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(54) Title: A COMPOSITION CONTAINING AN INSECT REPELLENT ACTIVE BLEND

(57) Abstract

Disclosed is an insect repellent composition comprising: a) an insect repellent active blend comprising a fragrance carbonyl compound, a fragrance alcohol, a fragrance ester, a nitrile compound, an epoxide, and an ether compound; and b) a cosmetically-acceptable carrier.

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A COMPOSITION CONTAINING AN INSECT REPELLENT ACTIVE BLEND

FIELD

The present invention relates to a topical composition. In particular, it relates to an insect repellent composition.

BACKGROUND

Consumers frequently use insect repellent products for protection from bites from insects including mosquitoes, alone or along with cosmetic products, during outdoor activities such as hiking, camping, picnicking, and hunting. These products, which come in the form of liquids, pastes, gels, creams and powders, are rubbed, sprayed, or otherwise applied to the skin.

Many substances have been suggested through the years to be used in such repellent products as insect repellent actives. N,N-diethyl-m-toluamide, which is sometimes referred to as "DEET," and dimethyl phthalate are widely used insect as repellent actives. DEET is very effective in protecting outdoors persons from insects, provided it is properly applied such that it adequately covers the skin of the user. See U.S. Patent 2,932,665, Wagner et al., issued April 12, 1960; U.S. Patent 4,756,905, Melnik, issued July 12, 1988; U.S. Patent 4,416,881, McGovern et al., issued November 22, 1983; and U.S. Patent 4,419,360, Smolanoff, issued December 6, 1983.

Certain formulations containing DEET have been designed for cosmetic uses, for example in sunscreen products such as lotions. See U.S. Patent 5,518,712, Stewart, issued May 21, 1996; U.S. Patent 5,575,988, Knowles,

issued November 19, 1996. However, relatively high concentrations of insect repellent actives such as DEET may give rise to allergic or toxic reactions in some individuals when applied to the skin. In addition, some users may find the smell of DEET to be unpleasant.

A certain insect repellent blend such as TREO™ containing terpineol, citronella, rhodinol extras, and geraniol has also been used as a non-toxic and natural repellent. See, U.S. Patent 5,227,406, issued July 13, 1993; U.S. Patent 5,346,922, issued September 13, 1994; and U.S. Patent 5,648,398, issued July 15, 1997, Beldock et al. Such an insect repellent blend tends to be more pleasantly scented but provides only weak repellency. Thus, there is still a need for effective insect repellent which is non-allergic and non-toxic to the skin as well as easy to formulate in compositions.

Based on the foregoing, there is a need for a composition containing insect repellent actives, which is natural and safe to the skin and which provides prolonged efficacy of the actives in addition to an attractive fragrance. None of the existing art provides all of the advantages and benefits of the present invention.

SUMMARY

The present invention is directed to an insect repellent composition comprising :

a) an insect repellent active blend comprising a fragrance carbonyl compound, a fragrance alcohol, a fragrance ester, a nitrile compound, an epoxide, and an ether compound; and

b) a cosmetically-acceptable carrier.

These and other features, aspects, and advantages of the present invention will become better understood from a reading of the following description, and appended claims.

DETAILED DESCRIPTION

While the specification concludes with claims particularly pointing out and distinctly claiming the invention, it is believed that the present invention will be better understood from the following description.

All percentages and ratios used hereinafter are by weight of total composition, unless otherwise indicated.

All measurements referred to herein are made at 25°C unless otherwise specified.

All percentages, ratios, and levels of ingredients referred to herein are based on the actual amount of the ingredient, and do not include solvents, fillers, or other materials with which the ingredient may be combined as a commercially available product, unless otherwise indicated.

All publications, patent applications, and issued patents mentioned herein are hereby incorporated in their entirety by reference. Citation of any reference is not an admission regarding any determination as to its availability as prior art to the claimed invention.

Herein, “comprising” means that other steps and other ingredients which do not affect the end result can be added. This term encompasses the terms “consisting of” and “consisting essentially of."

Herein, "topical application" means to apply or spread a material onto the surface of the skin.

Herein, "cosmetically-acceptable" means that the compositions or components thereof so described are suitable for use in contact with human skin without undue toxicity, incompatibility, instability, allergic response, and the like.

Herein, "safe and effective amount," means an amount of a compound or composition sufficient to significantly induce a positive benefit, preferably a positive skin appearance or feel benefit, including independently the benefits disclosed herein, but low enough to avoid serious side effects, *e.g.,* to provide a reasonable benefit to risk ratio, within the scope of sound judgment of the skilled artisan.

Herein, "mixtures" is meant to include a simple combination of materials and any compounds that may result from their combination.

All ingredients such as actives and other ingredients useful herein may be categorized or described by their cosmetic and/or therapeutic benefit or their postulated mode of action. However, it is to be understood that the active and other ingredients useful herein can, in some instances, provide more than one cosmetic and/or therapeutic benefit or operate via more than one mode of action. Therefore, classifications herein are made for the sake of convenience and are not intended to limit an ingredient to the particularly stated application or applications listed.

The composition of the present invention comprises an insect repellent active blend ("active blend") including a fragrance carbonyl compound, a fragrance alcohol, a fragrance ester, a nitrile compound, an epoxide, and an ether compound, and a cosmetically-acceptable carrier. The composition is, preferably, a dermatologically-acceptable topical composition; more preferably, a cosmetic composition used for insect repellent. The cosmetic composition provides superior insect repellent efficacy in addition to other skin benefits such as moisturizing, smoothness, skin lightening, and the like, as well as those provided by conventional cosmetic compositions. The composition of the present invention especially provides a prolonged repellent efficacy.

The composition useful herein may be made into a wide variety of products depending on the type of carriers utilized. These include, but are not limited to, skin care products such as liquid type products including lotions, creams, gels, powders, sticks, sprays, ointments, and pastes and cosmetics such as foundation (*e.g.*, solid, semi-solid, or liquid make-up).

In one embodiment, liquid type products such as lotions and creams of the present invention generally comprise a solution carrier and one or more emollients. Herein, "emollient" refers to a material used for the prevention or relief of dryness, as well as for the protection of the skin. Such liquids typically contain from about 1% to about 30%, preferably from about 5% to about 15% of the emollient; from about 70% to about 95%, preferably from about 70% to about 90% of water; in addition to the active blends described herein. A cream typically contains from about 5% to about 70%, preferably from about 10% to about 35% of an emollient; from about 30% to about 90%, preferably from about 45% to about 85% of water; in addition to the active blends described herein.

Powder type products such as skin powder including cosmetic powder foundation, are other embodiments used over a large area of the skin, such as over the face. Such powder products of the present invention include a cosmetically acceptable carrier and may further include conventional ingredients such as oils and waxes, pigments, stabilizers, colorants, and the like.

A. Insect Repellent Active Blend

The composition of the present invention contains the insect repellent active blend including a fragrance carbonyl compound, a fragrance alcohol, a fragrance ester, an nitrile compound, an epoxide, and an ether compound. The active blend herein provides excellent repellency, particularly against

mosquitoes, when applied to skin. For example, the composition containing the active blend herein can provide protection from at least 80% of bites over a 4 hours exposure period.

The fragrance carbonyl compound useful herein preferably has a molecular weight of from about 100 to about 300. Preferably, the fragrance carbonyl compound is selected from the group consisting of a fragrance aldehyde, a fragrance ketone, and mixtures thereof. Preferred fragrance aldehydes useful herein include an aliphatic aldehyde, a terpenic aldehyde, and an aromatic aldehyde.

Nonlimiting examples of the aliphatic aldehyde useful herein include hexyl aldehyde (caproaldehyde), heptyl aldehyde, octyl aldehyde (caprylaldehyde), nonyl aldehyde (pelargonaldehyde), decyl aldehyde (capraldehyde), undecyl aldehyde, dodecyl aldehyde (lauric aldehyde), tridecyl aldehyde, 3,5,5-trimethylhexanal, 2-methyldecanal (methyloctylacetaldehyde), 2-methylundecanal (methylnonylacetaldehyde), *trans*-2-hexenal (leaf aldehyde), *cis*-4-heptenal, *trans*-2-*cis*-6-nonadienal (cucumber aldehyde), *cis*-4-decenal, *trans*-4-decenal, 10-undecen-1-al (undecenoic aldehyde), *trans*-2-dodecenal, 2,6,10-trimethyl-9-undecenal, 2,6,10-trimethyl-5,9-undecadienal, 3,7-dimethyl-2,6-octadienal (citral), 3,7-dimethyl-6-octen-1-al (citronellal), 7-hydroxy-3,7-dimethyloctan-1-al (hydroxy citronellal), *p*-mentha-1,8-dien-7-al (perilla aldehyde).

Nonlimiting examples of the terpenic aldehyde herein include 3,7-dimethyl-7-methoxyoctan-1-al (methoxydihydrocitronellal), citronellyloxy acetaldehyde, 2,4-diemthyl-3-cyclohexenyl carboxyaldehyde, 2,4,6-trimethyl-3-cyclohexene-1-carboxyaldehyde (isocyclocitral), 5-methoxy-octahydro-4,7-menthano-1*H*-indene-2-carboxyaldehyde (scentenal), 4-(4-methyl-3-pentenyl)-3-cyclohexen-1-carboxyaldehyde (myrac aldehyde), 4-(4-hydroxy-4-methyl-pentyl)-3-cyclohexen-1-carboxyaldehyde (lyral), 1-methyl-4-(4-methyl-pentyl)-3-cyclohexen-carboxyaldehyde (vernaldehyde), 4-(tricyclo[5.2.1.$0^{2,6}$]decyliden-8)-butenal (dupical), 7-formyl-5-isopropyl-2-methyl-bicyclo-[2.2.2]oct-2-ene (maceal), 2-methyl-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-butenal (boronal), 2-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-butanal (cetonal).

Nonlimiting examples of the aromatic aldehyde useful herein include benzaldehyde, phenylacetaldehyde (hyacinth aldehyde), 3-phenylpropanal (phenylpropylaldehyde), 3-pheny-2-propenal (cinnamic aldehyde), 2-pentyl-3-

phenyl-2-propenal (α-amyl cinnamic aldehyde), 2-hexyl-3-phenyl-2-propenal (α-hexyl cinnamic aldehyde), 2-phenylpropanal (hydratropic aldehyde), 4-methoxybenzaldehyde (anis aldehyde), *p*-methylphenylacetaldehyde (*p*-tolyl acetaldehyde), 4-isopropylbenzaldehyde (cumin aldehyde), 2-methyl-3-(4-isopropylphenyl)-propanal (cyclamen aldehyde), 3-(*p*-*t*-butylphenyl)-propanal, 3-(*p*-ethylphenyl)-2,2-dimethylpropanal (*p*-ethyl 2,2-dimethylhydrocinnamic aldehyde), 2-methyl-3-(*p*-methoxyphenyl)-propanal, 2-methyl-3-(4-*t*-butylphenyl)-propanal (4-*t*-butyl-α-methylhydrocinnamic aldehyde, lily aldehyde), 2-hydroxybenzaldehyde (salicylic aldehyde), 3,4-methylenedioxy-benzaldehyde (heliotropine), 2-methyl-3-(3,4-methylenedioxy-phenyl)-propanal (helional), 4-hydroxy-3-methoxybenzaldehyde (vanillin), 3-ethoxy-4-hydroxybenzaldehyde (ethyl vanillin), 3,4-dimethyoxy-benzaldehyde (methyl vanillin): aldehydes having low volatility by virtue of incorporation of bulky polar moieties.

The preferred fragrance ketones useful herein include an aliphatic ketone, a terpenic and sesquiterpenic ketone, a cyclic ketone, and an aromatic ketone. The ketones can be saturated, unsaturated, linear, branched, or cyclic, preferably including alkyl, alkenyl, or aryl moieties. The ketones can include other functional groups such as ethers or esters.

Nonlimiting examples of the aliphatic ketone useful herein include 3-hydroxy-2-butanone (acetoine), 2,3-butanedione (diacetyl), 2-heptanone (methyl amyl ketone), 3-octanone (ethyl amyl ketone), 2-octanone (methyl hexyl ketone), 2-undecanone (methyl nonyl ketone), 6-methyl-5-hepten-2-one, acetyl diisoamylene (koavone).

Examples of the terpenic and sesquiterpenic ketone useful herein include 1,7,7-trimethyl bicyclo[2.2.1]heptan-2-one (camphor), 1,8-*p*-menthadien-6-one (carvone), *p*-menthan-3-one (menthone), *d*-*p*-menth-4(8)-en-3-one (*d*-pulegone), *p*-menth-1-en-3-one (piperitone), 1,3,3-trimethyl-bicyclo[2.2.1]heptan-2-one (fenchone), 6,10,-dimethyl-5,9-undecadiene-2-one (geranyl acetone), acetyl cedrene (cedryl methyl ketone), 5,6-dimethyl-8-isopropenylbicyclo-[4.4.0]-1-decen-3-one (nootkatone), 4-(2,2,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one (α-ionone), 4-(2,2,6-trimethyl-1-cyclohexen-1-yl)-3-buten-2-one (β-ionone), 5-(2,2,6-trimethyl-2-cyclohexen-1-yl)-4-pentan-3-one (α-methyl ionone), 5-(2,2,6-trimethyl-1-cyclohexen-1-yl)-4-pentan-3-one (β-methyl ionone), 5-(2,2,6-trimethyl-2-cyclohexen-1-yl)-3-methyl-3-buten-2-one (γ-methyl ionone), 5-(2,2,6-trimethyl-1-cyclohexen-1-yl)-3-methyl-3-buten-2-one (δ-methyl ionone), 1-(2,2,6-trimethyl-

2-cyclohexen-1-yl)-1,6-heptadien-3-one (allyl ionone), α-irone, β-irone, γ-irone, 1-(2,2,6-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one (α-damascone), 1-(2,2,6-trimethyl-1-cyclohexen-1-yl)-2-buten-1-one (β-damascone), 1-(2,2,6-trimethyl-3-cyclohexen-1-yl)-2-buten-1-one (δ-damascone), 1-(3,3-dimethyl-6-cyclohexen-1-yl)-penta-4-en-1-one (α-dynascone), 1-(3,3-dimethyl-1-cyclohexen-1-yl)-penta-4-en-1-one (β-dynascone).

Examples of the cyclic ketone useful herein include 3-hydroxy-2-methyl-*4H*-pyran-4-one (maltol), 2-ethyl-3-hydroxy-4*H*-pyran-4-one (ethyl maltol), 2,5-diemthyl-4-hydroxy-2*H*-furan-3-one, 4,5-dimethyl-3-hydroxy-5*H*-furan-2-one (sugar lactone), *p-t*-butylcyclohexanone, 2-amylcyclopentanone, 2-heptylcyclopentanone, 3-methyl-2-pentyl-2-cyclopenten-1-one (dihydrojasmone), 3-methyl-2-(2-cis-penten-1-yl)-2-cyclopenten-1-one (*cis*-jasmone), 6 (or 7)-ethylidene-octahydro-5,8-methano-2*H*-benzopyrane (florex), 7-methyl-octahydro-1,4-methanonaphthalen-6(2*H*)-one (plicatone), 4-cyclohexyl-4-methyl-2-pentanone, 1-(*p*-menthen-6(2)-yl)-1-propanone, 2,2,5-trimethyl-5-pentylcyclopentanone, 4-(1-ethoxyvinyl)-3,3,5,5-tetramethyl-cyclohexanone, 6,7-dihydro-1,1,2,3,3-pentamethyl-4(5*H*)-indanone, 7-acetyl-1,2,3,4,5,6,7,8-octahydro-1,1,6,7-tetramethylnaphthalene (Iso E Super), methyl 2,6,10-trimethyl-2,5,9,cyclododecatrien-1-yl ketone (trimofix "O").

Examples of the aromatic ketones useful herein include, acetophenone (methyl phenyl ketone), *p*-methyl acetophenone (*p*-tolyl methyl ketone), benzyl acetone, 7-methyl-3,4-dihydro-(2*H*)-1,5-benzodioxepin-3-one (calone), 4-(4-hydroxyphenyl)-2-butanone (raspberry ketone), *p*-methoxyphenylbutanone (anisyl acetone), 4-(4-hydroxy-3-methoxyphenyl)-2-butanone (Zingerone), 2-acetonaphthone (methyl β-naphthyl ketone), 4-phenyl-4-methyl-2-pentanone, and benzophenone (diphenyl ketone). Other exemplary ketones include Ethyl ketopropinate (ethyl pyruvate), isoamyl ketopropionate (isoamyl pyruvate), ethyl acetoacetate, ethyl γ-ketovalerate (ethyl levulinate), methyl jasmonate, and methyl dihydrojasmonate.

The fragrance alcohol useful herein preferably has a molecular weight of from about 100 to about 250. The fragrance alcohols can be any alcohols which are commercially available and known in the art. The fragrance alcohols can be saturated, unsaturated, linear or branched compound, preferably those having alkyl, alkenyl, aryl, aralkyl, alkylalkoxylate derivatives with one or more OH groups. Preferably, the fragrance alcohol can be alkoxylated with 1 to 30 units of

ethylene oxide, propylene oxide or mixtures thereof. Aromatic or aliphatic alcohols are useful. The alcohols can contain additional functionality such as amines, amides, ethers, or esters as a part of their structure. Nonlimiting examples include, but are not limited to, phenylethyl alcohol, *trans*-2-hexenol, *cis*-3-hexenol, 1-octen-3-ol (amyl vinyl carbinol), 9-decenol, 4-methyl-3-decen-5-ol, 10-undecenol, and *trans*-2-*cis*-6-nonadien-1-ol (violet leaf alcohol).

Other exemplary alcohols herein include 3,7-dimethyl-1,6-octadiene-3-ol (linalool), 3,7-dimetyl-*trans*-2,6-octadien-1-ol (geraniol), 3,7-dimethyl-*cis*-2,6-octadien-1-ol (nerol), 3,7-dimethyl-6-octen-1-ol (citronellol), 2-methyl-6-methylene-7-octen-2-ol (myrcenol), 2,6-dimethyl-5-hydroxymethyl-2,6-heptadien (lavandulol), 3,7-dimethyloctanol (tetrahydrogeraniol), 3,7-dimethyloctan-3-ol (tetrahydrolinalool), 3,7-dimethyloctan-1,7-diol (hydroxy citronellol), 2,6-dimethyl-7-octen-2-ol (dihydromyrcenol), 3,7-dimethyl-4,6-octadien-3-ol (allo-ocimenol), *p*-menthan-8-ol (α-terpineol), 1-*p*-menthen-4-ol (terpinen-4-ol), *p*-menth-8-en-3-ol (isopulegol), 6,6-dimethyl-bicyclo-[3.1.1]-2-heptene-2-ethanol (nopol), 3,7,11-trimethyl-2,6,10-dodecatrien-12-ol (farnesol), 3,7,11-trimethyl-1,6,10-dodecatrien-3-ol (nerolidol), (-)-α-bisabolol (bisabolol), patchouli alcohol, vetiverol, 2,4-dimethyl-3-cyclohexene-1-methanol, 4-isopropylcyclohexanol, 2,5,5-trimethyl-1,2,3,4,4α,5,6,7-octahydro-2-naphthalenol (ambrinol), 4-methoxybenzyl alcohol (anis alcohol), 3-phenyl-2-propen-1-ol (cinnamic alcohol), 2-methoxy-4-allylphenol (eugenol), 2-methoxy-4-(1-propenyl)-phenol (isoeugenol), 5-propenyl-2-ethoxyphenol (propenyl guaethol), santalol, 2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol (bacdanol), 2-methyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol (sandalmysore core), and 3-methyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-4-penten-2-ol (ebanol).

The fragrance ester useful herein preferably has a molecular weight of from about 150 to about 300. Examples of the fragrance ester herein include ethyl formate, linalyl formate, citronellyl formate, geranyl formate, benzyl formate, phenylethyl formate, butyl acetate, isoamyl acetate, cis-3-hexenyl acetate (leaf acetate), citronellyl acetate, linalyl acetate, geranyl acetate, benzyl acetate, phenylethyl acetate, terpinyl acetate, flor, acetate, 3,5,5-trimethylhexyl acetate, 3,7-dimethyl-6-octen-1-yl acetate, 2-isopropenyl-5-methyl-4-hexenyl acetate, 3,7-dimethyl-2,6-octadien-1-yl acetate, 3,7-dimethyl-1,6-octadien-3-yl acetate, 2-methyl-6-methylene-7-octen-2-yl acetate, *p*-menthen-8-yl acetate, L-menthyl acetate, *p*-menthanyl acetate, 2-(6,6-dimethyl-bicyclo[3.1.1]hep-2-en-2-yl

acetate, p-t-butylcyclohexyl acetate, o-t-butylcyclohexyl acetate, hexahydro-4,7-methanoinden-5 (or 6)-yl acetate, 2,4-dimethyl-3-cyclohexene-1-methanyl acetate, 2-phenylethyl acetate, 1-phenylethyl acetate, 3-phenyl-2-propen-1-yl acetate, 4-methoxybenzyl acetate, *p*-tolyl acetate, 4-allyl-2-methoxy-phenyl acetate, methyl dihydrojasmonate, hexyl butyrate, benzyl butyrate, methyl isobutenyl tetrahydropyran, myroxyde, and exaltolyde.

The nitrile compound useful herein preferably has a molecular weight of from about 100 to about 200. Examples of the nitrile compounds are 3,7-dimethyl-2,6-octadiene-1-nitrile (geranyl nitrile), 3,7-dimethyl-6-octen-1-nitrile (citronellyl nitrile), 5-phenyl-3-methyl-2-penten nitrile and 3,7-dimethyl-2,6-nonadien nitrile.

Preferably, the epoxide useful herein has a molecular weight of from about 100 to about 200. 2,2-dimethyl-3-(3-methyl-2,4-pentadienyl) oxirane is exemplary.

Preferably, the ether compound useful herein has a molecular weight of from about 100 to about 300. Examples of the ether compounds include 1,8-cineol (eucalyptol), 4-methyl-1-propenyl) tetrahydropyrane, and 4-acetoxy-3-amyltetrahydropyrane.

Preferably the active blend includes from about 2% to about 35% of a fragrance carbonyl compound selected from the group consisting of a fragrance aldehyde, a fragrance ketone, and mixtures thereof, from about 1% to about 25% of a fragrance alcohol and from about 3% to about 20% of a fragrance ester. Preferably, a nitrile compound, an epoxide, and an ether compound are contained from about 0.1 to about 5% of each by weight of the composition.

B. Cosmetically-Acceptable Carrier

The composition of the present invention contains a cosmetically-acceptable carrier. Herein, "cosmetically acceptable carrier" means one or more compatible solid or liquid fillers, diluents, extenders and the like, which are cosmetically acceptable as defined herein. The term "compatible" herein means that the components of the compositions of this invention are capable of being commingled with each other, in a manner such that there is no interaction which would substantially reduce the efficacy of the composition under ordinary use situations.

The type of the carrier utilized in the present invention depends on the type of the product desired and may comprise several types of carriers including,

but not limited to, solutions, aerosols, emulsions (including oil-in-water or water-in-oil), gels, solids, and liposomes.

The cosmetically-acceptable carrier of the present invention is preferably selected from the group consisting of a water soluble thickening polymer, a hydrophobic component, an amphiphilic surfactant, a hydrophilic liquid carrier, a water, and mixtures thereof.

1) Water-soluble Polymer

The water-soluble polymer is selected from the group consisting of a carbonic acid polymer, a polysaccharide, a gum, and mixtures thereof.

While not wishing to be bound by theory, it is believed that water-soluble polymer of the composition prevents and/or retards the evaporation of volatile repellent actives when present into the atmosphere and minimize the penetration of the repellent actives into the skin. Such performances tend to show the repellent active compound staying on the skin surface longer, resulting in a longer lasting repellent efficacy. While not wishing to be bound by theory, it is believed that prevention of the evaporation of volatile active compounds when present and the reducing of the penetration of the active compounds to skin can be explained by one of the following three mechanisms:

a) a film formed by the water-soluble polymer tends to provide a physical barrier to the repellent molecules;

b) the water-soluble polymers macro-molecules tend to randomly embody the repellent molecules; and

c) hydrophilic groups on the water-soluble polymer molecules tend to form strong hydrogen bonds with the repellent molecules through the hydroxyl and/or oxygen groups on the repellent molecules.

Accordingly, the repellent actives can stay on the skin surface longer, resulting in providing long lasting repellent efficacy.

Nonlimiting examples of suitable water-soluble polymers in the compositions of the present invention include carboxylic acid polymers, polysaccharides, and gums.

(i) Carboxylic Acid Polymers The carboxylic acid polymers useful herein are crosslinked compounds containing one or more monomers derived from acrylic acids, substituted acrylic acids, and salts and esters of these acrylic acids and the substituted acrylic acids, wherein the crosslinking agent contains two or more carbon-carbon double bonds and is derived from a polyhydric alcohol. The

preferred carboxylic acid polymers are of two general types. The first type of polymer is a crosslinked homopolymer of an acrylic acid monomer or derivative thereof (*e.g.*, wherein the acrylic acid has substituents on the two and three carbon positions independently selected from the group consisting of C_{1-4} alkyl, -CN, -COOH, and mixtures thereof). The second is a crosslinked copolymer having a first monomer selected from the group consisting of an acrylic acid monomer or derivative thereof (as just described in the previous sentence), a short chain alcohol (*i.e.*, C_{1-4}) acrylate ester monomer or derivative thereof (*e.g.*, wherein the acrylic acid portion of the ester has substituents on the two and three carbon positions independently selected from the group consisting of C_{1-4} alkyl, -CN, -COOH, and mixtures thereof), and mixtures thereof; and a second monomer which is a long chain alcohol (*i.e.*, C_{8-40}) acrylate ester monomer or derivative thereof (*e.g.*, wherein the acrylic acid portion of the ester has substituents on the two and three carbon positions independently selected from the group consisting of C_{1-4} alkyl, -CN, -COOH, and mixtures thereof). Combinations of these two types of polymers are also useful herein.

Examples of commercially available homopolymers of the first type useful herein include the carbomers, which are homopolymers of acrylic acid crosslinked with allyl ethers of sucrose or pentaerythritol. The carbomers are available as the Carbopol® 900 series from B.F. Goodrich (*e.g.*, Carbopol® 954). Examples of commercially available copolymers of the second type useful herein include copolymers of C_{10-30} alkyl acrylates with one or more monomers of acrylic acid, methacrylic acid, or one of their short chain (*i.e.* C_{1-4} alcohol) esters, wherein the crosslinking agent is an allyl ether of sucrose or pentaerythritol. These copolymers are known as acrylates/C10-30 alkyl acrylate crosspolymers and are commercially available as Carbopol® 1342, Carbopol® 1382, Pemulen TR-1, and Pemulen TR-2, from B.F. Goodrich. In other words, examples of carboxylic acid polymer thickeners useful herein are those selected from the group consisting of carbomers, acrylates/C_{10-30} alkyl acrylate crosspolymers, and mixtures thereof.

(ii) Polysaccharides A wide variety of polysaccharides are useful herein as the water-soluble polymer. Herein, "polysaccharides" refers to the water-soluble polymers containing a backbone of repeating sugar (*i.e.*, carbohydrate) units. Nonlimiting examples of polysaccharides include those selected from the group consisting of cellulose, carboxymethyl hydroxyethylcellulose, cellulose

acetate propionate carboxylate, hydroxyethylcellulose, hydroxyethyl ethylcellulose, hydroxypropylcellulose, hydroxypropyl methylcellulose, methyl hydroxyethylcellulose, microcrystalline cellulose, sodium cellulose sulfate, and mixtures thereof.

Alkyl substituted celluloses are also useful. The hydroxy groups of the cellulose polymer are preferably hydroxyalkylated (preferably, hydroxyethylated or hydroxypropylated), forming a hydroxyalkylated cellulose that is further modified with a C_{10-30} straight or branched alkyl group of from about 10 to about 30 carbon atoms through an ether linkage. Preferred polymers are ethers of straight or branched alcohols of from about 10 to about 30 carbons with hydroxyalkylcellulose. Examples of alkyl groups useful herein include those selected from the group consisting of stearyl, isostearyl, lauryl, myristyl, cetyl, isocetyl, cocoyl (i.e. alkyl groups derived from the alcohols of coconut oil), palmityl, oleyl, linoleyl, linolenyl, ricinoleyl, behenyl, and mixtures thereof. Preferred among the alkyl hydroxyalkyl cellulose ethers is the material given in the CTFA designation as cetyl hydroxyethylcellulose, which is the ether of cetyl alcohol and hydroxyethylcellulose. This material is sold under the tradename Natrosol® CS Plus from Aqualon Corporation.

Other useful polysaccharides include scleroglucans comprising a linear chain of 1 to less than 3 linked glucose units with a 1 to less than 6 linked glucose every three units, a commercially available example of which is Clearogel™ CS11 from Michel Mercier Products Inc. (Mountainside, NJ, USA).

(iii) Gums Other water-soluble polymers useful herein include materials which are primarily derived from natural sources. Nonlimiting examples of these gums include materials selected from the group consisting of acacia, agar, algin, alginic acid, ammonium alginate, amylopectin, calcium alginate, calcium carrageenan, carnitine, carrageenan, dextrin, gelatin, gellan gum, guar gum, guar hydroxypropyltrimonium chloride, hyaluroinic acid, hydroxypropyl chitosan, hydroxypropyl guar, karaya gum, kelp, locust bean gum, natto gum, potassium alginate, potassium carrageenan, propylene glycol alginate, sclerotium gum, sodium carboyxmethyl dextran, sodium carrageenan, tragacanth gum, xanthan gum, and mixtures thereof.

Other water-soluble polymers include those disclosed in U.S. Patent 4,387,107, Klein et al., issued June 7, 1983 and "Encyclopedia of Polymer and Thickeners for Cosmetics," R.Y. Lochhead and W. R. Fron, eds., Cosmetics &

Toiletries, vol. 108, pp. 95-135 (May 1993), the disclosures of which are herein incorporated by reference.

2) Hydrophobic Component

Hydrophobic components useful in the present invention include a lipid, oil, oily or other hydrophobic component. The hydrophobic component is used as an emollient.

A wide variety of suitable hydrophobic components are known and may be used herein and numerous examples can be found in Sagarin, Cosmetics, Science and Technology, 2nd Edition, Vol. 1, pp. 32-43 (1972). Nonlimiting examples of suitable hydrophobic components include mineral oil, petrolatum, C_{7-40} straight and branched hydrocarbons, C_1-C_{30} alcohol esters, glycerides, alkylene glycol esters, propoxylated and ethoxylated derivatives, sugar ester, vegetable oils and hydrogenated vegetable oils, animal fats and oils, and C_{4-20} alkyl ethers of polypropylene glycols, C_{1-20} carboxylic acid esters of polypropylene glycols, and di-C_{8-30} alkyl ethers. Examples of hydrophobic components useful herein are set forth in U.S. Patent 5,306,514, Letton et al., issued April 26, 1994; Merck Index, Tenth Edition, Entry 7048, p. 1033 (1983); and International Cosmetic Ingredient Dictionary, Fifth Edition, vol. 1, p.415-417 (1993).

Preferably, the composition contains from about 1% to about 98% of the hydrophobic component, more preferably from about 1% to about 50%, and still more preferably from about 1% to about 30%. The hydrophobic component may be derived from animals, plants, or petroleum and may be natural or synthetic (*e.g.*, man-made).

3) Amphiphilic Surfactant

The amphiphilic surfactant useful herein can include any of a wide variety of nonionic, cationic, anionic, zwitterionic, amphoteric, as well as mixtures of these surfactants. Such surfactants are well known to those skilled in the detergency art.

Nonlimiting examples of possible surfactants include isoceteth-20, sodium methyl cocoyl taurate, sodium methyl oleoyl taurate, and sodium lauryl sulfate. See U.S. Patent No. 4,800,197, to Kowcz et al., issued January 24, 1989, which is incorporated herein by reference in its entirety, for exemplary surfactants useful herein. Examples of a broad variety of additional surfactants useful herein are described in McCutcheon's Detergents and Emulsifiers, North American

Edition (1986), published by Allured Publishing Corporation, which is incorporated herein by reference in its entirety. The cleansing compositions can optionally contain, at their art-established levels, other materials which are conventionally used in cleansing compositions.

4) Hydrophilic Liquid Carrier

The composition of the present invention may contain a hydrophilic liquid carrier (HLC). Preferred HLC can contain a dermatologically acceptable, non-aqueous hydrophilic diluent. Nonlimiting examples of hydrophilic diluents are polyhydric alcohols such as low molecular weight monovalent alcohols (*i.e.*, C_{1-6}) and low molecular weight glycols and polyols including propylene glycol, butylene glycol, hexylene glycol, dipropylene glycol, polyethylene glycol (*e.g.*, Molecular Weight 200-1000 g/mole), polypropylene glycol (*e.g.*, Molecular Weight 425-2025 g/mole), glycerol, 1,2,4-butanetriol, 1,2,6-hexanetriol, and combinations thereof.

Preferably, the composition contains from about 1% to about 99% of HLC, more preferably from about 20% to about 95%. The HLC includes water and one or more water soluble or dispersible ingredients.

5) Water

The compositions of the present invention may comprise from about 25% to about 99%, more preferably from about 50% to about 95%, and most preferably from about 60% to about 90% water. The exact amount of water in the formulation will vary with the ranges of the required and optional components chosen.

6) Other Actives

The compositions of the present invention contain other actives capable of functioning in different ways to enhance the benefits of the active blend and/or to provide other benefits. Examples of such substances include, but are not limited to, anti-oxidants/radical scavengers, anti-inflammatory agents, antimicrobial agents, sunscreens and sunblocks, and chelators.

(i) Anti-Oxidants/Radical Scavengers Anti-oxidant/radical scavengers are especially useful for providing protection against UV radiation which can cause increased scaling or texture changes in the stratum corneum and against other environmental agents which can cause skin damage.

Anti-oxidants/radical scavengers such as ascorbic acid (vitamin C) and its salts, ascorbyl esters of fatty acids, ascorbic acid derivatives (*i.e.*, magnesium

ascorbyl phosphate), tocopherol (vitamin E), tocopherol sorbate, tocopherol acetate, other esters of tocopherol, butylated hydroxy benzoic acids and their salts, 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (commercially available under the tradename Trolox®), gallic acid and its alkyl esters, especially propyl gallate, uric acid and its salts and alkyl esters, sorbic acid and its salts, amines (*i.e.*, N,N-diethylhydroxylamine, amino-guanidine), sulfhydryl compounds (*i.e.*, glutathione), dihydroxy fumaric acid and its salts, lycine pidolate, arginine pilolate, nordihydroguaiaretic acid, bioflavonoids, lysine, methionine, proline, superoxide dismutase, silymarin, tea extracts, grape skin/seed extracts, melanin, and rosemary extracts may be used. Preferred anti-oxidants/radical scavengers are selected from tocopherol sorbate and other esters of tocopherol, more preferably tocopherol sorbate. For example, the use of tocopherol sorbate in topical compositions and applicable to the present invention is described in U.S. Patent 4,847,071, Bissett et al, issued on July 11, 1989.

(ii) Anti-Inflammatory Agents Anti-inflammatory agents enhance the skin appearance benefits, by for example, contribution of uniformity and acceptable skin tone and/or color.

Preferably, the anti-inflammatory agent includes a steroidal anti-inflammatory agent and an non-steroidal anti-inflammatory agent. Preferred steroidal anti-inflammatory for use is hydrocortisone.

The variety of compounds encompassed by this group are well-known to those skilled in the art. For detailed disclosure of the chemical structure, synthesis, side effects, etc. of non-steroidal anti-inflammatory agents, reference may be had to standard texts, including Anti-inflammatory and Anti-Rheumatic Drugs, K. D. Rainsford, Vol. I-III, CRC Press, Boca Raton, (1985), and Anti-inflammatory Agents, Chemistry and Pharmacology, 1, R. A. Scherrer, et al., Academic Press, New York (1974), each incorporated herein by reference.

So-called "natural" anti-inflammatory agents are also useful. Such agents may suitably be obtained as an extract by suitable physical and/or chemical isolation from natural sources (*i.e.*, plants, fungi, by-products of microorganisms). For example, alpha bisabolol, aloe vera, Manjistha (extracted from plants in the genus Rubia, particularly Rubia Cordifolia), and Guggal (extracted from plants in the genus Commiphora, particularly Commiphora Mukul), kola extract, chamomile, and sea whip extract, may be used.

Additional anti-inflammatory agents useful herein include compounds of the Licorice (the plant genus/species Glycyrrhiza glabra) family, including glycyrrhetic acid, glycyrrhizic acid, and derivatives thereof (*e.g.*, salts and esters). Suitable salts of the foregoing compounds include metal and ammonium salts. Suitable esters include C_{2-24} saturated or unsaturated esters of the acids, preferably C_{10-24}, more preferably C_{16-24}.

(iii) Antimicrobial Agent For the purpose of the present invention, "antimicrobial agents" means a compound capable of destroying microbes, preventing the development of microbes or preventing the pathogenic action of microbes. Antimicrobal agents are useful, for example, in controlling acne. Preferred antimicrobial agents useful in the present invention are benzoyl peroxide, erythromycin, tetracycline, clindamycin, azelaic acid, sulfur resorcinol phenoxyethanol, and Irgasan™ DP 300 (Ciba Geigy Corp., U.S.A.). A safe and effective amount of an antimicrobial agent may be added to compositions of the present invention, preferably from about 0.001% to about 10%, more preferably from about 0.01% to about 5%, still more preferably from about 0.05% to about 2%.

(iv) Sunscreens and Sunblocks Sunscreens and sunblocks generally prevent excessive scaling and texture changes of the stratum corneum by exposure of ultraviolet light and may be added to the present invention. Suitable sunscreens and sunblocks may be organic or inorganic.

A wide variety of conventional sunscreens and sunblocks are suitable for use herein. See, U.S. Patent 5,087,445, Haffey et al, issued February 11, 1992; U.S. Patent 5,073,372, Turner et al, issued December 17, 1991; U.S. Patent 5,073,371, Turner et al., issued December 17, 1991; and Segarin, et al, at Chapter VIII, pages 189 et seq., of Cosmetics Science and Technology (1972), which discloses numerous suitable sunscreens and sunblocks. Preferred among those sunscreens and sunblocks which are useful in the compositions are those selected from 2-ethylhexyl-*p*-methoxycinnamate (commercially available as PARSOL MCX), butylmethoxydibenzoyl-methane, 2-hydroxy-4-methoxybenzo-phenone, 2-phenylbenzimidazole-5-sulfonic acid, octyldimethyl-p-aminobenzoic acid, octocrylene, 2-ethylhexyl N,N-dimethyl-p-aminobenzoate, p-aminobenzoic acid, 2-phenylbenzimidazole-5-sulfonic acid, octocrylene, oxybenzone, homomenthyl salicylate, octyl salicylate, 4,4'-methoxy-*t*-butyldibenzoylmethane, 4-isopropyl dibenzoylmethane, 3-benzylidene camphor, 3-(4-methylbenzylidene)

camphor, titanium dioxide, zinc oxide, silica, iron oxide, Eusolex™ 6300, Octocrylene, Parsol 1789, and mixtures thereof.

Also particularly useful in the compositions are sunscreens and sunblocks such as those disclosed in U.S. Patent 4,937,370, Sabatelli, issued on June 26, 1990, and U.S. Patent 4,999,186, Sabatelli, issued on March 12, 1991. The sunscreens and sunblocks disclosed therein have, in a single molecular, two distinct chromophore moieties which exhibit different ultraviolet radiation absorption spectra. One of the chromophore moieties absorbs predominantly in the UVB radiation range and the other absorbs strongly in the UVA radiation range. These sunscreens and sunblocks provide higher efficacy, broader UV absorption, lower skin penetration and longer lasting efficacy relative to conventional sunscreens and sunblocks.

Exact amounts will vary depending upon the sunscreen chosen and the desired Sun Protection Factor (SPF). SPF is a commonly used measure of photoprotection of a sunscreen against erythema. See Federal Register, Vol. 43, No. 166, pp. 38206-38269, August 25, 1978.

A sunscreen or sunblock herein may also be added to improve the skin, particularly to enhance their resistance to being washed off by water, or rubbed off. Preferred sunscreens and sunblocks which will provide this benefit are a copolymer of ethylene and acrylic acid. Compositions comprising this copolymer are disclosed in U.S. Patent 4,663,157, Brock, issued May 5, 1987.

(v) Chelators For the purpose of the present invention, "chelator" reacts for removing a metal ion from a system by forming a complex so that the metal ion cannot readily participate in or catalyze chemical reactions. The inclusion of a chelator is especially useful for providing protection against UV radiation which can contribute to excessive scaling or skin texture changes and against other environmental agents which can cause skin damage.

Exemplary chelators that are useful herein are disclosed in U.S. Patent 5,487,884, Bissett et al, issued January 30, 1996; PCT application 91/16035 and 91/16034, Bush et al, published October 31, 1995. Preferred chelators are furildioxime and derivatives thereof.

7) Other components

Other than the above optional components, the composition of the present invention may include preservatives and preservative enhancers such as water-soluble or solubilizable preservatives including Germall 115, methyl, ethyl, propyl

and butyl esters of hydroxybenzoic acid, benzyl alcohol, EDTA, Bronopol (2-bromo-2-nitropropane-1,3-diol) and phenoxypropanol; skin lightening/evenness agents including kojic acid, arbutin, ascorbic acid and derivatives thereof and described in PCT Application number U.S. 95/07432, Hillebrand, filed on June 12, 1995; WO95/23780, Kvalnes et al, published September 8, 1995; skin-conditioning agents; skin penetration enhancing agents; skin protectants; skin soothing agents; skin healing agents; ultraviolet light absorbers or scattering agents; sequestrants; anti-acne agents; anti-androgens; depilation agents; keratolytic agents/ desquamation agents/ exfoliants such as salicylic acid; panthenol moisturizer such as D-panthenol; soluble or colloidally-soluble moisturizing agents such as hyaluronic acid and starch-grafted sodium polyacrylates such as Sanwet™ IM-1000, IM-1500 and IM-2500 available from Celanese Superabsorbent Materials, Portsmith, VA, USA and described in US Patent 4,076,663; proteins and polypeptides and derivatives thereof; organic hydroxy acids; vitamins and derivatives thereof such as vitamin A (*e.g.*, retinoid which are commercially available from a number of sources, for example, Sigma Chemical Company (St. Louis, MO), and Boerhinger Mannheim (Indianapolis, IN) and described in U.S. Patent 4,677,120, Parish et al., issued Jun. 30, 1987; U.S. Patent 4,885,311, Parish et al., issued Dec. 5, 1989; U.S. Patent 5,049,584, Purcell et al., issued Sep. 17, 1991; U.S. Patent 5,124,356, Purcell et al., issued Jun. 23, 1992; and Reissue Patent 34,075, Purcell et al., issued Sep. 22, 1992), vitamin B_3 (*e.g.*, nicotinic acid esters and derivatives of niacinamide, commercially available from a number of sources, for example, the Sigma Chemical Company (St. Louis, MO); ICN Biomedicals, Inc. (Irvin, CA) and Aldrich Chemical Company (Milwaukee, WI) and as described by W. Wenner, "The Reaction of L-Ascorbic and D-Isoascorbic Acid with Nicotinic Acid and Its Amide", J. Organic Chemistry, Vol. 14, 22-26 (1949), vitamin C, vitamin E and vitamin K; drug astringents; external analgesics; film formers; absorbents including oil absorbents such as clays and polymeric absorbents; abrasives; anticaking agents; antifoaming agents; binders; biological additives; bulking agents; coloring agents; perfumes, essential oils, and solubilizers thereof; natural extracts; compounds which stimulate collagen production.

C. Testing Procedure

4% ethyl alcohol solutions are prepared as a blend of actives. 0.75 ml of the active blend is applied to 50 cm^2 of the depilated back of a guinea pig. The treated guinea pigs are exposed to 150 - 200 female mosquitoes (Aedes aegypti) in a cage for a determined time (for example, 4 hours).

After the exposure, the number of mosquito biting sites is counted by a LDF (Laser Dopplar Flowmetry) using a template of acetate sheet having 20 holes (2 cm apart, covering approx. 50 cm^2) as a site marker for measurement. Measurements are before and after exposure at the specific sites and at the mosquito bite sites. The result is expressed as numbers of bites and the protection percentage calculated by ethyl alcohol control.

EXAMPLES

The following examples further describe and demonstrate embodiments within the scope of the present invention. The examples are given solely for the purpose of illustration and are not to be construed as limitations of the present invention, as many variations thereof are possible without departing from the spirit and scope of the invention. Where applicable, ingredients are identified by chemical or CTFA name, or otherwise defined below.

The compositions shown below can be prepared by any conventional method known in the art. Suitable methods and formulations are as follows:

Example I - III

The active blend as shown below is suitably prepared as follows.

1) Mix pinene and citronellol at the room temperature;

2) Add all solid ingredients; and

3) Add the rest of liquid ingredients to the mixture of step 2 until the resulting solution is uniform. If all solid ingredients are not dissolved completely, ultra sonication may be used to dissolve them.

	I	II	III
β pinene	0.32	0.32	-
α pinene	-	-	0.32
citronellol	12.01	6.01	2.00

phenylethyl alcohol	10.00	10.00	2.01
linalool	-	6.00	8.00
geraniol	-	-	10.00
benzaldehyde	19.28	9.28	5.28
citronellal	10.00	10.00	4.00
hydroxy citronellal	-	10.00	10.00
cymal	-	-	10.00
p-hydroxy phenyl butanone	10.00	-	-
methyl cedrylone	-	7.77	10.77
methyl β-naphthyl ketone	7.77	5.00	4.00
benzophenone	-	5.00	3.00
benzyl benzoate	13.57	5.00	5.00
geranyl formate	2.00	-	-
diethylphthalate	3.00	-	3.57
methyl dihydrojasmonate	2.00	5.00	-
phenyl ethyl phenyl acetate	3.00	-	-
terpinyl acetate	-	5.00	5.00
flor acetate	-	5.00	5.00
benzyl acetate	-	3.57	5.00
undecalactone	1.00	1.93	0.93
exaltolyde	1.00	-	1.00
eucalyptol	-	0.89	0.89
ethylene brassylate	0.93	1.00	1.00
galaxolide 50 dep	0.89	-	-
methyl isobutenyl tetrahydropyran	1.00	1.00	1.00
myroxyde	0.17	0.17	0.17
geranyl nitrile	0.15	-	-
baranyl nitrile	-	0.15	0.15
benzoic acid	1.91	1.91	1.91
total	100.00	100.00	100.00

The following data shows results of the experimental studies according to the testing procedure described herein. The active blends described above provide excellent repellency against mosquitoes when applied to skin. The

protection percentages are calculated based on a control (ethyl alcohol solution). As shown below, protection from at least 80% of the number of bites is provided.

Repellent Active Blend	4 hour exposure	
	Number of Bites	protection %
control (no active)	41	0
Repellent Active Blend I	4	90.2
Repellent Active Blend II	8	80.5
Repellent Active Blend III	5	87.8

The following examples further disclose and demonstrate embodiments using the active blend of the present invention.

Example IV Spray

The following example is a spray composition. The spray composition is suitably prepared by the following steps:

(a) Mix Phase A ingredients until completely dissolved;

(b) Add Repellent Active Blend I to the mixture of phase A while continuing to mix;

(c) Add water to the batch mixture of phases A-B until uniform while continuing to mix; and

(d) Continue to mix until the resulting batch mixture is uniform.

	Ingredient	wt%
phase A	PVP/VA S-630 [1]	3.0
	99.5% Ethanol	52.5
phase B	Repellent Active Blend I	2.0
phase C	Deionized Water	up to 100

[1]PVP/VA S-630 : Vinylpyrrolidone/vinyl acetate Copolymer

Example V Clear Gel

The following example is a Clear Gel composition. The Clear Gel is suitably prepared by the following steps:

(a) Mix Phase A ingredients until completely dissolved;

(b) Add Phase B ingredient to the mixture of Phase A until uniform while continuing to mix.

	Ingredient	wt%
phase A	Repellent Active Blend I	2.0
	95% Ethanol	52.0
	De-ionized Water	44.2
	Carbopol 954[2]	0.6
phase B	Triethanolamine	0.7

[2]Carbopol 954 : Carbomer

Example VI UV protect lotion

The following example is a UV protect lotion composition. The UV protect lotion is suitably prepared by the following steps:

(a) Mix Phase A ingredients at a temperature of about 70-75°C;

(b) Separately, mix Phase B ingredients at a temperature of about 70-75°C until uniform and add to the mixture of Phase A to form a complete emulsion of Phase A-B;

(c) Cool the batch mixture of A-B to about 60°C;

(d) Add Phase C ingredient to the batch mixture of phases A-B and mix until uniform;

(e) Separately, mix Phase D ingredients until uniform and add to the batch mixture of phases A-C at about 60°C while continuing to mix;

(f) Cool the batch mixture of phases A-D to about 35°C.

	Ingredient	wt%
phase A	Glyceryl Stearate & PEG-100 Stearate	0.80
	Polyglyceryl-10 Stearate	1.00
	Hydrogenated Lecithin	1.00
	Cholesterol	1.00
	C10-30 Chloresterol/Lanosterol Esters	0.50
	Squalane	3.40
	Methyl Phenyl Polysiloxane	1.00
	Octyl Methoxycinnamate	8.50
	Propylparaben	0.20
phase B	De-ionized Water	53.67
	Methylparaben	0.25
	EDTA-2Na	0.05
	1,3-Butylene Glycol	6.00
	Glycerin	2.00
phase C	Carbopol 954-2% disp.	13.00
	Repellent Active Blend II	2.00
phase D	Sodium Hydroxide	0.13
	De-ionized Water	up to 100

Example VII Body Moisturizer

The following example is a body moisturizer. The body moisturizer is suitably prepared by the following steps:

(a) Mix Phase A ingredients at a temperature of about 70-75°C;

(b) Separately, mix Phase B ingredients at a temperature of about 70-75°C until uniform and add to the mixture of Phase A to form a complete emulsion of Phase A-B;

(c) Cool the batch mixture of A-B to about 60°C;

(d) Separately, mix Phase C ingredients until uniform and add to the batch mixture of phases A-B at about 60°C while continuing to mix;

(e) Cool the batch mixture of phases A-C to about 35°C; and

(f) Add phase D to the batch mixture of phases A-C and continue to mix until the resulting batch mixture is uniform.

	Ingredient	wt%
phase A	Isopropyl Palmitate (and) Lanolin Oil	3.000
	Laneth 5	0.500
	Laneth 40	0.300
	Oleth 10	0.800
	Squalane	2.000
	Propylparaben	0.100
phase B	De-ionized Water	79.560
	Propylene glycol	5.000
	Methylparaben	0.150
	Carbomer 941	0.440
phase C	Sodium Hydroxide	0.150
	De-natured Alcohol	5.000
phase D	Repellent Active Blend II	3.000

Example VIII Moisturizing cream

The following example is a moisturizing cream. The moisturizing cream is suitably prepared by the following steps:

(a) Mix Phase A ingredients at a temperature of about 70-80°C;

(b) Separately, mix Phase B ingredients at a temperature of about 70-80°C until uniform and add to the mixture of Phase A to form a complete emulsion of Phase A-B;

(c) Cool the batch mixture of A-B to about 60°C;

(d) Add Phase C ingredient to the batch mixture of phases A-B and mix until uniform;

(e) Add phase D to the batch mixture of phases A-C at about 60°C while continuing to mix until the resulting batch mixture is uniform.

	Ingredient	wt%
phase A	Glyceryl Stearate & PEG-100 Stearate	3.000
	Sorbitan Stearate	1.200
	Polyglyceryl-10 Stearate	0.500
	Myristyl Alcohol	2.000
	C10-30 Choresterol/Lanosterol Esters	3.000
	Dipentaerythritol Hexahydroxy-stearate/Stearate/Rosinate	2.000
	Cetyl Octanoate	4.500
	Cetyl Lactate	2.200
	Squalane	7.000
	Hydrogenated Coco-Glycerides	4.500
	Cetyl Palmitate	2.200
	Paraffin wax	1.000
	Trioctanoin	1.000
	Propylparaben	0.190
	DL-alpha-Tocopherol acetate	0.100
phase B	De-ionized Water	58.020
	Butylene Glycol	5.000
	Methylparaben	0.200
	Carbomer 934	0.260
phase C	sodum hydroxide	0.130
phase D	Repellent Active Blend III	2.000

Example IX Body Powder

The following example is a body powder. The body powder is suitably prepared by the following steps:

(a) Mix all ingredients except for active blend III uniformly; and

(b) Add the active blend III the mixture until the resulting mixture batch is uniform.

Ingredient	wt%
Talc	92.850
Titanium Dioxide	3.000
Zinc Laurate	2.000
Methylparaen	0.050
Pigment	0.100
Repellent Active Blend III	2.000

The embodiments disclosed and represented by the previous examples have many advantages. For example, compositions containing the active blends herein can be safe to the skin and provide long lasting repellent efficacy.

It is understood that the foregoing detailed description of examples and embodiments of the present invention are given merely by way of illustration, and that numerous modifications and variations may become apparent to those skilled in the art without departing from the spirit and scope of the invention; and such apparent modifications and variations are to be included in the scope of the appended claims.

What is claimed is:

1. An insect repellent composition comprising:
   a) an insect repellent active blend comprising a fragrance carbonyl compound, a fragrance alcohol, a fragrance ester, a nitrile compound, an epoxide, and an ether compound; and
   b) a cosmetically-acceptable carrier.

2. The composition of Claim 1, wherein the composition provides protection from at least 80% of bites over a 4 hours exposure period.

3. The composition of Claim 1, wherein the fragrance alcohol has a molecular weight of from about 100 to about 250.

4. The composition of Claim 1, wherein the fragrance ester has a molecular weight of from about 150 to about 300.

5. The composition of Claim 1, wherein the fragrance carbonyl compound is selected from the group consisting of a fragrance aldehyde, a fragrance ketone, and mixtures thereof.

6. The composition of Claim 5, wherein the fragrance carbonyl compound has a molecular weight of from about 100 to about 300.

7. The composition of Claim 1, wherein the cosmetically-acceptable carrier is selected from the group consisting of a water soluble polymer, a hydrophobic component, an amphiphilic surfactant, a hydrophilic liquid carrier, water, and mixtures thereof.

8. A composition comprising:
   (a) an insect repellent active blend comprising;
      (i) from about 2% to about 35% of a fragrance carbonyl compound selected from the group consisting of a fragrance aldehyde, a fragrance ketone, and mixtures thereof;
      (ii) from about 1% to about 25% of a fragrance alcohol;

(iii) from about 3% to about 20% of a fragrance ester;
(iv) from about 0.1% to about 5% of a nitrile compound;
(v) from about 0.1% to about 5% of an epoxide;

and;

(b) a cosmetically-acceptable carrier.

9. The composition of Claim 8, wherein the cosmetically-acceptable carrier is selected from the group consisting of a water soluble thickening polymer, a hydrophobic component, an amphiphilic surfactant, a hydrophilic liquid carrier, water, and mixtures thereof.

10. A skin care composition comprising the composition of Claim 1 or Claim 8 and at least one other active selected from the group consisting of anti-oxidants/radical scavengers, anti-inflammatory agents, antimicrobial agents, sunscreens and sunblocks, and chelators.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/24021

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A01N43/04 A01N37/36 A01N37/42 A01N37/34 A01N37/10
A01N37/06 A01N37/04 A01N37/02 A01N35/06 A01N35/04
A01N35/02 A01N31/16 A01N31/08 A01N31/06 A01N31/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A01N A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 08147 A (QUEST INT.) 21 March 1996 see the whole document ---	1-10
X	EP 0 717 100 A (INT. FLAVORS & FRAGRANCES INC.) 19 June 1996 see page 3, line 49 - page 4, line 8; example II ---	1-10
X	US 5 892 133 A (AMANO AKIRA ET AL.) 6 April 1999 see column 2, line 14-41; examples 12,13 ---	1-10
X	US 5 106 622 A (SHERWOOD KAREN ET AL.) 21 April 1992 see 'case studies -test 1'. --- -/--	1-10

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 July 1999	03.08.99

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Klaver, J

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

I. ...national Application No
PCT/US 98/24021

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61K7/46

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Section Ch, Week 9136 Derwent Publications Ltd., London, GB; Class C03, AN 91-262290 XP002108963 & JP 03 170403 A (SHISEIDO CO LTD) , 24 July 1991 see abstract ---	1-10
X	T. P. MCGOVERN & M. BEROZA: "Effect of fixatives and other chemicals in extending the activity of the insect attractant Trimedlure." J. ECON. ENTOMOL., vol. 60, no. 2, April 1967, pages 379-383, XP002108962 see the whole document --- -/--	1-10

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 July 1999	03.08.99

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Klaver, J

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/24021

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 337 180 A (KIWALA JACOB ET AL.) 29 June 1982 see column 5, line 26-54 ---	1-10
X	US 5 180 710 A (NAEF REGULA ET AL.) 19 January 1993 see examples 1-8 -----	1-10

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 98/24021

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Terms such as carbonyl, alcohol, ester, nitrile, epoxide and ether encompass an almost infinite amount of compounds whiczh cannot be searched within a reasonable amount of time.
The search has been restricted to the preferred compounds as defined in the description and as used in the examples.

INTERNATIONAL SEARCH REPORT

Information on patent family members

I. ıational Application No
PCT/US 98/24021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP 0781091 A	02-07-1997
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US 5180710 A	19-01-1993	DE 69111557 D	31-08-1995
		DE 69111557 T	18-01-1996
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