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(54) **COMPOSITION WITH SUSTAINED ANTIMICROBIAL ACTIVITY**

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(57) **ABSTRACT**

Disclosed herein are compositions comprising benzyl alcohol, one or more cationic antimicrobial agent, and one or more emollient, the combination of which results in persistent antimicrobial activity after application to the skin. The compositions optionally further comprise an organic acid and/or a zinc salt, such as zinc gluconate, as an anti-irritant.

COMPOSITION WITH SUSTAINED ANTIMICROBIAL ACTIVITY

PRIORITY CLAIM

[0001] The present application is a continuation of International Application No. PCT/US12/063,013, filed Nov. 1, 2012, which claims priority to U.S. Provisional Patent Application Ser. No. 61/555,367, filed Nov. 3, 2011, U.S. Provisional Patent Application Ser. No. 61/583,505, filed Jan. 5, 2012, and U.S. Provisional Patent Application Ser. No. 61/668,160, filed Jul. 5, 2012, to each of which priority is claimed and all of which are incorporated herein by reference in their entireties.

1. INTRODUCTION

[0002] Disclosed herein are compositions comprising benzyl alcohol, a cationic antimicrobial agent, and an emollient, the combination of which results in persistent antimicrobial activity when applied to the skin.

2. BACKGROUND

[0003] Hand hygiene guidelines for healthcare personnel published by the Centers for Disease Control and Prevention recommend that alcohol-based hand gels and foams be used routinely, with intermittent thorough hand washing with soaps throughout the day. Studies have shown that the rate of compliance by the healthcare workers with the hand washing guidelines is lower than 50% partly because of the possibility/fear of skin irritation with the frequent use of soaps and partly due to lack of time. This problem could be addressed by the development of soaps and other skin-care products that have sufficient residual antibacterial activity on the skin to inactivate newly introduced bacteria.

3. SUMMARY

[0004] Disclosed herein are compositions comprising benzyl alcohol, one or more cationic antimicrobial agent, and one or more sesquiterpenoid and/or emollient solvent, the combination of which results in persistent antimicrobial activity after application to the skin. The compositions optionally further comprise an organic acid and/or one or more zinc salt as an anti-irritant.

[0005] In certain non-limiting embodiments, the composition comprises a synergistic combination of benzyl alcohol and one or more cationic antimicrobial agent such as a biguanide and/or a quaternary ammonium compound.

[0006] In certain non-limiting embodiments, the emollient is farnesol or dipropylene glycol. Without being limited by any theory, it is believed that such emollients enhance penetration of antimicrobial agents into the superficial layer of the skin, thereby prolonging their action.

[0007] The compositions disclosed herein may be used as soaps, hand sanitizers, creams, lotions, and splashes and may optionally be comprised in wipes.

[0008] Also provided is a method of providing a skin surface with a persistent antimicrobial activity, comprising treating the skin surface with a composition as described herein.

4. DETAILED DESCRIPTION

[0009] For clarity and not by way of limitation the detailed description is divided into the following subsections:

[0010] (i) benzyl alcohol;

[0011] (ii) antimicrobial agents;

[0012] (iii) sesquiterpenoids;

[0013] (iv) emollient solvents;

[0014] (v) organic acids;

[0015] (vi) additional components; and

[0016] (vii) compositions/methods of use.

[0017] "About" as that term is used herein means+10% of the recited value.

[0018] "Persistent antimicrobial activity" is antimicrobial activity that is retained after the initial exposure to the composition, although not necessarily at the same level. In non-limiting embodiments, use of the composition results in topical antimicrobial activity for at least one hour or at least two hours or at least four hours following exposure to the composition. In specific non-limiting embodiments, the antimicrobial activity remaining after one hour is a log 10 reduction in colony forming units of at least 0.5, or at least 1, or at least 1.5, for example as determined by tests set forth below in section 5. In other specific non-limiting embodiments, the antimicrobial activity remaining after two hours is a log 10 reduction in colony forming units of at least 0.5, or at least 1, or at least 1.5, for example as determined by tests set forth below in section 5.

4.1 Benzyl Alcohol

[0019] The compositions disclosed herein comprise benzyl alcohol, at a concentration (percent weight/weight, "% w/w") between about 0.1 and about 5% w/w, or between about 0.1 and about 3% w/w, or between about 1.0 and about 3% w/w; or between 0.5 and 2% w/w. In specific non-limiting embodiments the benzyl alcohol is plant-derived.

[0020] In certain, non-limiting embodiments, the compositions disclosed herein comprise benzyl alcohol, at a concentration (percent weight/weight, "% w/w") between about 0.05 and about 5% w/w; or between about 0.05 and about 4.5% w/w; or between about 0.05 and about 4% w/w; or between about 0.05 and about 3.5% w/w; or between about 0.05 and about 3% w/w; or between about 0.05 and about 2.5% w/w; or between about 0.05 and about 2% w/w; or between about 0.05 and about 1.5% w/w; or between about 0.05 and about 1% w/w; or between about 0.05 and about 0.5% w/w; or between about 0.05 and about 0.45% w/w; or between about 0.05 and about 0.4% w/w; or between about 0.05 and about 0.35% w/w; or between about 0.05 and about 0.3% w/w; or between about 0.05 and about 0.25% w/w; or between about 0.05 and about 0.2% w/w; or between about 0.05 and about 0.15% w/w; or between about 0.05 and about 0.1% w/w; or between about 0.1 and about 0.5% w/w; or between about 0.1 and about 0.45% w/w; or between about 0.1 and about 0.4% w/w; or between about 0.1 and about 0.35% w/w; or between about 0.1 and about 0.3% w/w; or between about 0.1 and about 0.25% w/w; or between about 0.1 and about 0.2% w/w; or between about 0.1 and about 0.15% w/w.

4.2 Antimicrobial Agents

[0021] The compositions disclosed herein comprise one or more cationic antimicrobial agent. In certain non-limiting embodiments, the cationic antimicrobial agent(s) is (are) selected from the group consisting of quaternary ammonium antimicrobial compounds, antimicrobial biguanides, and combinations thereof. Quaternary ammonium antimicrobial compound, where present, is at a concentration between about 0.05 and 1% w/w, or between about 0.05 and about

0.5% w/w, or between about 0.1 and about 0.3% w/w, or between 0.1 and 0.23% w/w (if more than one species of quaternary ammonium antimicrobial compound is present, the foregoing are the concentration ranges of the total amount of all species present). Antimicrobial biguanide, where present, is at a concentration between about 0.05 and about 3.0% w/w, or between about 0.05 and 1.5% w/w, or between about 0.05 and about 1.0% w/w, or between about 0.05 and about 0.8% w/w, or between 0.05 and 0.5% w/w, or about 0.4% w/w; if more than one species of biguanide is present, the foregoing are the concentrations/ranges of the total amount of all species present.

[0022] Non-limiting examples of quaternary ammonium antimicrobial compounds that may be used include benzalkonium chloride (BZK), benzethonium chloride (BZT), dequalinium chloride, alkyldimethylbenzylammonium chloride, cetyl pyridinium chloride, methylbenzethonium chloride, cetalkonium chloride, cetrimonium chloride, cetyl trimethyl ammonium bromide (cetrimide) dofanium chloride, tetraethylammonium bromide, domiphen bromide, and combinations thereof.

[0023] Non-limiting examples of biguanides that may be used include chlorhexidine, as a free base or salt, polyhexamethylene biguanide ("PHMB"), alexidine, polyaminopropyl biguanide (e.g., Cosmocil CQ), and combinations thereof. Chlorhexidine salts that may be used include but are not limited to the following: chlorhexidine diphosphanilate, chlorhexidine digluconate, chlorhexidine diacetate, chlorhexidine dihydrochloride, chlorhexidine dichloride, chlorhexidine dihydroiodide, chlorhexidine diperchlorate, chlorhexidine dinitrate, chlorhexidine sulfate, chlorhexidine sulfite, chlorhexidine thiosulfate, chlorhexidine di-acid phosphate, chlorhexidine difluorophosphate, chlorhexidine diformate, chlorhexidine dipropionate, chlorhexidine di-iodobutyrate, chlorhexidine di-n-valerate, chlorhexidine dicaproate, chlorhexidine malonate, chlorhexidine succinate, chlorhexidine malate, chlorhexidine tartrate, chlorhexidine dimonoglycolate, chlorhexidine mono-diglycolate, chlorhexidine dilactate, chlorhexidine di-.alpha.-hydroxyisobutyrate, chlorhexidine diglucoheptonate, chlorhexidine di-isothionate, chlorhexidine dibenzoate, chlorhexidine dicinnamate, chlorhexidine dimandelate, chlorhexidine diisophthalate, chlorhexidine di-2-hydroxy-napthoate, chlorhexidine embonate, and combinations thereof.

[0024] The compositions may further comprise one or more antimicrobial agent that is not a cationic antimicrobial agent. Non-limiting examples of such additional agents include triclosan, parachlorometaxylenol ("PCMX"), chloroeresol, chlorxylenol, benzyl alcohol, bronopol, chlorbutanol, ethanol, phenoxyethanol, phenylethyl alcohol, 2,4-dichlorobenzyl alcohol, thiomersal, clindamycin, erythromycin, benzoyl peroxide, mupirocin, bacitracin, polymyxin B, neomycin, triclosan, parachlorometaxylene, foscarnet, miconazole, fluconazole, itriconazole, ketoconazole, povidone iodine, combinations thereof and pharmaceutically acceptable salts thereof. For example, but not by way of limitation, phenoxyethanol, where present, may be at a concentration between about 0.1 and about 1% w/w, and triclosan, where present, may be at a concentration between about 0.025 to about 2% w/w, or between 0.15 and 1% w/w.

[0025] Another non-limiting example of an antimicrobial which may be used is iodopropynylbutyl carbamate (IPBC; German plus), for example at a concentration between 0.05 and 2% w/w.

4.3 Sesquiterpenoids

[0026] Compositions disclosed herein may comprise one or more sesquiterpenoid selected from the group consisting of farnesol, nerolidol, bisabolol, apritone and combinations thereof. Where present, the sesquiterpenoid (e.g. farnesol) is at a concentration between about 0.1 and about 4% w/w, or between about 0.1 and about 3% w/w, or between about 0.3 and about 3% w/w, or between about 1 and 3% w/w, or between about 0.1 and 0.3% w/w; or between about 0.5 and about 4% w/w, or between about 0.5 and 3% w/w; or between about 0.5 and 0.3% w/w.

4.4 Emollient Solvents

[0027] Compositions disclosed herein may comprise one or more emollient solvent selected from the group consisting of dipropylene glycol, diglycerol, ethyl hexyl glycerin and combinations thereof. Dipropylene glycol or diglycerol, where present, is at a concentration of between about 0.1 and 10% w/w, or between about 1 and about 5% w/w, or between 0.2 and 7% w/w, or between 0.1 and 4% w/w, or between 0.2 and 5% w/w; or ethyl hexyl glycerin where present, is at a concentration between about 0.3 and about 4% w/w, or between about 0.3 and 3% w/w, or between about 0.5 and about 3% w/w, or between 1 and 3% w/w, or between 0.5 and 1.0% w/w.

[0028] Additional compounds with emollient properties that may optionally be comprised in the compositions include, for example, butylene glycol, pentylene glycol, a C_3-C_{12} alkanediol, a C_5-C_{10} alkanediol, butanediol, pentanediol, hexanediol, octanediol, Symdiol™, emu oil, grapeseed oil, olive oil, caprylic/capric triglyceride, panthenol, lauric alcohol, propylene glycol, glycerin, isopropyl myristate and combinations thereof. In non-limiting examples, alkanediol may be present at a concentration between about 0.5 and about 2.0% w/w, or between about 0.5 and about 1.0% w/w, or between about 0.2 and about 2% w/w, or between about 0.2 and about 1.0% w/w; octanediol may be at a concentration between about 0.5 and about 2% w/w, or between about 0.5 and about 1.0% w/w; and butylene glycol may be present at a concentration between about 0.5 and about 3% w/w.

4.5 Organic Acids

[0029] Organic acids that may be used in the disclosed compositions include lactic acid, citric acid, salicylic acid, glycolic acid, mandelic acid, benzoic acid and combinations thereof. In non-limiting examples, an organic acid may be at a concentration between about 0.1 and about 2% w/w.

4.6 Additional Components

[0030] The compositions may contain additional components known in the art for use in soaps, skin sanitizers, and other topical compositions.

[0031] In certain non-limiting embodiments, the composition may comprise a polyethylene oxide (Polyox) hydrogel polymer which, without being bound to any particular theory, can help the skin retain moisture.

[0032] In certain non-limiting embodiments, the composition may comprise an anti-irritant component, for example a zinc salt, such as zinc gluconate, alpha bisabolol, aloe gel/leaf juice, oat beta glucan, oat flour, oat extract and combinations thereof. Further non-limiting examples of zinc salts that may

be used include zinc acetate, zinc butyrate, zinc citrate, zinc glycerate, zinc glycolate, zinc formate, zinc lactate, zinc picolinate, zinc propionate, zinc salicylate, zinc tartrate, zinc undecylenate, zinc oxide, zinc stearate and combinations thereof. For example, a combination of aloe gel/leaf juice and alpha bisabolol may be used where the ratio of bisabolol to aloe gel/leaf juice may be between about 1:1 to 1:10. In non-limiting embodiments, the concentration of zinc salt may be between about 0.1 and about 2.0% w/w, the concentration of bisabolol may be between about 0.01 and about 0.2% w/w, and/or the concentration of Aloe gel/leaf juice may be between about 0.125 and about 2.0%. In non-limiting embodiments, the oat beta glucan, the oat flour or oat extract may be between about 0.5-5.0% w/w.

[0033] For example, a composition disclosed herein may further comprise a thickening and/or gelling agent such as polyethylene oxide (Polyox) hydrogel polymer, stearyl alcohol, cellulose polymer, cationic hydroxy ethyl cellulose (e.g., Ucare; JR30), hydroxy propyl methyl cellulose, hydroxy propyl cellulose (Klucel), chitosan pyrrolidone carboxylate (Kytamer), behenyl alcohol, zinc stearate, emulsifying waxes, including but not limited to Incroquat and Polawax, an addition polymer of acrylic acid, a resin such as Carbopol® ETD 2020, guar gum, acacia, acrylates/steareth-20 methacrylate copolymer, agar, algin, alginic acid, ammonium acrylate co-polymers, ammonium alginate, ammonium chloride, ammonium sulfate, amylopectin, attapulgite, bentonite, C_{9-15} alcohols, calcium acetate, calcium alginate, calcium carrageenan, calcium chloride, caprylic alcohol, carbomer 910, carbomer 934, carbomer 934P, carbomer 940, carbomer 941, carboxymethyl hydroxyethyl cellulose, carboxymethyl hydroxypropyl guar, carrageenan, cellulose, cellulose gum, cetearyl alcohol, cetyl alcohol, corn starch, damar, dextrin, dibenzlidine sorbitol, ethylene dihydrogenated tallowamide, ethylene diolamide, ethylene distearamide, gelatin, guar gum, guar hydroxypropyltrimonium chloride, hectorite, hyaluronic acid, hydrated silica, hydroxybutyl methylcellulose, hydroxyethylcellulose, hydroxyethyl ethylcellulose, hydroxyethyl stearamide-MIPA, isocetyl alcohol, isostearyl alcohol, karaya gum, kelp, lauryl alcohol, locust bean gum, magnesium aluminium silicate, magnesium silicate, magnesium trisilicate, methoxy PEG-22/dodecyl glycol copolymer, methylcellulose, microcrystalline cellulose, montmorillonite, myristyl alcohol, oat flour, oleyl alcohol, palm kernel alcohol, pectin, PEG-2M, PEG-5M, polyacrylic acid, polyvinyl alcohol, potassium alginate, potassium aluminium polyacrylate, potassium carrageenan, potassium chloride, potassium sulfate, potato starch, propylene glycol alginate, sodium acrylate/vinyl alcohol copolymer, sodium carboxymethyl dextran, sodium carrageenan, sodium cellulose sulfate, sodium chloride, sodium polymethacylate, sodium silicoaluminate, sodium sulfate, stearalkonium bentotnite, stearalkonium hectorite, stearyl alcohol, tallow alcohol, TEA-hydrochloride, tragacanth gum, tridecyl alcohol, tromethamine magnesium aluminium silicate, wheat flour, wheat starch, xanthan gum, abietyl alcohol, acrylinoleic acid, aluminum behenate, aluminum caprylate, aluminum dilinoleate, aluminum salts, such as distearate, and aluminum isostearates, beeswax, behenamide, butadiene/acrylonitrile copolymer, C29-70 acid, calcium behenate, calcium stearate, candelilla wax, carnauba, ceresin, cholesterol, cholesterol hydroxystearate, coconut alcohol, copal, diglyceryl stearate malate, dihydroabietyl alcohol, dimethyl lauramine oleate, dodecanoic acidlcetearyl alcohol/glycol copolymer, erucamide, ethylcellulose, glyceryl triacetyl hydroxystearate, glyceryl tri-acetyl ricinolate, glycol dibehenate, glycol di-octanoate, glycol distearate, hexanediol distearate, hydrogenated C_{6-14} olefin polymers, hydrogenated castor oil, hydrogenated cottonseed oil, hydrogenated lard, hydrogenated menhaden oil, hydrogenated palm kernel glycerides, hydrogenated palm kernel oil, hydrogenated palm oil, hydrogenated polyisobutene, hydrogenated soybean oil, hydrogenated tallow amide, hydrogenated tallow glyceride, hydrogenated vegetable glyceride, hydrogenated vegetable oil, Japan wax, jojoba wax, lanolin alcohol, shea butter, lauramide, methyl dehydroabietate, methyl hydrogenated rosinate, methyl rosinate, methylstyrene/vinyltoluene copolymer, microcrystalline wax, montan acid wax, montan wax, myristyleicosanol, myristyloctadecanol, octadecene/maleic anhyrdine copolymer, octyldodecyl stearoyl stearate, oleamide, oleostearine, ouricury wax, oxidized polyethylene, ozokerite, paraffin, pentaerythrityl hydrogenated rosinate, pentaerythrityl tetraoctanoate, pentaerythrityl rosinate, pentaerythrityl tetraabietate, pentaerythrityl tetrabehenate, pentaerythrityl tetraoleate, pentaerythrityl tetrastearate, ophthalmic anhydride/glycerin/glycidyl decanoate copolymer, ophthalmic/trimellitic/glycols copolymer, polybutene, polybutylene terephthalate, polydipentene, polyethylene, polyisobutene, polyisoprene, polyvinyl butyral, polyvinyl laurate, propylene glycol dicaprylate, propylene glycol dicocoate, propylene glycol diisononanoate, propylene glycol dilaurate, propylene glycol dipelargonate, propylene glycol distearate, propylene glycol diundecanoate, PVP/eiconsene copolymer, PVP/hexadecene copolymer, rice bran wax, stearlkonium bentonite, stearalkonium hectorite, stearamide, stearamide DEA-distearate, stearamide DIBA-stearate, stearamide MEA-stearate, stearone, stearyl erucamide, stearyl stearate, stearyl stearoyl stearate, synthetic beeswax, synthetic wax, trihydroxystearin, triisononanoin, triisostearin, tri-isostearyl trilinoleate, trilaurin, trilinoleic acid, trilinolein, trimyristin, triolein, tripalmitin, tristearin, zinc laurate, zinc myristate, zinc neodecanoate, zinc rosinate, and mixtures thereof. Gelling agents used in vehicles may be natural gelling agents such as natural gums, starches, pectins, agar and gelatin, and may be based on polysaccharides or proteins Examples include but are not limited to guar gum, xanthum gum, alginic acid (E400), sodium alginate (E401), potassium alginate (E402), ammonium alginate (E403), calcium alginate (E404,-polysaccharides from brown algae), agar (E406, a polysaccharide obtained from red seaweeds), carrageenan (E407, a polysaccharide obtained from red seaweeds), locust bean gum (E410, a natural gum from the seeds of the Carob tree), pectin (E440, a polysaccharide obtained from apple or citrus-fruit), and gelatin (E441, made by partial hydrolysis of animal collagen), pentylene glycol 4-t-nutylcyclohexanol (Symsitive 1609).

[0034] A composition as disclosed herein may optionally further comprise a surfactant. The surfactant may be a cationic surfactant, an ampholytic surfactant, or a nonionic surfactant. Non-limiting examples of surfactants include polyethoxylates, fatty alcohols (e.g., ceteth-20 (a cetyl ether of polyethylene oxide having an average of about 20 ethylene oxide units) and other "BRIJ"™ nonionic surfactants available from ICI Americas, Inc. (Wilmington, Del.)), cocamidopropyl betaine, alkyl phenols, fatty acid esters of sorbitol, sorbitan, or polyoxyethylene sorbitan.

[0035] A composition as disclosed herein may optionally further comprise an alcohol or a mixture of alcohols, for

example, ethanol, isopropyl alcohol, n-propyl alcohol, and mixtures thereof; fatty alcohols, including, but not limited to, cetyl alcohol, myristol alcohol, stearyl alcohol, octyl alcohol, decyl alcohol and lauryl alcohol, and mixtures thereof; hexanol, and/or other aliphatic or aromatic alcohol.

[0036] A composition as disclosed herein may optionally further comprise a silicone polymer or silicone fluid, for example one or more than one polydimethylsiloxane polymer (Dow Corning 225 Silicone Fluid), dimethiconol fluid in dimethicone (Dow Corning 1403 Silicone Fluid), Silsurf J208 (Siltech LLC, 30019) cyclomethicone and dimethicone copolyl (Dow Corning 3225C Silicone Fluid), Dow Corning 190 and 193 surfactants, polyarylsiloxanes, polyalkylarylsiloxanes, polysiloxane gums, polyether siloxane copolymers, dimethicone polysiloxane, dimethiconol, polysiloxanes, polysiloxane copolymers, polyalkyl aryl silanes, polyaryl siloxanes, polyalkyl siloxanes, polyalkyl aryl silanes, polysiloxane copolymers, alkyl dimethicones, alkylmethicones, alkyldimethicone copoloyls, phenyl silicones, alkyl trimethylsilanes, dimethicone crosspolymer, trisiloxaDC silicone fluid 1404, 1503, silicone glycol (BASF 1066 DCG polyol), GE silicones, dimethicones, cyclomethicones, Bis PEG 15 Methyl ether dimethicone, Dow Corning 2501cosmetic wax, and combinations thereof.

[0037] A composition as disclosed herein may optionally further comprise one or more essential oil and/or individual constituent thereof, one or more additives such as dyes, fragrances, pH adjusters, including basic pH adjusters such as ammonia, mono-, di- and tri-alkyl amines, mono-, di- and tri-alkanolamines, alkali metal and alkaline earth metal hydroxides (e.g., ammonia, sodium hydroxide, potassium hydroxide, lithium hydroxide, monoethanolamine, triethylamine, isopropylamine, diethanolamine and triethanolamine); acid pH adjusters such as mineral acids and polycarboxylic acids; vitamins such as vitamin A, vitamin E and vitamin C; polyamino acids and salts, such as ethylenediamine tetraacidic acid (EDTA), preservatives such as Germall plus and DMDM hydantoin, and sunscreens such as aminobenzoic acid, arobenzone, cinoxate, diioxybenzone, homosalate, menthyl anthranilate, octocrylene, octyl methoxycinnarnate, octyl salicylate, oxybenzoate, padimate O, phenylbenzimidazole, sulfonic acid, sulisobenzone, titanium dioxide, trolamine salicylate and zinc oxide.

[0038] In certain non-limiting embodiments the composition does not contain a cationic emulsifier selected from the group consisting of include incroquat compounds such as (but not limited to) behenyltrimonium methosulfate in cetearyl alcohol (e.g., incroquat behenyl TMS and incroquat behenyl TMS 50 (Croda Inc., Edison, N.J.)), behenalkonium chloride and cetyl alcohol Incroquat B-65 (Croda Inc., Edison, N.J.)), behenamido propyl ethyl dimonium ethosulfate and stearyl alcohol (Incroquat BES-35 S (Croda Inc., Edison, N.J.)), steralkonium chloride and cetearyl alcohol and PEG-40 Castor oil (e.g., Incroquat CR concentrate (Croda Inc., Edison, N.J.)), Incroquat CTC-30 (Croda Inc., Edison, N.J.), Incroquat DBM-90 (Croda Inc., Edison, N.J.), Incroquat 0-50 (Croda Inc., Edison, N.J.), Incroquat S-DQ-25 (Croda Inc., Edison, N.J.), Incroquat BA-85 (Croda Inc., Edison, N.J.), Incroquat WG-85 (Croda Inc., Edison, N.J.), as well as distearyldimonium chloride (e.g., VARISOFT® TA 100 (Essen-Degussa, Germany)), palmitamidopropyltrimonium chloride (e.g., VARISOFT® PATC (Essen-Degussa, Germany)), and cetearyl alcohol (and) palmitamiclopropyltrimonium chloride (e.g., TEGO® Care CE 40).

4.7 Compositions/Methods of Use

[0039] In non-limiting embodiments, the compositions are embodied as soap, cleansing foam, leave-on hand sanitizer, alcohol-containing hand sanitizer or soap, alcohol-free hand sanitizer or soap, lotion, cream, splash, astringent, or wipe formulations. The formulations may be applied to humans or non-human animals (for example, for veterinary or agricultural purposes). Non-limiting examples are described below by way of illustration but further embodiments would be envisaged by the person of skill in the art.

[0040] In one set of non-limiting embodiments, the composition is a soap comprising the following components:

Ingredients	(% w/w)
Benzyl alcohol	1.0-3.0
Benzethonium chloride and/or Benzalkonium chloride	0.1-0.23
Biguanide	0.05-0.6
Dipropylene Glycol and/or diglycerin	1.0-5.0
Farnesol	0.3-3.0
Organic acid	0.0-2.0

This composition may further contain one or more of the following anti-irritants:

Zinc gluconate/Zinc lactate	0.1-0.2
Bisabolol	0.01-0.2
Aloe leaf juice	0.125-1.0

This composition may have a pH between about 5 and about 6.8.

[0041] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Benzyl alcohol	1.0-3.0
Benzethonium chloride/Benzalkonium chloride	0.1-0.23
Chlorhexidine and/or PHMB	0.05-0.6
Dipropylene Glycol/diglycerin	1.0-5.0
Farnesol	0.3-3.0
Organic acid	0.0-2.0
Pluronic F-87 prill	0.5-2.0
Hydroxypropyl methylcellulose (Methocel)	0.1-0.5
Non ionic poly (ethylene Oxide) Polymer (Polyox)	0.1-1.0
Incromine Oxide L	3.0-5.0
Montalene C 40	3.0-8.0
Germall Plus	0.0-2.0
Water	55-70
Glycerin	1.0-3.0
SDA-40 B alcohol	5.0-15
Butylene glycol	1.0-3.0
Dehydroquat (Cetrimonium chloride)	0-2.0
Phenoxyethanol/Phenylethanol	0.0-1.0
Alkanediol	0.2-2.0
Zinc gluconate/Zinc lactate	0-0.2
Bisabolol	0-0.2
Aloe leaf juice	0-1.0

This composition may have a pH between about 5 and about 6.8.

[0042] In one specific non-limiting embodiment, the composition is a soap ("LPS-14E") having the following formulation:

Ingredients	% w/w
Benzyl alcohol	2.0
Benzethonium chloride	0.23
Dipropylene Glycol	5.0
Farnesol	1.0
Lactic acid	0.2
Zinc gluconate	0.2
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
PolyoxWSR 205	0.3
Incromine Oxide L	5.0
Montalene C 40	8.0
Germall Plus	0.2
Water	64.27
Glycerine	1.0
SDA-40 B alcohol	8.0
Butylene glycol	1.0
Phenoxyethanol	1.0
PHMB	0.4
Octanediol	1.0

pH 5.2-5.5

[0043] In one specific non-limiting embodiment, the composition is a soap ("LPS-14F") having the following formulation:

Ingredients	% w/w
Benzyl alcohol	2.0
Benzethonium chloride	0.23
PHMB	0.4
Dipropylene Glycol	5.0
Farnesol	2.0
Zinc gluconate	0.2
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
PolyoxWSR 205	0.5
Incromine Oxide L	3.0
Montalene C 40	8.0
Water	57.12
Glycerine	1.0
SDA-40 B alcohol	15.0
Butylene glycol	1.0
Phenoxyethanol	1.0
Octanediol	1.0
Dehydroquat	1.0
Bisabolol	0.025
Aloe leaf juice	0.25

pH 5.2-5.5

[0044] In one specific non-limiting embodiment, the composition is a soap ("ILS-14F7-2") having the following formulation:

Ingredients	% w/w
Benzyl alcohol	2.0
Benzethonium chloride	0.23
PHMB	0.4
Dipropylene Glycol	5.0
Farnesol	2.0
Zinc gluconate	0.2
Bisabolol	0.1
Aloe leaf juice	0.25
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
PolyoxWSR 205	0.3
Incromine Oxide L	3.42
Montalene C 40	8.0
Water	57.3
Glycerin	1.0

-continued

Ingredients	% w/w
SDA-40 B alcohol	14.0
Butylene glycol	1.0
Phenoxyethanol	1.0
Octanediol	1.0

pH 5.6-6.0

[0045] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Pluronic F-87 prill	0.5-1.0
Methocel E4 M	0.1-0.5
PolyoxWSR 205	0.1-0.5
Incromine Oxide L	3.0-5.0
Montalene C 40	3.0-8.0
Germall Plus	0.0-2.0
Water	55-70
Zinc gluconate	0.0-0.2
Glycerin	1.0-3.0
SDA-40 B alcohol	5.0-15
Butylene glycol	1.0-3.0
Benzyl alcohol	1.0-3.0
Fruit acid	0.1-2.0
Benzethonium chloride and/or Benzalkonium chloride	0.1-0.23
Dipropylene Glycol and/or diglycerin	1.0-5.0
Farnesol	0.3-2.0
Phenoxyethanol and/or Phenylthanol	0.0-1.0
Chlorhexidine and/or PHMB	0.05-0.6
Alkanediol	0.2-2.0

[0046] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Pluronic F-87 prill	0.5-1.0
Methocel E4 M	0.1-0.5
PolyoxWSR 205	0.1-0.5
Incromine Oxide L	3.0-5.0
Montalene C 40	3.0-8.0
Water	50-70
Zinc gluconate	0.1-0.2
Glycerine	1.0-3.0
SDA-40 B alcohol	5.0-15
Butylene glycol	1.0-3.0
Benzyl alcohol	1.0-3.0
Benzethonium chloride	0.1-0.23
Dipropylene Glycol	1.0-5.0
Farnesol	0.3-3.0
Phenoxyethanol	0.0-1.0
PHMB	0.05-0.6
Octanediol	0.2-2.0
Bisabolol	0.01-1.0
Aloe leaf juice	0.1-2.0

[0047] In one specific non-limiting embodiment, the composition is a soap ("LPS 3") having the following formulation:

Ingredients	(% w/w)
Pluronic F-87 prill	1.00
Methocel E4 M	0.2
PolyoxWSR 205	0.3
Incromine Oxide L	3.42

-continued

Ingredients	(% w/w)
Montalene C 40	8.0
Water	57.3
Zinc gluconate	0.2
Glycerine	1.0
SDA-40 B alcohol	14.0
Butylene glycol	1.0
Benzyl alcohol	2.0
Benzethonium chloride	0.23
Dipropylene Glycol	5.0
Farnesol	2.0
Phenoxyethanol	1.0
PHMB	0.4
Octanediol	1.0
Bisabolol	0.1
Aloe leaf juice	0.25

[0048] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Benzyl alcohol	2.0
Benzethonium chloride	0.23
PHMB	0.4
Dipropylene Glycol	5.0
Farnesol	2.0
Zinc gluconate	0.2
Bisabolol	0.1
Aloe leaf juice	0.25
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
PolyoxWSR 205	0.3
Incromine Oxide L	3.42
Montalene C 40	8.0
Water	57.3
Glycerine	1.0
SDA-40 B alcohol	14.0
Butylene glycol	1.0
Phenoxyethanol	1.0
Octanediol	1.0

[0049] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Benzyl alcohol	2.0
Benzethonium chloride	0.23
PHMB	0.4
Dipropylene Glycol	5.0
Zinc gluconate	0.2
Bisabolol	0.1
Aloe leaf juice	0.25
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
PolyoxWSR 205	0.3
Incromine Oxide L	3.42
Montalene C 40	8.0
Water	59.3
Glycerine	1.0
SDA-40 B alcohol	14.0
Butylene glycol	1.0
Phenoxyethanol	1.0
Octanediol	1.0

[0050] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Benzethonium chloride	0.23
PHMB	0.4
Dipropylene Glycol	5.0
Farnesol	2.0
Zinc gluconate	0.2
Bisabolol	0.1
Aloe leaf juice	0.25
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
PolyoxWSR 205	0.3
Incromine Oxide L	3.42
Montalene C 40	8.0
Water	59.3
Glycerine	1.0
SDA-40 B alcohol	14.0
Butylene glycol	1.0
Phenoxyethanol	1.0
Octanediol	1.0

[0051] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Benzyl alcohol	2.0
Benzethonium chloride	0.23
PHMB	0.4
Dipropylene Glycol	5.0
Nerolidol	2.0
Zinc gluconate	0.2
Bisabolol	0.1
Aloe leaf juice	0.25
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
PolyoxWSR 205	0.3
Incromine Oxide L	3.42
Montalene C 40	8.0
Water	57.3
Glycerine	1.0
SDA-40 B alcohol	14.0
Butylene glycol	1.0
Phenoxyethanol	1.0
Octanediol	1.0

[0052] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Benzyl alcohol	2.0
Benzethonium chloride	0.23
PHMB	0.4
Dipropylene Glycol	5.0
Bisabolol	2.0
Zinc gluconate	0.2
Bisabolol	0.1
Aloe leaf juice	0.25
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
PolyoxWSR 205	0.3
Incromine Oxide L	3.42
Montalene C 40	8.0
Water	57.3
Glycerine	1.0
SDA-40 B alcohol	14.0
Butylene glycol	1.0

-continued

Ingredients	(% w/w)
Phenoxyethanol	1.0
Octanediol	1.0

[0053] In one specific non-limiting embodiment, the composition is a soap having the following formulation:

Ingredients	(% w/w)
Benzyl alcohol	2.0
Benzethonium chloride	0.23
PHMB	0.4
Dipropylene Glycol	5.0
Apritone	2.0
Zinc gluconate	0.2
Bisabolol	0.1
Aloe leaf juice	0.25
Pluronic F-87 prill	1.0
Methocel E4 M	0.2
Incromine Oxide L	3.42
Montalene C 40	8.0
Water	57.3
Glycerine	1.0
SDA-40 B alcohol	14.0
Butylene glycol	1.0
Phenoxyethanol	1.0
Octanediol	1.0

[0054] In one set of non-limiting embodiments, the composition is an alcohol-free hand disinfectant foam comprising the following components:

Ingredients	% w/w
Benzyl alcohol	0.5-2.0
Quaternary ammonium compound	0.1-0.23
PHMB	0.05-0.6
Dipropylene Glycol	0.2-5.0
Farnesol	0.1-0.5
Fruit acid	0.-2.0

[0055] The composition may optionally further comprise one or more of the following anti-irritants:

Zinc gluconate	0.1-0.5
Bisabolol + gingerextract (Symrelief)	0.05-0.2
Aloe Barbedensis juice/gel	0.25-1.0
Siliconefluid/Polymer	0.25-2.0

[0056] In one specific non-limiting embodiment, the composition is an alcohol-free hand disinfectant foam (HSBZT) having the following formulation:

Ingredients	% w/w
Benzyl alcohol	0.5-2.0
Benzethonium chloride	0.1-0.23
PHMB	0.05-0.6
Dipropylene Glycol	0.2-5.0
Farnesol	0.1-0.5
Fruit acid	0.1-2.0
Zinc gluconate	0.1-0.5
Bisabolol + gingerextract (Symrelief)	0.05-0.2
Aloe Barbedensis juice/gel	0.25-1.0

-continued

Ingredients	% w/w
Water	60-80
Polyox WSR 205	0.05-0.2
Pluronic F-87	0.5-1.0
Solubilizer 611674	0.5-2.0

[0057] (PEG-40 Hydrogenated castor oil, Trideceth-9,water)

Phenoxy ethanol	0.0-1.0
Octanediol	0.5-2.0.
Pentanediol	0.5-2.0
Arlasilk Phospholipid PTM	0.0-0.5
Montalene C-40	0.25-1.0
Silsurf J208	0.25-2.0

pH to 4.00-4.5

[0058] In one set of non-limiting embodiments, the composition is an alcohol-free hand disinfectant foam comprising the following components:

Ingredients	% w/w
Benzyl alcohol	0.5-2.0
Benzalkonium chloride	0.1-0.23
PHMB	0.05-0.6
Dipropylene Glycol	0.2-5.0
Farnesol	0.1-0.5
Lactic acid	0.1-2.0

[0059] The composition may optionally further comprise one or more of the following anti-irritants:

Zinc gluconate/Zinc lactate	0.1-0.2
Bisabolol + gingerextract (Symrelief)	0.05-0.2
Aloe Barbedensis juice/gel	0.25-1.0

[0060] In one set of non-limiting embodiments, the composition is an alcohol-free hand disinfectant foam comprising the following components:

Ingredients	(% w/w)
Water	60-85
Zinc gluconate	0.1-0.2
Pluronic F-87	0.5-1.0
Bisabolol + gingerextract (Symrelief)	0.05-0.2
Aloe Barbedensis juice/gel	0.25-1.0
Benzethonium chloride	0.1-0.23
PHMB	0.05-0.6
Phenoxy ethanol	0.0-1.0
Pentanediol	0.5-2.0
Montalene C-40	0.5-3.0
Benzyl alcohol	0.5-2.0
Farnesol	0.5-2.0
Organic acid	0.2-0.5
Dipropylene Glycol	0.2-2.0
Propylene glycol	0.2-1.0
Glycerin	0.5-2.0
Ultrapure MFB1-1	0.2-2.0

pH to 4.00-4.2

[0061] In one specific non-limiting embodiment, the composition is an alcohol-free hand disinfectant foam ("AQ-D14") comprising the following components:

Ingredients	(% w/w)
Water	85.0
Zinc gluconate	0.2
Pluronic F-87	1.0
Bisabolol + gingerextract (Symrelief)	0.05
Aloe Barbedensis juice/gel	0.5
Benzethonium chloride	0.18
PHMB	1.0
Phenoxy ethanol	0.5
Pentanediol	1.0
Montalene C-40	2.0
Benzyl alcohol	1.0
Farnesol	0.3
Organic acid	0.2
Dipropylene Glycol	0.5
Propylene glycol	0.5
Glycerin	1.0
Ultrapure MFB1-1	1.0

pH to 4.00-4.2

[0062] In one specific non-limiting embodiment, the composition is an alcohol hand disinfectant foam comprising the following components:

Ingredient	(% w/w)
Water	25-35
SoftcatPolymerSL-100	0.05-0.2
Zinc gluconate	0.1-0.2
Glycerin	1.0-5.0
Benzethonium chloride	0.12-2.3
Lactic acid	0.1-0.2
Glucam P-20	0.2-2.0
SDA 40B alcohol	55-65
Benzyl alcohol	0.5-2.0
Lemongrass oil	0.01-0.03
Dowcorning silicone fluid 190	1.0-4.0
Aloe leaf juice	0.3-1.0
Symrelief	0.03-0.1
Ultrapure MFB -10	1.0-5.0
PHMB	0.1-0.3

pH 4.5-4.6

[0063] In one specific non-limiting embodiment, the composition is an alcohol hand disinfectant foam comprising the following components:

Ingredient	(% w/w)
Water	28.05
SoftcatPolymerSL-100	0.05
Zinc gluconate	0.2
Glycerin	1.0
Benzathonium chloride	0.18
Lactic acid	0.1
Glucam P-20	1.0
SDA 40B alcohol	60.0
Benzyl alcohol	1.0
Lemongrass oil	0.02
Dowcorning silicone fluid 190	1.0
Aloe leaf juice	0.5
Symrelief	0.05
Ultrapure MFB -10	1.0
PHMB	0.3

pH 4.5-4.6

[0064] In one specific non-limiting embodiment, the composition is an alcohol-free hand disinfectant lotion (HSBAC) having the following formulation:

Ingredients	% w/w
Benzyl alcohol	0.5-2.0
Benzalkonium chloride	0.1-0.23
PHMB	0.05-0.6
Dipropylene Glycol	0.2-5.0
Farnesol	0.1-0.5
Lactic acid	0.1-2.0
Zinc gluconate/Zinc lactate	0.1-0.2
Bisabolol + gingerextract (Symrelief)	0.05-0.2
Aloe Barbedensis juice/gel	0.25-1.0
Polyox WSR 205	0.05-0.2
Polowax NF	0.5-2.0
Incroquat TMS	0.5-4.0
Stearyl alcohol	0.5-3.0
Isopropyl myristate	0.5-2.0
Arlacel 165	0.5-1.0
Vit. E acetate	0.2-0.5
Zinc oxide	0-1.0
Zn stearate	0.25-1.0
Glycerine	1.0-3.0
Water	60-80.0
Polyquaternium 10	0.1-0.30
Butylene glycol	0.5-3.0
Allantoin	0.2-0.5
Alkanediol	0.2-1.0
Silicone fluid	03-1.0

pH to 5.5-6.0

[0065] In one specific non-limiting embodiment, the composition is an alcohol-free hand disinfectant lotion having the following formulation:

Ingredients	(% w/w)
Polowax NF	0.5-2.0
Incroquat TMS	0.5-4.0
Stearyl alcohol	0.5-3.0
Isopropyl myristate	0.5-2.0
Arlacel 165	0.5-1.0
Vit. E acetate	0.02-0.5
Zn oxide	0.0-2.0
Zn stearate	0.25-0.50
Glycerin	1.0-3.0
Dipropyleneglycol	0.5-2.0
Water	60-85.0
Polyquaternium 10	0.1-0.30
Polyox WSR 205	0.05-0.2
Butylene glycol	0.5-3.0
Dipropylene glycol	0.2-5.0
Farnesol	0.5-2.0
Zinc gluconate	0.0-0.2
Lactic acid	0.1-2.0
Benzalkonium Chloride	0.1-0.23
PHMB	0.05-0.6
Benzyl alcohol	0.5-2.0
Silicone fluid	0.3-1.0
Aloe leaf Juice	0.01-2.0
Symrelief	0.01-1.0

Adjust pH to 5.5-6.0

[0066] In one specific non-limiting embodiment, the composition is an alcohol-free hand disinfectant lotion ("Lotion D-10") having the following formulation:

Ingredients	(%w/w)
Polowax NF	2.0
Incroquat TMS	4.0
Stearyl alcohol	1.0
Isopropyl myristate	1.0
Arlacel 165	1.0
Vit. E acetate	0.1
Zn oxide	0.25
Zn stearate	0.5
Glycerin	2.0
Dipropyleneglycol	1.0
Water	80.75
Polyquaternium 10	0.15
Polyox WSR 205	0.1
Butylene glycol	1.0
Farnesol	0.3
Zinc gluconate	0.2
Lactic acid	0.2
Benzalkonium Chloride	0.12
PHMB	0.3
Benzyl alcohol	1.0
Silicone fluid	1.0
Aloe leaf Juice	0.5
Symrelief	0.05

Adjust pH to 5.5-6.0

[0067] In one specific non-limiting embodiment, the composition is a wound-healing cream having the following formulation;

Ingredients	% w/w	Range (% w/w)
White Petrolatum*	5.0	4-6
Stearyl Alcohol	13	10-15
Isopropyl Myristate	4.0	3-5
Sorbitan Oleate	1.6	1-2
Polyoxyl 40 Stearate(Myrj 52)	4.0	3-5
Dipropyleneglycol	1.0	0.5-3.0
Incroquat Behenyl TMS	1.0	0.5-3.0
Zinc Oxide	0.3	0.2-1.0
Polawax N.F	1.0	0.5-2.0
Zinc stearate	0.3	0.2-1.0
Water	63.85	55-70
Germall+	0.2	0.1-0.3
Ascorbic acid(Vitamin C)	1.0	0.5-2.0
Calendula Oil	0.5	0.3-1.-0
Benzyl alcohol	0.1	0.1-0.5
PHMB	0.15	0.1-0.3
Benzoic acid	0.2	0.2-0.5
Sodium Benzoate	0.2	0.2-0.5
Resveretrol/*Echinacea purpuria* extract	0.5	0.3-1.0
Zinc lactate/Zinc gluconate	0.2	0.1-0.5
Aloe leaf *Barbadensis* juice/*Aloe* gel	0.5	0.25-1.0
Alpha Bisabolol	0.1	0.05-0.2

Adjust pH to 5.8-6.0

[0068] In one specific non-limiting embodiment, the composition is a wound-healing cream having the following formulation:

Ingredients	% w/w	Range (% w/w)
White Petrolatum*	5.0	4-6
Stearyl Alcohol	13	10-15
Isopropyl Myristate	4.0	3-5
Sorbitan Oleate	1.6	1-2
Polyoxyl 40 Stearate(Myrj 52)	4.0	3-5
Dipropyleneglycol	1.0	0.5-3.0
Incroquat Behenyl TMS	1.0	0.5-3.0
Zinc Oxide	0.3	0.2-1.0
Polawax N.F	1.0	0.5-2.0

-continued

Ingredients	% w/w	Range (% w/w)
Zinc stearate	0.3	0.2-1.0
Water	63.85	55-70
Germall+	0.2	0.1-0.3
Ascorbic acid(Vitamin C)	1.0	0.5-2.0
Calendula Oil	0.5	0.3-1.-0
Benzyl alcohol	0.1	0.1-0.5
PHMB	0.15	0.1-0.3
Benzoic acid	0.2	0.2-0.5
Sodium Benzoate	0.2	0.2-0.5
Rosemary oil	0.1	0.1-0.3
Resveratrol/*Echinacea purpuria* extract	0.5	0.3-1.0
Pomogranate oil	0.5	0.3-1.0
Zinc lactate/Zinc gluconate	0.2	0.1-0.5
Aloe leaf *Barbadensis* juice/*Aloe* gel	0.5	0.25-1.0
Alpha Bisabolol	0.1	0.05-0.2

Adjust pH to 5.8-6.0

[0069] In one specific non-limiting embodiment, the composition is a wound-healing cream having the following formulation:

Ingredients	% w/w	Range (% w/w)
White Petrolatum*	5.0	4-6
Polyox WSR 205	0.1	0.05-0.3
Stearyl Alcohol	13	10-15
Isopropyl Myristate	4.0	3-5
Sorbitan Oleate	1.6	1-2
Polyoxyl 40 Stearate (Myrj 52)	4.0	3-5
Dipropyleneglycol	2.0	0.5-3.0
Incroquat Behenyl TMS	1.0	0.5-3.0
Zinc Oxide	0.3	0.2-1.0
Polawax N.F	1.0	0.5-2.0
Zinc stearate	0.3	0.2-1.0
Water	63.85	55-70
Germall +	0.2	0.1-0.3
Ascorbic acid (Vitamin C)	1.0	0.5-2.0
Glucan (Symglucan from Symrise)	5.0	2-10
Calendula Oil	0.5	0.3-1.-0
PHMB	0.15	0.1-0.3
Benzyl alcohol	0.1	0.1-0.5
Benzoic acid	0.2	0.2-0.5
Sodium Benzoate	0.2	0.2-0.5
Resveratrol/*Echinacea purpuria* extract	0.2	0.3-1.0
Zinc lactate/Zinc gluconate	0.2	0.1-0.5
Aloe leaf *Barbadensis* juice/Aloe gel	0.5	0.25-1.0
Alpha Bisabolol	0.1	0.05-0.2

Adjust pH to 5.8-6.0

[0070] In one specific non-limiting embodiment, the composition is a first aid cream having the following formulation:

Ingredients	(% w/w)
Silver carbonate	0.1-0.3
Calendula Oil	0.3-1.-0
Curcumin	0.1-2.0
Benzyl alcohol	0.1-0.5
Farnesol	0.3-0.5
PHMB	0.1-0.3
Benzoic acid	0.2-0.5
Zinc gluconate	0.1-0.5
Alpha Bisabolol	0.05-0.2
Aloe leaf juice	0.3-1.0
White Petrolatum	1.0-10.0
Stearyl Alcohol	5.0-20.0
Isopropyl Myristate	1.0-6.0
Sorbitan Oleate	0.5-5.0

-continued

Ingredients	(% w/w)
Polyoxyl 40 Stearate (Myrj 52)	1.0-10.0
Germal +	0.05-2.0
Zinc Oxide	0.2-1.0
Zinc stearate	0.2-1.0
Water	55-70

Adjust pH to 5.8-6.0

[0071] In one specific non-limiting embodiment, the composition is a first aid cream having the following formulation:

Ingredients	(% w/w)
Silver carbonate	0.2
Calendula Oil	0.5
Curcumin	0.5
Benzyl alcohol	0.1
Farnesol	0.1
PHMB	0.15
Benzoic acid	0.2
Zinc gluconate	0.2
Alpha Bisabolol	0.1
Aloe leaf juice	0.5
White Petrolatum	5.0
Stearyl Alcohol	13
Isopropyl Myristate	4.0
Sorbitan Oleate	1.6
Polyoxyl 40 Stearate (Myrj 52)	4.0
Germal +	0.2
Zinc Oxide	0.3
Zinc stearate	0.3
Water	59.95

Adjust pH to 5.8-6.0

[0072] In one specific non-limiting embodiment, the composition is a wound-healing cream having the following formulation:

Ingredient	Range (% w/w)
Stearyl Alcohol	5.0-20.0
Isopropyl Myristate	1.0-6.0
Sorbitan Oleate	0.2-3.0
Polyoxyl 40 Stearate(Myrj 52)	1.0-6.0
Dipropyleneglycol	0.1-4.0
Incroquat Behenyl TMS	0.1-5.0
Zinc Oxide	0.01-2.0
Polawax N.F	0.1-3.0
Zinc stearate	0.05-2.0
Water	40.0-90.0
Polyox WSR 205	0.01-1.0
Benzyl alcohol	0.0-2.0
Germall +	0.05-2.0
Zinc lactate	0.01-1.0
Zinc gluconate	0.01-0.1
Ascorbic acid(Vit. C)	0.01-2.0
Calendula oil	0.01-1.0
Cosmocil	0.05-3.0
Tetrahydrocurcuminoid	0.05-2.0
Rosemary oil	0.05-2.0
Oat beta glucan (Sym glucan)	0.05-2.0
Oat flour/Oat extract	0.5-5.0
Resveratrol/*Echinacea* extract	0.0-2.0
Pomogranate oil	0.02-2.0
Aloe leaf *Barbadensis* juice/Aloe gel	0.5-5.0
Alpha Bisabolol	0.01-2.0

5. EXAMPLE 1

Comparison of Persistent Activities of Commercial Soaps With LPS 14E- and LPS 14 7-2 (the Compositions of Which are Described Above)

[0073] Method of Testing Substantive Activity:

[0074] Pigskins (3 cm^2 mounted on petri dishes) were washed with non antibacterial soap and rinsed under running tap water. 3 pairs for control (Soap base) and 3 pairs for test were used. 0.15 ml soap was added to each piece of the pair and rubbed for 30 seconds and rinsed each piece with 75 ml water. After 1 or 2 hours, the pieces were contaminated with 10 μl of 10^5 Cfu/ml bacterial culture. After 15 minutes the pieces were rinsed with 10 ml of drug inactivating fluid (DNF). The fluid was diluted and plated on TSA. After incubation at 37° C., the bacterial counts were enumerated and the 3 soaps were compared

[0075] 1="DC" (0.46% T) Commercial soap containing 0.46% triclosan

[0076] 2="TPB", Comercial soap containing 0.15% triclosan, PHMB and Benzathonium chloride without emollients

[0077] 3=LPS 14E Soap with emollients

[0078] 4=LPS 14F7-2 Soap with emollients

[0079] Log reduction is calculated from Control Growth which is 1×10^3 to 5×10^3 cfu (3-3.5 log 10)

[0080] The bacteria tested were, *S. aureus* (ATCC 6538) and *E. coli* (ATCC 11229). The results of these experiments are shown in Table 1.

TABLE 1

Log10 reduction in colony-forming units, mean ± SD

	S. aureus	*E. coli*
DC (0.46% T)		
1 hour post wash	0.58	0.5
2 hour post wash	0.17	0.4
TPB (0.15% T)		
1 hour post wash	0.9	0.7
2 hour post wash	0.7	0.7
LPS 14E		
1 hour post wash	1.8	1.6
2 hour post wash	1.74	1.6
LPS 14F7-2		
1 hour post wash	2.3	1.8
2 hour post wash	1.9	1.9

[0081] Conclusion:

[0082] Activity against both *S. aureus* (gram positive) and *E. coli* (gram negative) is seen even 2 hour after rinsing the skin with the LPS14E and soap containing emollients LPS 14 F7-2 soap without lactic acid provides slightly more substantive activity. Both DC and TPB showed lower antimicrobial activity, and the antimicrobial activity of the DC soap deteriorated over the testing interval.

6. EXAMPLE 2

Comparison of Persistent Activities of Commercial Hand Sanitizers With HSBZT and HSBAC (The Compositions of which are Described Above)

[0083] A method analogous to that used to test the soaps (above) was used to test persistent antimicrobial activities of

hand sanitizers. The test organism was *S. aureus* and HSP is a commercial alcohol-based hand sanitizer. The results are shown in Table 2.

TABLE 2

	Log10 reduction from control counts	
Disinfectant	1 hour post application	4 hour Post application
HSBZT	2.851	2.130
HSBAC	3.2	2.9
HSP	0.102	0.050

Conclusion Both aqueous HSBZT and HSBAC show grater activity than the commercial alcohol-based hand sanitizer tested.

7. EXAMPLE 3

Evaluation of Anti Irritant Composition (ZAB) in an Alcohol Based Hand Disinfectant

[0084] Alcohol based hand disinfectant (ABHD)

Ingredients	% w/w
Alcohol SDA 40 B	70.0
Benzyl alcohol	1.0
Lactic acid	0.2
Octanediol	1.0
Dipropylene glycol	1.0
Farnesol	0.5
Benzathonium chloride	0.18
PHMB	0.3
Polyquaternium-10	0.1
Hydroxypropyl methyl cellulose	0.1
Incromine oxide	1.0
Water	23.62
Total	99.0

[0085] ABHD with the following ingredients were prepared for testing in volunteers for anti irritant effect. These ingredients were added to the above ABHD and total weight adjusted to 100 gm with water

ABHD Z	ABHD containing 0.2% zincgluconate
ABHDZ1	ABHD containing 0.2% zincgluconate + 0.2% Zinc lactate
ABHD ZA	ABHD containing 0.2% zinc gluconate + 0.5% *Aloe* leaf juice
ABHD ZB	ABHD containing 0.2% zinc gluconate + 0.2% bisabolol
ABHD ZAB	ABHD containing 0.2% zinc gluconate + 0.5% *Aloe* leaf Juice + 0.2% bisabolol
ABHD ZAB 1	ABHD containing 0.2% zincgluconate + 0.25% *Aloe* leaf Juice + 0.1% bisabolol

[0086] Volunteer Test Results:

[0087] Volunteer A had severe irritation when ABHD was applied on the hand.

[0088] Volunteer B had moderate reaction

[0089] These two volunteers were used for the test.

[0090] Test Method:

[0091] 2 ml of the product is applied on the hand and dried the reaction was observed after 10 minutes The hands were washed and dried After 1 hour the second product was applied. Thus each product was applied after 1 hour interval between application.

[0092] Grading of Irritation

[0093] 0=No reaction

[0094] 1=Mild itching

[0095] 2=Moderate itching

[0096] 3=Severe itching/slight redness

[0097] The results are shown in Table 3.

TABLE 3

	Reaction	
Group	Volunteer A	Volunteer B
ABHD	3.0	2.0
ABHD Z	3.0	2.0
ABHDZ1	2.5	1.5
ABHD ZA	1.5	0
ABHD ZB	2.0	0.5
ABHD ZAB	0	0
ABHD ZAB 1	1.0	0

[0098] Conclusion: ZAB provides good anti irritant protection. The alcohol based hand disinfectant (ABHD produced ABHD) without anti irritant Zinc salts produced severe itching and some redness (grading #3).

8. EXAMPLE 4

Evaluation of Emollients in Hand Disinfectant Antimicrobial Compositions

[0099]

TABLE 4

Formulations containing various emollients

	% w/w		
Ingredients	A	B	C
Benzyl alcohol	2.0	2.0	—
Benzethonium chloride	0.23	0.23	0.23
PHMB	0.4	0.4	0.4
Dipropylene Glycol	5.0	5.0	5.0
Farnesol	2.0	—	2.0
Zinc gluconate	0.2	0.2	0.2
Bisabolol	0.1	0.1	0.1
Aloe leaf juice	0.25	0.25	0.25
Pluronic F-87 prill	1.0	1.0	1.0
Methocel E4 M	0.2	0.2	0.2
PolyoxWSR 205	0.3	0.3	0.3
Incromine Oxide L	3.42	3.42	3.42
Montalene C 40	8.0	8.0	8.0
Water	57.3	59.3	59.3
Glycerine	1.0	1.0	1.0
SDA-40 B alcohol	14.0	14.0	14.0
Butylene glycol	1.0	1.0	1.0
Phenoxyethanol	1.0	1.0	1.0
Octanediol	1.0	1.0	1.0

Composition (A) was formulated with both benzyl alcohol and farnesol; composition (B) was formulated with benzyl alcohol without farnesol; and composition (C) was formulated with farnesol without benzyl alcohol.

Method of Testing Substantive Activity

[0100] Pigskins (3 cm^2 mounted on petri dishes) were washed with non antibacterial soap and rinsed under running tap water. 3 pairs for control (Soap base) and 3 pairs for testing were used. 0.15 ml soap was added to each piece of the pair and rubbed for 30 seconds and each piece was rinsed with 75 ml water. After 1 or 2 hours, the pieces were contaminated with 10 µl of 10^5 Cfu/ml bacterial culture. After 15 minutes the pieces were rinsed with 10 ml of drug inactivating fluid (DNF). The fluid was diluted and plated on TSA. After incubation at 37° C., the bacterial counts were enumerated and the soap compositions were compared. The results are shown in Table 5.

TABLE 5

Substantive antibacterial activity after one time application of soap by pig skin method against, *E. coli* (ATCC 11229)

SOAP	Log_{10} reduction in colony-forming units from control growth
A	1.8
B	1.0
C	0.7

[0101] Conclusion: From the above results it is concluded that farnesol and benzyl alcohol provide substantive antibacterial efficacy. Dipropylene glycol acts to dissolve farnesol.

[0102] The effect of different sesquiterpenoids on substantive antibacterial activity was also examined using the methods described above. The sesquiterpenoids nerolidol, bisabolol and apritone were examined using the formulations described below in Table 6.

TABLE 6

	% w/w			
Ingredients	A	B	C	D
Benzyl alcohol	2.0	2.0	2.0	2.0
Benzethonium chloride	0.23	0.23	0.23	0.23
PHMB	0.4	0.4	0.4	0.4
Dipropylene Glycol	5.0	5.0	5.0	5.0
Farnesol	2.0	—	—	—
Nerolidol	—	2.0	—	—
Bisabolol	—	—	2.0	—
Apritone	—	—	—	2.0
Zinc gluconate	0.2	0.2	0.2	0.2
Bisabolol	0.1	0.1	0.1	0.1
Aloe leaf juice	0.25	0.25	0.25	0.25
Pluronic F-87 prill	1.0	1.0	1.0	1.0
Methocel E4 M	0.2	0.2	0.2	0.2
PolyoxWSR 205	0.3	0.3	0.3	—
Incromine Oxide L	3.42	3.42	3.42	3.42
Montalene C 40	8.0	8.0	8.0	8.0
Water	57.3	57.3	57.3	57.3
Glycerine	1.0	1.0	1.0	1.0
SDA-40 B alcohol	14.0	14.0	14.0	14.0
Butylene glycol	1.0	1.0	1.0	1.0
Phenoxyethanol	1.0	1.0	1.0	1.0
Octanediol	1.0	1.0	1.0	1.0

The antibacterial effects of the compositions described in Table 6 were tested using the pigskin assay method described above. The results are shown below in Table 7.

TABLE 7

Substantive antibacterial activity with various sesquiterpenoids against *E. coli* (ATCC 11229)

SOAP	Log_{10} reduction in colony-forming units, mean ± SD
A 1 hour post wash	1.8
B 1 hour post wash	1.5
C 1 hour post wash	1.6
D 1 hour post wash	1.7

Conclusion: All the sesquiterpenoids tested have similar substantive antibacterial efficacy.

9. EXAMPLE 5

Evaluation of Substantive Activity and Test Results of an Antibacterial Soap Formulation (LPS 3, Described Above)

Method of Testing Substantive Activity

[0103] Pigskins (3 cm^2 mounted on petri dishes) were washed with non antibacterial soap and rinsed under running tap water. 3 pairs for control (Soap base) and 3 pairs for testing were used. 0.15 ml soap was added to each piece of the pair and rubbed for 30 seconds and each piece was rinsed with 75 ml water. After 1 or 2 Hour, the pieces were contaminated with 10 µl of 10^5 Cfu/ml bacterial culture. After 15 minutes the pieces were rinsed with 10 ml of drug inactivating fluid (DNF). The fluid was diluted and plated on TSA. After incubation at 37° C., the bacterial counts were enumerated and the effect of the three soaps were compared.

The following formulations were tested:

1 DC (0.46% T): Commercial soap containing 0.46% triclosan (T) (Dial).

2 TPB (0.15% T): Soap containing 0.15% triclosan (T), PHMB and benzethonium chloride without emollients.

3 LPS 3 Soap with emollients.

The results are described in Table 8.

TABLE 8

Antibacterial activity after a single one time application of soap against *S. aureus* (ATCC 6538) and *E. coli* (ATCC 11229)

	Log_{10} reduction in colony-forming units, mean ± SD Pigskin Method	
SOAP	*S. aureus*	*E. coli*
DC (0.46% T)		
1 hour post wash	0.58 ± 0.208	0.5 ± 0.12
2 hour post wash	0.17 ± 0.051	0.4 ± 0.10
TPB (0.15% T)		
1 hour post wash	0.9 ± 0.21	0.7 ± 0.11
2 hour post wash	0.7 ± 0.18	0.7 ± 0.20

TABLE 8-continued

Antibacterial activity after a single one time application of soap against *S. aureus* (ATCC 6538) and *E. coli* (ATCC 11229)

	Log_{10} reduction in colony-forming units, mean ± SD Pigskin Method	
SOAP	*S. aureus*	*E. coli*
LPS-3		
1 hour post wash	2.3 ± 0.26	1.8 ± 0.21
2 hour post wash	1.94 ± 0.27	1.9 ± 0.10

Control growth ranged from 1×10^3 to 5×10^3 efu

Conclusion: Activity against both S aureus (Gram positive) and *E. coli* (Gram negative) bacteria was seen even 2 hours after rinsing skin that had been treated with the LPS 3 soap containing emollients. The TPB soap, which contains antibacterial agents but no emollients, did not exhibit any substantive antibacterial activity against *S. aureus* and *E. coli*. Dial soap, which contains a higher concentration of triclosan, also showed no significant substantive antibacterial activity in this assay against *S. aureus* and *E. coli*.

The antibacterial efficacy of alcohol-free hand sanitizer formulations was also examined using the methods described above.

TABLE 9

Comparison of the substantive antibacterial efficacy of alcohol-free hand sanitizers by pigskin method-C (Test organism *S. aureus*)

	Log_{10} reduction from control counts	
Disinfectant	1 hour post application	2 hour Post application
AQ-D14	2.851	2.130
Lotion D-10	3.2	2.9
HSP	0.102	0.050

HSP: alcohol based hand sanitizer Purell

Conclusion: Both of the AQ-D14 and Lotion D-10 alcohol-free hand sanitizers show greater activity than the commercial alcohol-based hand sanitizer tested.

[0104] Various patent and non-patent references are cited herein, the contents of which are hereby incorporated by reference in their entireties herein.

We claim:

1. A composition for topical application comprising:

(i) benzyl alcohol at a concentration of between about 0.1 and about 5% w/w;

(ii) one or more cationic antimicrobial agent selected from the group consisting of a quaternary ammonium compound, a biguanide, and a combination thereof, wherein the quaternary ammonium compound, if present, is at a concentration of between about 0.05 and about 1% w/w and the biguanide, if present, is at a concentration of between about 0.05 to about 3.0% w/w; and

(iii) one or more emollient selected from the group consisting of dipropylene glycol, farnesol, and combinations thereof, at a concentration effective in producing persistent antimicrobial activity after application to the skin.

2. The composition of claim **1**, further comprising an organic acid.

3. The composition of claim **2**, where the organic acid is selected from the group consisting of lactic acid, citric acid, glycolic acid, salicylic acid, mandelic acid and benzoic acid.

4. The composition of claim **1**, further comprising a zinc salt as an anti-irritant.

5. The composition of claim **1**, further comprising an anti-irritant selected from the group consisting of bisabolol, aloe vera gel, aloe leaf extract, and combinations thereof.

6. The composition of claim **1**, further comprising a component selected from the group consisting of propylene glycol, glycerin, polyglycerol, butylene glycol, pentylene glycol, hexanediol, octanediol, ethyl hexyl glycerin, caprylic triglyceride, capric triglyceride, panthenol, lauric alcohol, emu oil, grapeseed oil, olive oil, and combinations thereof.

7. The composition of claim **1**, further comprising a polyethylene oxide polymer.

8. The composition of claim **1**, further comprising oat flour, oat extract or combinations thereof.

9. The composition of claim **1**, which is a formulation selected from the group consisting of soap, hand sanitizer, cream, lotion, splash, astringent and wipe.

10. A method of providing a skin surface with a persistent antimicrobial activity, comprising treating the skin surface with a composition according to claim **1**.

11. A composition for topical application comprising:

(i) benzyl alcohol at a concentration of between about 0.1 and about 5% w/w;

(ii) polyaminopropyl biguanide at a concentration of between about 0.05 and about 3.0% w/w; and

(iv) oat beta glucan, oat flour, oat extract or a combination thereof.

* * * * *