl phenylacetate
101-97-3	Ethyl phenylacetate
102-13-6	Isobutyl phenylacetate
102-16-9	Benzyl phenylacetate
102-19-2	Isoamyl phenylacetate
102-22-7	Geranyl phenylacetate
103-07-1	2-Methyl-4-phenyl-2-butyl acetate
103-36-6	Ethyl cinnamate
103-38-8	Benzyl isovalerate
103-41-3	Benzyl cinnamate
103-52-6	Phenethyl butyrate
103-53-7	Phenethyl cinnamate
103-54-8	Cinnamyl acetate

103-56-0	Cinnamyl propionate
103-59-3	Cinnamyl isobutyrate
103-60-6	2-Phenoxyethyl isobutyrate
103-82-2	Phenylacetic acid
103-93-5	p-Tolyl isobutyrate
104-09-6	p-Tolylacetaldehyde
104-20-1	4-(p-Methoxyphenyl)-2-butanone
104-21-2	Anisyl acetate
104-45-0	p-Propylanisole
104-53-0	3-Phenylpropionaldehyde
104-55-2; 14371-10-9	Cinnamaldehyde
104-57-4	Benzyl formate
10458-14-7	Menthone
104-62-1	Phenethyl formate
104-65-4	Cinnamyl formate
104-76-7	2-Ethyl-1-hexanol
105-01-1	Isobutyl 3-(2-furan)propionate
105-37-3	Ethyl propionate
105-57-7	Acetal
105-68-0	Isoamyl propionate
105-85-1	Citronellyl formate
105-86-2	Geranyl formate
105-90-8	Geranyl propionate
106-21-8	3,7-Dimethyl-1-octanol
106-22-9	*dl*-Citronellol
106-23-0	Citronellal
106-24-1	Geraniol
106-29-6	Geranyl butyrate
106-35-4	3-Heptanone
106-44-5	p-Cresol
106-68-3	3-Octanone
106-70-7	Methyl hexanoate

1076-56-8	1-Methyl-3-methoxy-4-isopropylbenzene
107-87-9	2-Pentanone
108-21-4	Isopropyl acetate
108-29-2	*gamma*-Valerolactone
108-50-9	2,6-Dimethylpyrazine
108-64-5	Ethyl isovalerate
108-82-7	2,6-Dimethyl-4-heptanol
108-83-8	2,6-Dimethyl-4-heptanone
109-08-0	2-Methylpyrazine
109-19-3	Butyl isovalerate
109-21-7	Butyl butyrate
109-42-2	Butyl 10-undecenoate
109-94-4	Ethyl formate
110-27-0	Isopropyl myristate
110-40-7	Diethyl sebacate
110-43-0	2-Heptanone
11050-62-7	Isojasmone
110-93-0	6-Methyl-5-hepten-2-one
111-11-5	Methyl octanoate
111-13-7	2-Octanone
111-62-6	Ethyl oleate
1117-55-1	Hexyl octanoate
111-81-9	Methyl 10-undecenoate
1118-27-0	Linalyl isovalerate
112-06-1	Heptyl acetate
112-12-9	2-Undecanone
112-14-1	Octyl acetate
112-17-4	Decyl acetate
1123-85-9	beta-Methylphenethyl alcohol
112-38-9	10-Undecenoic Acid
112-45-8	10-Undecenal
112-66-3	Lauryl acetate

112-80-1	Oleic Acid
1128-08-1	3-Methyl-2-(n-pentanyl)-2-cyclopenten-1-one
1139-30-6	beta-Caryophyllene oxide
115-71-9 (α) 77-42-9 (β 11031-45-1)	Santalol
115-95-7	Linalyl acetate
115-99-1	Linalyl formate
116-02-9	3,5,5-Trimethylcyclohexanol
116-53-0	2-Methylbutyric acid
118-58-1	Benzyl salicylate
118-71-8	Maltol
119-36-8	Methyl salicylate
1193-81-3	(±)-1-Cyclohexylethanol
1195-32-0	p,alpha-Dimethylstyrene
119-65-3	Isoquinoline
1197-01-9	*p-alpha,alpha*-Trimethylbenzyl alcohol
120-11-6	Isoeugenyl benzyl ether
120-45-6	alpha-Methylbenzyl propionate
120-50-3	Isobutyl benzoate
120-51-4	Benzyl benzoate
120-57-0	Piperonal
1207-44-0	Prenyl benzoate
121-32-4	Ethyl vanillin
121-33-5	Vanillin
121-39-1	Ethyl 3-phenylglycidate
121-98-2	Methyl anisate
122-40-7	alpha-Amylcinnamaldehyde
122-48-5	Zingerone
122-67-8	Isobutyl cinnamate
122-68-9	3-Phenylpropyl cinnamate
122-69-0	Cinnamyl cinnamate
122-70-3	Phenethyl propionate

122-72-5	3-Phenylpropyl acetate
122-78-1	Phenylacetaldehyde
122-91-8	Anisyl formate
123-07-9	p-Ethylphenol
123-32-0	2,5-Dimethylpyrazine
123-51-3	Isoamyl alcohol
123-68-2	Allyl hexanoate
123-76-2	Levulinic acid
123-86-4	Butyl acetate
123-92-2	Isoamyl acetate
124-06-1	Ethyl myristate
124-10-7	Methyl myristate
125037-13-0; 502-61-4	Farnesene
125-12-2	Isobornyl acetate
126-64-7	Linalyl benzoate
127-17-3	Pyruvic acid
127-41-3	alpha-Ionone
127-42-4	Methyl-alpha-ionone
127-43-5	Methyl-beta-ionone
127-91-3	beta-Pinene
13171-00-1	4-Acetyl-6-t-butyl-1,1-dimethylindan
1322-17-4	1,3-Nonanediol acetate (mixed esters)
133-37-9, 87-69-4	Tartaric acid (*d-*, *l-*, *dl-*, *meso-*)
1334-78-7	Tolualdehydes (mixed o,m,p)
13466-78-9	3-Carene
13481-87-3	Methyl 3-nonenoate
13494-06-9	3,4-Dimethyl-1,2-cyclopentadione
13532-18-8	Methyl 3-methylthiopropionate
13679-70-4	5-Methyl-2-thiophenecarboxyaldehyde
13877-91-3	3,7-Dimethyl-1,3,6-octatriene
140-11-4	Benzyl acetate
140-39-6	p-Tolyl acetate

141-12-8	Neryl acetate
141-14-0	Citronellyl propionate
141-16-2	Citronellyl butyrate
141-92-4	Hydroxycitronellal dimethyl acetal
142-19-8	Allyl heptanoate
142-50-7	Petitgrain Oil
143-13-5	Nonyl acetate
143-14-6	9-Undecenal
143-28-2	*cis*-9-Octadecenol
144-39-8	Linalyl propionate
14765-30-1	2-sec-Butylcyclohexanone
148-05-1	*gamma*-Dodecalactone
14901-07-6; 79-77-6	beta-Ionone
150-78-7	p-Dimethoxybenzene
151-10-0	m-Dimethoxybenzene
15111-96-3	*p*-Mentha-1,8-dien-7-yl acetate
151-82-4	3-Hexenyl formate
15356-70-4, 89-78-1, 1490-04-6	Menthol
15679-13-7	2-Isopropyl-4-methylthiazole
15706-73-7	*n*-Butyl 2-methylbutyrate
15707-23-0	2-Ethyl-3-methylpyrazine
1604-28-0	6-Methyl-3,5-heptadien-2-one
1617-23-8	Ethyl 2-methyl-3-pentenoate
16356-11-9	1,3,5-Undecatriene
16409-43-1	Tetrahydro-4-methyl-2-(2-methylpropen-1-yl)pyran
16491-24-0	2,4-Hexadienyl isobutyrate
16510-27-3	1-Cyclopropanemethyl-4-methoxybenzene
1786-08-9	Nerol oxide
1866-31-5	Allyl cinnamate
197098-61-6	8-Ocimenyl acetate
198-24-2	1-Octen-3-yl acetate

198404-98-7	(1-Methyl-2-(1,2,2-trimethylbicyclo[3.1.0]hex-3-ylmethyl)cyclopropyl)methanol
19872-52-7	4-Mercapto-4-methyl-2-pentanone
2021-28-5	Ethyl 3-phenylpropionate
21368-68-3	dl-Camphor
2142-94-1	Neryl formate
21722-83-8	Cyclohexaneethyl acetate
2173-57-1	beta-Naphthyl isobutyl ether
21834-92-4	5-Methyl-2-phenyl-2-hexenal
2236-90-2	Vanilla (*Vanilla* spp.)
2239-36-8	Mace oil (*Myristica fragrans* Houtt.)
2270-60-2	Methyl 3,7-dimethyl-6-octenoate
2305-21-7	2-Hexen-1-ol
23267-57-4	beta-Ionone epoxide
2345-26-8	Geranyl isobutyrate
2408-20-0	Allyl propionate
24168-70-5	2-Methoxy-3-(1-methylpropyl)pyrazine
2416-94-6	2,3,6-Trimethylphenol
2463-53-8	2-Nonenal
24683-00-9	2-Isobutyl-3-methoxypyrazine
24717-85-9	Citronellyl 2-methylbut-2-enoate,
24817-51-4	Phenylethyl 2-methylbutyrate
24851-98-7	Methyl dihydrojasmonate
2497-18-9	2-Hexen-1-yl acetate
25152-85-6	cis-3-Hexenyl benzoate
25524-95-2	5-Hydroxy-7-decenoic acid delta-lactone
2593-35-2	Benzoin gum, Sumatra
2785-89-9	4-Ethylguaiacol
27939-60-2	(2,4) and (3,5) and (3,6)-Dimethyl-3-cyclohexenylcarbaldehyde
29214-60-6	Ethyl 2-acetyloctanoate
29350-73-0; 523-47-7	Cadinene (mixture of isomers)

29548-30-9	3,7,11-Trimethyldodeca-2,6,10-trienyl acetate
29895-73-6	Phenylacetaldehyde glyceryl acetal
299-35-2	Methyl N-acetylanthranilate
301-00-8, 112-63-0	Methyl linoleate & Methyl linolenate (mixture)
30390-50-2	4-Decenal
30640-46-1;1888-90-0	Mixture of Methyl cyclohexadiene and Methylene cyclohexene
3142-72-1	2-Methyl-2-pentenoic acid
3208-40-0	2-(3-Phenylpropyl)tetrahydrofuran
326-61-4	Piperonyl acetate
32764-98-0	8-Decen-5-olide
33467-74-2	*cis*-3-Hexenyl propionate
3391-86-4	1-Octen-3-ol
3452-97-9	3,5,5-Trimethyl-1-hexanol
35044-68-9; 23726-92-3; 23726-91-2	4-[(2,6,6)-Trimethyl cyclohex-1-enyl) but-2-en-4one
3558-60-9	Methyl phenethyl ether
360676-70-1; 2216-45-7; 17373-93-2	Methylbenzyl acetate (mixed o,m,p)
36267-71-7	5,7-Dihydro-2-methylthieno(3,4-d)pyrimidine
36431-72-8	Theaspirane
3658-77-3	4-Hydroxy-2,5-dimethyl-3(2H)-furanone
3681-71-8	*cis*-3-Hexen-1-yl acetate
3738-00-9	1,5,5,9-Tetramethyl-13-oxatricyclo(8.3.0.0(4,9))tridecane
37526-88-8	Benzyl trans-2-methyl-2-butenoate
3777-69-3	2-Pentylfuran
38462-22-5	p-Mentha-8-thiol-3-one
3848-24-6	2,3-Hexanedione
39255-32-8	Ethyl 2-methylpentanoate
39770-05-3	9-Decenal
41519-23-7	*cis*-3-Hexenyl isobutyrate

4180-23-8	trans-Anethole
43052-87-5	alpha-Damascone
431-03-8	Diacetyl
432-25-7	2,6,6-Trimethyl-1&2-cyclohexen-1-carboxaldehyde
4395-92-0	p-Isopropylphenylacetaldehyde,
459-80-3	Geranic acid
4602-84-0	Farnesol
464-49-3	d-Camphor
4674-50-4	Nootkatone
4695-62-9	d-Fenchone
470-67-7	1,4-Cineole
470-82-6	Eucalyptol
472-66-2	2,6,6-Trimethyl-1-cyclohexen-1-acetaldehyde
4748-78-1	4-Ethylbenzaldehyde
4826-62-4	2-Dodecenal
488-10-8, 6261-18-3	3-Methyl-2-(2-pentenyl)-2-cyclopenten-1-one
490-03-9	(+/-) 2-Hydroxypiperitone
491-07-6	d,l-Isomenthone
4940-11-8	Ethyl maltol
495-62-5	Bisabolene
501-52-0	3-Phenylpropionic acid
502-47-6	3,7-Dimethyl-6-octenoic acid
503-74-2	Isovaleric acid
507-70-0	Borneol
513-86-0	Acetoin
515-03-7	(-)-Sclareol
527-60-6	2,4,6-Trimethylphenol
5320-75-2	Cinnamyl benzoate
536-59-4	*p*-Mentha-1,8-dien-7-ol
536-60-7	p-Isopropylbenzyl alcohol
5392-40-5	Citral

539-88-8	Ethyl levulinate
539-90-2	Isobutyl butyrate
540-07-8	Amyl hexanoate
540-18-1	Amyl butyrate
5405-41-4	Ethyl 3-hydroxybutyrate
541-47-9	3-Methylcrotonic acid
541-91-3	3-Methyl-1-cyclopentadecanone
543-49-7	2-Heptanol
544-40-1	Butyl sulfide
55066-56-3	p-Tolyl 3-methylbutyrate
55418-52-5	4-(3,4-Methylenedioxyphenyl)-2-butanone
556-82-1	3-Methyl-2-buten-1-ol
55719-85-2	Phenethyl tiglate
5579-78-2	*epsilon*-Decalactone
56011-02-0	Isoamyl phenethyl ether
562-74-3	4-Carvomenthenol
564-20-5	Sclareolide
564-94-3	2-Formyl-6,6-dimethylbicyclo(3.1.1.)hept-2-ene
5655-61-8	*l*-Bornyl acetate
57-10-3	Palmitic acid
57-11-4	Stearic acid
57-55-6	Propylene glycol
576-26-1	2,6-Xylenol
5837-78-5	Ethyl tiglate
589-59-3	2-Methylpropyl 3-methylbutyrate
589-66-2	Isobutyl 2-butenoate
590-86-3	3-Methylbutyraldehyde
593-08-8	2-Tridecanone
59558-23-5	p-Tolyl octanoate
5988-91-0	3,7-Dimethyloctanal
5989-27-5	d-Limonene

60047-17-8, 5989-33-3, 34995-77-2	Linalool oxide
60-12-8	Phenethyl alcohol
60-33-3	Linoleic Acid
606-45-1	Methyl o-methoxybenzoate
621-82-9; 140-10-3	Cinnamic acid
623-42-7	Methyl butyrate
624-41-9	2-Methylbutyl acetate
628-97-7	Ethyl palmitate
6290-17-1	Ethyl 2,4-dimethyl-1,3-dioxolane-2-acetate
6290-37-5	Phenethyl hexanoate
63449-68-3	beta-Naphthyl anthranilate
638-49-3	Amyl formate
6413-10-1	Ethyl acetoacetate ethyleneglycol ketal
64275-73-6	*cis*-5-Octen-1-ol
644-35-9	o-Propylphenol
645-13-6	p-Isopropylacetophenone
645-56-7	p-Propylphenol
65416-14-0	Maltyl isobutyrate
65620-50-0	6-Hydroxydihydrotheaspirane
65-85-0	Benzoic acid
659-70-1	Isoamyl isovalerate
67028-40-4	Ethyl (p-tolyloxy)acetate
67-63-0	Isopropyl alcohol
67634-23-5	2-Phenylpropanal propyleneglycol acetal
67674-36-6	2,6-Nonadienal diethyl acetal
67715-80-4	2-Methyl-4-propyl-1,3-oxathiane
67801-20-1	3-Methyl-5-(2,2,3-trimethylcyclopent-3-en-1-yl)pent-4-en-2-ol
67801-45-0	*trans*-3-Heptenyl 2-methylpropanoate
67883-79-8	*cis*-3-Hexenyl tiglate
6789-88-4	Hexyl benzoate

68398-18-5	(+/-) 2,8-Epithio-cis-p-menthane
68606-81-5	Currant buds black absolute (*Ribes nigrum* L.)
68606-83-7	Cananga oil
68648-39-5	Oils, lemon, terpene-free
68917-18-0	Cornmint Oil
68917-52-2	Schinus molle oil (*Schinus molle* L.)
68917-75-9	Wintergreen oil (*Gaultheria procumbens* L.)
68952-43-2	Oils, star anise
689-67-8	6,10-Dimethyl-5,9-undecadien-2-one
692-86-4	Ethyl 10-undecenoate
698-10-2	5-Ethyl-3-hydroxy-4-methyl-2(5H)-furanone
698-76-0	*delta*-Octalactone
7011-83-8	*gamma*-Methyldecalactone
705-73-7	alpha-Propylphenethyl alcohol
70851-61-5	4-Hydroxy-4-methyl-7-cis-decenoic acid gamma lactone
71159-90-5	1-p-Menthene-8-thiol
713-95-1	*delta*-Dodecalactone
71-41-0	Amyl alcohol
7452-79-1	Ethyl 2-methylbutyrate
7492-44-6	alpha-Butylcinnamaldehyde
7492-67-3	Citronelloxyacetaldehyde
7492-70-8	Butyl butyryllactate
7493-57-4	Propyl phenethyl acetal
7493-74-5	Allyl phenoxyacetate
75-18-3	Methyl sulfide
7549-33-9	Anisyl propionate
7549-37-3	Citral dimethyl acetal
76-49-3	Bornyl acetate
77-53-2	(+)-Cedrol
7779-23-9	Linalyl hexanoate

7779-50-2, 28645-51-4, 123-69-3	*omega*-6-Hexadecenlactone
7779-65-9	Isoamyl cinnamate
7779-78-4	alpha-Isobutylphenethyl alcohol
7779-81-9	Isobutyl angelate
77-83-8	Ethyl methylphenylglycidate
7785-33-3	Geranyl tiglate
7786-29-0	2-Methyloctanal
7786-44-9	2,6-Nonadien-1-ol
7786-61-0	2-Methoxy-4-vinylphenol
78-35-3	Linalyl isobutyrate
78-37-5	Linalyl cinnamate
78-70-6	Linalool
78-84-2	Isobutyraldehyde
79-09-4	Propionic acid
79-31-2	Isobutyric acid
79-69-6	alpha-Irone
79-76-5	gamma-Ionone
79-89-0	beta-Isomethylionone
79-92-5	Camphene
8000-25-7	Oils, rosemary
8000-26-8	Pine needle oil
8000-28-0	Oils, lavender
8000-29-1	Oil of Citronella, *Cymbopogon nardus* (l.) Rendle (Sri Lanka type)
8000-29-1	Oil of citronella, *Cymbopogon winterianus* Jowitt (Java type)
8000-46-2	Oils, geranium
8000-48-4	Eucalyptus oil
8000-66-6	Cardamom seed oil (Elettaria cardamomum (L.) Maton)
8002-68-4	Juniper oil (*Juniperus communis* L.)

8002-73-1	Orris absolute (*Iris pallida*)
8006-64-2	Turpentine, oil
8006-77-7	Allspice oil *(Pimenta officinalis* Lindl.)
8006-82-4	Pepper, black, oil (*Piper nigrum* L.)
8006-83-5	Hyssop oil (Hyssopus officinalis L.)
8006-84-6	Fennel oil bitter (Foeniculum vulgare Miller)
8006-90-4	Oils, peppermint
8007-00-9	Balsam oil, Peru (*Myroxylon pereirae* Klotzsch)
8007-01-0	Rose absolute (*Rosa* spp.)
8007-11-2	Origanum oil, Spanish
8007-35-0	Terpinyl acetate
8007-46-3	Oils, thyme
8007-70-3	Oil of anise
8007-75-8	Oil of bergamot
8007-80-5	Cassia bark oil
8008-51-3	Oil of camphor
8008-52-4	Coriander oil (*Coriandrum sativum* L.)
8008-57-9	Oil of orange
8008-80-8	Oils, spruce
8008-98-8	Cajeput oil (Melaleuca leucadendron L.)
8014-19-5	Oils, palmarosa
8014-29-7	Rue oil (Ruta graveolens L.)
8015-77-8	Bois de rose oil
8015-92-7	Chamomile flower, Roman, oil (Anthemis nobilis L.)
8016-21-5	Cognac oil, green
8016-31-7	Lovage oil (Levisticum officinale Koch)
8016-38-4	Neroli bigarde oil (*Citrus aurantium* L.)
8016-44-2	Petitgrain Paraguay oil

8016-63-5	Clary oil (Salvia sclarea L.)
8016-78-2	Sandalwood yellow oil (*Santalum album* L.)
8016-78-2	Spike lavender oil (*Lavandula spp.*)
8016-84-0	Tagetes oil (*Tagetes erecta* L.)
8021-29-2	Oils, Fir
8022-56-8	Oils, sage (Spanish)
8022-96-6	Jasmine oil (*Jasminum grandiflorum* L.)
8023-95-8	Helichrysum leaf oil (*Helichrysum angustifolium*)
8023-99-2	Pine scotch oil (*Pinus sylvestris* L.)
8024-05-3	Tuberose oil (Polianthes tuberosa L.)
80-27-3	Terpinyl propionate
8030-28-2	Orange flower water absolute
8046-19-3	Storax (*Liquidambar* spp.)
80-56-8	alpha-Pinene
80-59-1	*trans*-2-Methyl-2-butenoic acid
80-71-7	Methylcyclopentenolone
821-55-6	2-Nonanone
83-34-1	Skatole
84082-70-2	Peppermint (*Mentha piperita*) ext.
84649-98-9	Cinnamon leaf oil
84650-63-5	Vanilla extract (*Vanilla* spp.)
84929-51-1	Thyme (*Thymus vulgaris*) oil
84961-50-2	Cloves (*Eugenia* spp.)
85940-32-5	Cardamom (Elettaria cardamomum (L.) Maton)
868-57-5	Methyl 2-methylbutyrate
87-19-4	Isobutyl salicylate
87-20-7	Isoamyl salicylate
87-22-9	Phenethyl salicylate
87-25-2	Ethyl anthranilate
87-44-5	beta-Caryophyllene

87-91-2	Diethyl tartrate
88-69-7	2-Isopropylphenol
88-84-6	Guaiene
89-79-2	Isopulegol
89-83-8	Thymol
9000-64-0	Tolu, balsam, gum (*Myroxylon* spp.)
90-02-8	Salicylaldehyde
90-05-1	Guaiacol
90-12-0	1-Methylnaphthalene
90147-36-7	Violet leaves absolute (*Viola odorata* L.)
91-10-1	2,6-Dimethoxyphenol
91-16-7	1,2-Dimethoxybenzene
91-62-3	6-Methylquinoline
92-52-4	Biphenyl
928-96-1	3-Hexen-1-ol
93-04-9	beta-Naphthyl methyl ether
93-08-3	Methyl beta-naphthyl ketone
93-16-3	Isoeugenyl methyl ether
93-18-5	beta-Naphthyl ethyl ether
93-28-7	Eugenyl acetate
93-29-8	Isoeugenyl acetate
93-51-6	2-Methoxy-4-methylphenol
94-02-0	Ethyl benzoylacetate
94087-83-9	4-Methoxy-2-methyl-2-butanethiol
94167-14-3	*Vanilla tahitensis*, ext.
94266-47-4	*Citrus*, ext.
94-46-2	Isoamyl benzoate
94-48-4	Geranyl benzoate
94-86-0	Propenylguaethol
95-16-9	Benzothiazole
95-65-8	3,4-Xylenol
95-87-4	2,5-Xylenol

96-48-0	4-Hydroxybutanoic acid lactone
97-42-7	Carvyl acetate
97-53-0	Eugenol
97-54-1	Isoeugenol
97-64-3	Ethyl lactate
97-89-2	Citronellyl isobutyrate
98-01-1	Furfural
98-02-2	Furfuryl mercaptan
99-72-9	2-(p-Tolyl)propionaldehyde
997-29-7	Valencene
99-83-2	alpha-Phellandrene
99-86-5	p-Mentha-1,3-diene

Water

The compositions disclosed herein may comprise water. The water may be of any hardness. The water may be de-ionized water, reverse-osmosis-treated water, distilled water, or soft water (typically, soft water does not exceed 40 ppm hardness (as $CaCO_3$)). The amount of water in a given composition depends on the degree to which the composition is concentrated. A concentrate composition may comprise less than about 50% water, usually from about 40% to 75%, or from about 50% to 60% of water by weight of the composition. The concentrate may provide improved economics on a per-use basis (e.g., following recommended dilution) for the user. It is found that even at water content levels of about 50%, the compositions of the invention show surprisingly good hydrolytic stability (octyl sulfate reversion to octanol + sulfuric acid).

Ready-to-use compositions generally comprise greater water content than concentrated compositions, which are intended to be diluted at the point of use. A ready-to-use composition may comprise from about 80% to about 99.9%, or from about 90% to about 99.5% water, or from about 91% to about 99% water by weight of the composition.

pH

The compositions disclosed herein have pH values ranging from about 1.5 to about 5.0, or from about 2 to about 4, or from about 2.1 to about 3.5. For a concentrated composition that comprises less than 70% water, the pH is measured after adding de-ionized water to the composition, until the total water concentration in the composition is 70%. For compositions that

comprise greater than or equal to 70% water, pH is measured on the composition as made (the composition is not diluted prior to measuring the pH).

A preferred concentrate composition comprises:

a) from about 3% to about 15% by weight of the composition of octanoic acid and preferably from about 5% to about 10% by weight of the composition of a secondary acid having a pKa below 4, preferably the secondary acid is selected from the group consisting of citric acid, lactic acid and mixtures thereof;

b) from about 12% to about 20% by weight of the composition of octyl sulfate and preferably from about 2% to about 6% by weight of the composition of sodium lauryl sulfate; and

c) from about 5% to about 20% by weight of the composition of 2-phenoxyethanol or from about 0.1 to about 5% by weight of the composition of a fragrance.

A preferred concentrate composition comprises:

a) from about 5% to about 10% by weight of the composition of octanoic acid and preferably from about 6% to about 12% by weight of the composition of a secondary acid having a pKa below 4, preferably the secondary acid is selected from the group consisting of citric acid, lactic acid and mixture thereof, more preferably the secondary acid comprises lactic acid;

b) from about 12% to about 20% by weight of the composition of octyl sulfate and preferably from about 2% to about 6% by weight of the composition of a secondary surfactant having a hydrophobic moiety comprising a carbon chain length with at least twelve carbon atoms; and

c) from about 0.1% to about 5% by weight of the composition of a fragrance.

A preferred concentrate composition comprises:

a) from about 4% to about 12% by weight of the composition of octanoic acid from about 5% to about 12% by weight of the composition of an acid selected from the group consisting of lactic acid, citric acid and mixtures thereof;

b) from about 10% to about 15% by weight of the composition of octyl sulfate and from about 2% to about 6% by weight of the composition of lauryl sulfate; and

c) from about 0.1% to about 5% by weight of the composition of a fragrance.

A preferred ready-to-use composition comprises:

a) from about 0.05% to about 1% by weight of the composition of octanoic acid and preferably from about 0.5% to about 5% by weight of the composition of a secondary

acid having a pKa below 4, preferably the secondary acid is selected from the group consisting of citric acid, lactic acid and mixtures thereof;

b) from about 1% to about 5% by weight of the composition of octyl sulfate and preferably from about 0.1% to about 2% by weight of the composition of a secondary surfactant having a hydrophobic moiety comprising a carbon chain length with at least twelve carbon atoms, and

c) from about 0.1% to about 5% by weight of the composition of 2-phenoxyethanol.

A preferred ready-to-use composition comprises:

a) from about 0.05% to about 0.6% by weight of the composition of octanoic acid and preferably from about 0.5% to about 3% by weight of the composition of a secondary acid selected from the group consisting of lactic acid, citric acid and mixtures thereof;

b) from about 1% to about 4% by weight of the composition of octyl sulfate and preferably from about 0.1% to about 1% by weight of the composition of a secondary surfactant having a hydrophobic moiety comprising a carbon chain length with at least twelve carbon atoms; and

c) from about 0.01% to about 0.5% by weight of the composition of fragrance.

Adjuncts

The compositions disclosed herein may also contain one or more adjuncts. Adjuncts may be employed to increase immediate and/or residual efficacy of the compositions, improve the wetting characteristics of the compositions upon application to a target substrate, operate as solvents for diluted compositions, and/or serve to modify the aesthetic characteristics of the composition. These adjuncts may also provide degreasing and solubilizing benefits, additional antimicrobial potentiation, suds control, thickening, soil agglomeration or soil release benefits, enhanced composition solubility, freeze-thaw stability, further catalysis of antimicrobial activity, residual or long-lasting (e.g., 24 hours) duration antimicrobial properties and/or enhanced surface safety benefits.

The composition(s) disclosed herein may comprise an adjunct selected from the group consisting of chelants, builders, buffers, abrasives, electrolytes, bleaching agents, dyes, foaming control agents, corrosion inhibitors, essential oils, thickeners, pigments, gloss enhancers, enzymes, detergents, solvents, dispersants, polymers, silicones, hydrotropes (e.g., sodium toluene, sodium xylene or sodium cumene sulfonate), and mixtures thereof.

In one embodiment, the composition of the invention is approved to clean and disinfect food-contact surfaces. As such, selection of approved food-contact surface adjuncts is needed to ensure that the complete composition consists only of approved food use active and inert

ingredients. This includes fragrances and fragrances, which are usually composed of a large blend of individual raw materials. In another embodiment, each of the fragrance raw materials is approved for use on food contact surfaces. Use on contact use surfaces allows for product application on hard surfaces without the need for a rinse step.

Methods of Use

The compositions disclosed herein may be used in a variety of applications and methods, including the treatment of inanimate surfaces, preferably hard surfaces. The compositions may be used in the home to clean, sanitize, disinfect and/or sterilize hard surfaces, such as counters, sinks, restrooms, toilets, bathtubs, shower stalls, kitchen appliances, restaurant tables and seats, countertops, floors, windows, walls, furniture, phones, toys, drains, pipes, and the like. The compositions may also be used in commercial establishments, such as hotels, hospitals, care homes, eating establishments, fitness centers, schools, office buildings, department stores, and prisons, to clean, sanitize, disinfect, or sterilize equipment, tools, food and medical preparation areas (in addition to the surfaces mentioned above that are common to both homes and commercial establishments). The compositions disclosed herein may be used to treat indoor as well as outdoor inanimate surfaces and may also be used to sanitize, disinfect, and/or sterilize soft inanimate surfaces, such as carpets, area rugs, curtains, upholstery, and clothes, in both home and commercial settings.

The compositions may be used to kill or inactivate bacteria, non-enveloped or enveloped viruses, fungi, mycobacteria, spores, or allergens on surfaces or in the air. The compositions may also be used to purify contaminated water. The compositions may be used to disinfect or sanitize indoor or outdoor non-food, indirect food, or food contact agricultural premises, buildings, including animal housing, pens, feed troughs, greenhouses, storage containers and the like. The compositions may be used to sanitize and/or disinfect equipment used in non-food, indirect food, or food contact indoor and outdoor settings, including equipment used in green houses (with or without ornamental or food crops), feed handling, hatcheries, ice dispensing, processing livestock feeding, milk processing, milking, mushroom houses, poultry processing or handling, transport vehicles, and the like. The compositions may also be used to clean and disinfect food and non-food contact surfaces in consumer homes and in commercial establishments, including but not limited to, kitchens, front and back of restaurants, cafeterias, cafes, bars, hotel lobbies and rooms, commercial establishment bathrooms, conference rooms, workplace desks and benches, care home areas, and the like.

Ready-to-use compositions may be housed in any container that allows for dispensing. Such containers may be metered to dispense a desired quantity or may include devices, such as

caps, that allow the user to determine the level of dosing. Examples of containers include bottles, aerosols, pumps, and the like. Ready-to-use compositions may also be embedded in wipes or foams, such as melamine-formaldehyde foams. Such wipes may comprise woven and/or nonwoven substrates, where the substrates may include synthetic fibers, non-synthetic fibers, or mixtures of synthetic and non-synthetic fibers. As such, the wipe may optionally comprise cellulosic or non-cellulosic fibers, and, for high chemical resistance, may be in the form of a microfiber. The wipe may be a stand-alone or singly-formed substrate or a laminate of two or more substrates. The concentrate may be housed in any container as well. In a preferred embodiment, the concentrate is housed in a PET bottle, preferably made from recycled PET. The concentrate may be dosed using mechanical or electrical pumps.

The composition(s) disclosed herein can be in a spray dispenser or in a nonwoven substrate. The spray bottle may be a 2-chamber bottle in which, for example, the antimicrobial active is present in a first chamber and is separated from other formulation components present in the second chamber so as to mitigate or preclude reactivity of the antimicrobial active prior to use. For example, the 2-chamber bottle can be used to reduce or eliminate equilibrium ester formation from reaction octanoic acid with 2-phenoxyethanol or with specific fragrance components. Upon spraying, the contents of the 2 chambers are mixed together and sprayed as a uniform solution. The present disclosure also relates to a method of reducing the population of microorganism on a surface comprising the steps of applying an effective amount of the composition(s) disclosed herein to the surface and optionally wiping the surface. The present disclosure also relates to a method of reducing population of microorganism on a surface comprising the steps of applying an effective amount of the composition(s) disclosed herein to the surface, where the composition contacts the surface for about 30 seconds to about 2 minutes, and optionally wiping the surface.

The methods of the invention provide fast disinfection as measured using the US EPA protocol for the Germicidal Spray Test *versus* Gram (+) bacteria such as Staphylococcus aureus and Gram (-) bacteria such as Pseudomonas aeruginosa using a one-minute exposure time. The methods provide fast fungicidal activity using the US EPA protocol for the Germicidal Spray Test versus *Trichophyton interdigitale* at a two-minute exposure time. The methods also provide fast virucidal activity using the US EPA protocol for the Germicidal Spray Test vs. non-enveloped viruses such as Rhinovirus and Feline calicivirus (Norovirus surrogate) and Murine Norovirus at 15 second and 30 second exposure times.

Examples

For purposes of illustrating the benefits provided by the compositions of the invention, bactericidal, fungicidal and virucidal tests were performed. The bactericidal and fungicidal

activity of the compositions of the present disclosure was quantified by the Association of Official Analytical Chemists (AOAC) Germicidal Spray Test (GST) Official Method 961.02, Germicidal Spray Products as Disinfectants (Official Methods of Analysis of the AOAC, 2009 Edition). Briefly, the GST is a carrier-based method used to evaluate disinfection efficacy of aerosol/pump-based spray products and volatile liquid products. In this method, a series of glass slides ("carriers") are inoculated with a representative test organism and dried for 30 minutes (> 4 log inoculation). The carriers contacting the dried organism film are then sequentially treated with the spray product until thoroughly wet and are exposed for a finite contact time. After exposure, the carriers are sequentially transferred to a liquid subculture medium specifically selected to neutralize the test substance antimicrobial active and to recover any surviving test organism. The carriers are incubated and visually examined for the presence or absence of growth. Results are recorded as: number of carriers showing growth/number of carriers tested. For example, a test result with 2 carriers showing growth out of 60 carriers tested would be recorded as 2/60; it is understood that a lower number of carriers showing growth is suggestive of a stronger performance, with 0/60 being the best result achievable. As such, comparisons may be made to differentiate the cidal efficacy of different compositions at a given contact time. In examples below, the exposure (contact) time for each experiment or group of experiments is provided. The virucidal activity of the compositions of the invention is measured using the EPA Virucidal Hard Surface Efficacy Test. Briefly, 8 glass Petri dishes with marked 4 square inches are inoculated with 0.4 ml of the challenge microorganism and dried for 30 minutes. Inoculated carriers are then sprayed until thoroughly wet, from a distance of 6 to 8 inches, with each pre-diluted composition using AOAC hard water (400 ppm as $CaCO_3$) or de-ionized water. The carriers include 5% serum organic load and the exposure time is either 15 or 30 seconds.

The compositions below were made up by mixing the components together. The concentration of each component in a given composition corresponds to the weight of the component, provided on an active basis, as a percent of the mass of the composition. Thus, '7% citric acid' means that the composition contains 7 grams citric acid active per 100 grams total mass of the composition. The components were added in the following order: de-ionized water, then sodium octyl sulfate and other surfactants, then organic acid(s), then octanoic acid, then optional fragrance or 2-phenoxyethanol and other optional adjuncts. The compositions were heated to about 50°C to accelerate dissolution of components though this is not a requisite step. All compositions were stored at ambient conditions (20-23°C) prior to testing.

For the Germicidal Spray Test results, the following microorganism abbreviations are used:
SA = *Staphylococcus aureus* ATCC 6538

PA = *Pseudomonas aeruginosa* ATCC 15442

TI = *Trichophyton interdigitale* ATCC 9533

For the Virucidal Hard Surface Efficacy Test, the following microorganism abbreviations are used:

RV 14 = Rhinovirus Type 14 ATCC VR-284

FCV – Feline calicivirus- ATCC VR-782

MNS = Murine Norovirus, Strain 99 (from Friedlich-Loeffer-Institut)

Just prior to testing, the concentrate compositions were diluted in either 400 ppm hardness AOAC synthetic water expressed as $CaCO_3$ ('Hard Water') or de-ionized water (abbreviated 'DI H_2O'). The methodology is described in the Association of Official Analytical Chemists (AOAC), Official Method 960.09, Germicidal and Detergent Sanitizing Action of Disinfectants, Preparation of Synthetic Hard Water, in Official Methods of Analysis of the AOAC, 2005 Edition. Dilutions are made on a volume basis. A 1:40 dilution means that a ready-to-test solution is made by combining with 39 milliliters of water for each milliliter of the composition to be diluted. Carrier results for bactericidal and fungicidal tests are reported as the number of carriers showing growth divided by the total number of carriers. Carrier results for virucidal tests are reported as a $\log_{10}$ reduction number.

Abbreviations

C8 AS: Sodium octyl sulfate, tradename Stepanol® C-8 sulfate from the Stepan Company, supplied as a 33% active solution in water.

C12-14 AS: Sodium lauryl sulfate, tradename Stepanol® WA-Extra from the Stepan Company, supplied as a 29% solution in water.

Citric acid: Citric acid, from Tate & Lyle Corporation, supplied as a 50% solution in water

Lactic acid: Lactic acid, from Sigma-Millipore supplied as an 88% solution in water.

Octanoic acid: Octanoic acid, tradename C8-99K, from Procter & Gamble, supplied as a 99+% neat liquid.

2-EPh: 2-Phenoxyethanol, tradename Phenoxitol®, from Univar supplied as a 99+% neat liquid.

PMA: Polymaleic acid, tradename Dequest P9000, from Italmatch supplied as a 50% amber solution in water.

PAA: Polyacrylic acid, tradename Acumer 1020, from Dow Chemical, supplied as a 40% solution in water.

Benzoic acid: ACS reagent benzoic acid supplied as a soft pellets by Sigma-Millipore with a minimum 99.5% activity.

NaCS: Sodium cumene sulfonate, tradename Naxonate® SC from Nease Corporation, supplied as a 45% solution in water.

Compositions #1-9 Testing:

Germicidal spray tests are performed in hard water conditions. Testing results are at 1-minute exposure time, unless stated otherwise, (SA = *Staphylococcus aureus* ATCC 6538, PA = *Pseudomonas aeruginosa* ATCC 15442, TI – *Trichophyton interdigitale* ATCC 9533). Microorganism inoculum count was ≥ 6 log for SA and PA testing, and ≥ 5 log for TI testing

Concentrate compositions #1-3:

Ingredient	# 1 (wt%)	# 2 (wt%)	# 3 (wt %)
C8 AS	15.0	15.0	15.0
C12-14 AS	3.5	3.5	3.5
Citric Acid	8.4	----	----
Lactic Acid	----	8.4	8.4
Octanoic Acid	7.0	7.0	7.0
NaCS	7.0	7.0	7.0
2-EPh	----	----	16.0
Fragrance	1.5	1.5	----
DI H2O	Remainder	Remainder	Remainder
pH	2.3	2.5	2.9

Composition #	SA 1:40 dilution Hard water	PA 1:40 dilution Hard water	TI 1:40 dilution Hard water
1	0/60	0/60	0/30
2	0/60	0/60	0/30
3	0/60	0/60	0/30

Upon dilution, compositions 1-3 of the invention provide complete kill results (e.g., no observed carrier failures). Additionally, compositions 1-3 all use US EPA inert food contact raw materials.

Ready-To-Use Compositions # 4-6

Germicidal spray tests results are at 30 seconds exposure time for composition 4 and 5, and at 15 seconds exposure time for composition 6.

Ingredient	# 4 (wt%)	# 5 (wt%)	# 6 (wt %)
C8 AS	3.0	3.0	2.0
C12-14 AS	0.4	0.4	0.7
Lactic Acid	1.0	1.0	----
Citric Acid	----	----	1.0
Octanoic Acid	0.3	0.6	0.6
2-EPh	----	4.0	4.0
DI H2O	Remainder	Remainder	Remainder
pH	2.3	2.3	2.3

Composition #	SA	PA	TI
4	0/60	0/60	0/30
5	0/60	0/60	0/30
6	0/60	Not Tested	0/10

Composition #4 and #5 of the invention provide complete kill activity vs. bacteria and fungi at 30 seconds exposure time. Composition #6 shows complete kill activity vs. bacteria and fungi at 15 seconds contact time.

Compositions #1, #3 and #5 Virucidal testing

The effectiveness of compositions 3 (concentrate, diluted 1:40 in AOAC hard water) and 5 (ready-to-use, undiluted) is evaluated versus three non-enveloped viruses as follows:

Rhinovirus Type 14 (RV 14) - ATCC VR-284 and Feline calicivirus (FCV) - ATCC VR-782. & Murine Norovirus, Strain 99 (MNS). Composition performance is measured using the EPA Virucidal Hard-Surface Efficacy Test. Briefly, 8 glass petri dishes with marked areas of 4 square inches are inoculated with 0.4 ml of the challenge microorganism and dried for 30 minutes. Inoculated carriers are then sprayed until thoroughly wet, from a distance of 6 to 8 inches. Composition 3 is pre-diluted 1:40 in AOAC hard water (400 ppm $CaCO_3$). The carriers include a 5% serum organic load and the exposure time is 15 seconds at 20 ±2°C.

	Composition 1 1:40 dilution, Hard H_2O		
	Carrier Result	Log Reduction	Conclusion
MNS	Not requested	3.50	Passed
FCV	0/8 failures	≥ 7.75	Passed

	Composition 3 1:40 dilution, Hard H_2O		
	Carrier Result	Log Reduction	Conclusion
RV 14	0/8 failures	≥ 4.00	Passed
FCV	0/8 failures	≥ 7.75	Passed

	Composition 5 No dilution		
	Carrier Result	Log Reduction	Conclusion
RV 14	0/8 failures	≥ 4.00	Passed
FCV	0/8 failures	≥ 7.75	Passed

Composition #1 diluted 1:40 in AOAC hard water passes the Virucidal Hard-Surface Efficacy Test versus Feline calicivirus and Murine Norovirus at a 15 second contact time. Composition #3 diluted 1:40 in AOAC hard water and composition #5, undiluted, pass the Virucidal Hard-Surface Efficacy Test versus Rhinovirus Type 14, and versus Feline calicivirus at a 15 second contact time with complete virus inactivation.

Concentrate compositions # 7-9:

Ingredient	# 7 (wt %)	# 8 (wt%)	# 9 (wt%)
C8 AS	12.0	12.0	12.0
C12-14 AS	2.0	2.0	2.0
Polymaleic acid	7.0	7.0	----
Benzoic acid	----	3.0	----

Polyacrylic acid	----	----	7.0
Octanoic Acid	7.0	7.0	5.0
Fragrance	1.0	1.0	0.5
DI H2O	Remainder	Remainder	Remainder
pH	2.1	2.1	2.1

Composition #	SA 1:40 dilution Hard Water	PA 1:40 dilution Hard Water	TI 1:40 dilution Hard Water
7	0/60	0/60	0/30
8	1/60	0/60	0/30
9	0/60	0/60	0/30

Compositions 7-9 diluted 1:40 in AOAC hard water demonstrate the ability to use a polymeric acid and still deliver bactericidal and moldicidal benefits.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

CLAIMS

What is claimed is:

1. An antimicrobial composition comprising:
   a) an acid system comprising at least 30% by weight thereof of octanoic acid and a secondary acid;
   b) an anionic surfactant system comprising at least 60% by weight thereof of octyl sulfate and a secondary surfactant having a moiety comprising a carbon chain length with at least ten carbon atoms; and
   c) a fragrance and/or 2-phenoxyethanol;
   and wherein the composition has a pH of from about 1.5 to about 5 as measured at 20°C.

2. A composition according to claim 1 comprising:
   a) from about 10% to about 30% by weight of the composition of the acid system;
   b) from about 10% to about 30% by weight of the composition of the anionic surfactant system comprising at least 70% by weight thereof of octyl sulfate and preferably at least 10% by weight thereof of dodecyl sulfate; and
   c) from about 10% to about 30% by weight of the composition of 2-phenoxyethanol and/or from about 0.1% to about 5% by weight of the composition of the fragrance;
   and wherein the composition has a pH of from about 2 to about 4 as measured at 20°C.

3. A composition according to any of the preceding claims wherein the composition comprises from about 12% to about 22% by weight of the composition of the acid system and wherein the acid system comprises from about 35% to about 55% by weight thereof of octanoic acid and the secondary acid has a pKa of 4 or below at 20°C.

4. A composition according to any of the preceding claims wherein the composition comprises from about 12% to about 22% by weight of the composition of the surfactant system and wherein the surfactant system comprises from about 70% to about 90% by weight thereof of octyl sulfate and the secondary surfactant preferably has a moiety comprising a carbon chain length with at least twelve carbon atoms, preferably the surfactant system comprises from about 10% to 30% by weight of dodecyl sulfate or lauryl sulfate.

5. A composition according to any of the preceding claims comprising from about 0.1% to about 3% by weight of the composition of the fragrance.

6. A composition according to claim 1 comprising:
   a) from about 4% to about 12% by weight of the composition of octanoic acid and preferably from about 5% to about 12% by weight of the composition of a secondary acid having a pKa below 4 at 20°C;
   b) from about 10% to about 20% by weight of the composition of octyl sulfate and preferably from about 2% to about 6% by weight of the composition of a secondary surfactant having a moiety comprising a carbon chain length with at least twelve carbon atoms; and
   c) from about 10% to about 20% by weight of the composition of 2-phenoxyethanol and/or from about 0.1% to about 3% by weight of the composition of the fragrance.

7. A composition according to claim 1 comprising:
   a) from about 0.5% to about 4% by weight of the composition of the acid system comprising at least 30% by weight thereof of octanoic acid;
   b) from about 1% to about 5% by weight of the composition of the anionic surfactant system comprising at least 60% by weight thereof of octyl sulfate; and
   c) from about 1% to about 8% by weight of the composition of 2-phenoxyethanol and/or from about 0.1% to about 3% by weight of the composition of the fragrance.

8. A composition according to claim 7 wherein the composition comprises from about 1% to about 4% by weight of the composition of the acid system and wherein the acid system comprises from about 35% to about 45% by weight thereof of octanoic acid and the secondary acid has a pKa of 4 or below at 20°C.

9. A composition according to any of claims 7 or 8 wherein the composition comprises from about 2% to about 4% by weight of the composition of the surfactant system and wherein the surfactant system comprises from about 60% to about 80% by weight thereof of octyl sulfate and the secondary surfactant preferably has a moiety comprising a carbon chain length with at least twelve carbon atoms.

10. A composition according to any of claims 7 to 9 wherein the composition comprises from about 1% to about 6% by weight of the composition of 2-phenoxyethanol and/or from about 0.1% to about 3% by weight of the composition of the fragrance.

11. The composition according to any of claims 7 to 10 wherein the composition comprises:
    a) from about 0.1% to about 2% by weight of the composition of octanoic acid and preferably from about 0.5% to about 5% by weight of the composition of a secondary acid having a pKa below 4 as measured at 20°C;
    b) from about 0.5% to about 4% by weight of the composition of octyl sulfate and preferably from about 0.1% to about 2% by weight of the composition of a secondary surfactant having a moiety comprising a carbon chain length with at least twelve carbon atoms; and
    c) from about 1% to about 6% by weight of the composition of 2-phenoxyethanol and/or from about 0.1% to about 3% by weight of the composition of the fragrance.

12. A method of treating an inanimate surface comprising the steps of:
    i) diluting in water a composition according to any of claims 1 to 6 to make an aqueous solution;
    ii) contacting the surface with the solution; and
    iii) optionally wiping the surface.

13. A method of treating an inanimate surface comprising the steps of:
    i) contacting the surface with a composition according to any of claims 7 to 11; and
    ii) optionally wiping the surface.

14. A method according to any of claims 12 or 13 to provide biocidal activity *vs.* Gram (+) bacteria such as *Staphylococcus aureus* and Gram (-) bacteria such as *Pseudomonas aeruginosa* wherein the biocidal activity is measured using a one minute exposure time following the US EPA protocol for the Germicidal Spray Test.

15. Use of a composition according to any of claims 1 to 11 to provide antibacterial activity as measured *vs.* Gram (+) bacteria such as *Staphylococcus aureus* and Gram (-) bacteria such as *Pseudomonas aeruginosa* using a one minute exposure time following the US EPA protocol for the Germicidal Spray Test.