Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

FIELD OF THE INVENTION

[0001] The present invention is directed to antiperspirant compositions comprising an antiperspirant compound, like an astringent salt; a gelling agent selected from the group consisting of a sterol, like lanosterol, a sugar or carbohydrate ester of a fatty C8-C22 carboxylic acid, like dextrin palmitate, and mixtures thereof; a carrier comprising a silicone or a hydrocarbon; and optionally, water, a fatty alcohol, a fatty ester, or a mixture thereof. The antiperspirant compositions are viscous, gelled compositions that are opaque and phase stable; effectively deliver the antiperspirant compound to the skin; are nonwhitening and nonstaining to skin and clothing after topical application; and exhibit excellent sensory properties. The antiperspirant compositions also can be formulated into aerosol antiperspirant compositions. The present invention also is directed to methods of using the antiperspirant compositions.

BACKGROUND OF THE INVENTION

[0002] Antiperspirant compositions are well known in the cosmetic art. An ideal antiperspirant composition is stable for the life of the composition, effectively delivers the antiperspirant compound to the skin, does not leave a visually observable white residue on the skin or clothing, and is esthetically pleasing to the consumer.

[0003] Antiperspirant compositions are available in a variety of forms, such as aerosol suspensions; pump sprays; roll-on powders; emulsions, lotions, or suspensions; and solid gels, waxes, creams, or suspensions. Antiperspirant compositions traditionally have been prepared as either oil-in-water emulsions or water-in-oil emulsions. Therefore, antiperspirant compositions of any form typically have a milky or opaque appearance, but some antiperspirant compositions are transparent. Antiperspirant compositions conventionally are manufactured by complex methods. Antiperspirant compositions prepared as emulsions often feel wet or oily when applied to the skin, and often remain tacky after the carrier of the composition evaporates. In addition, many emulsion-type antiperspirant compositions leave a white, staining residue on contacted skin or clothing.

[0004] Roll-on and gelled emulsion-type antiperspirant compositions are used by rubbing an area of the body, such as the underarm, to apply a layer of the composition to the skin, and thereby reduce odor and/or perspiration. Roll-on and gel antiperspirant compositions preferably possess the esthetic properties of smoothness, nonoiliness and nontackiness. Gelled antiperspirant compositions also require a sufficient firmness to maintain its shape. Another highly desirable, but hard to achieve, esthetic property is avoiding a visible residue, e.g., a white layer, that is left on the skin or clothing after the antiperspirant composition is applied.

[0005] Nonemulsified antiperspirant compositions also are known in the art. However, nonemulsified compositions often require shaking prior to each use in order to redisperse the insoluble antiperspirant compound that has separated from the composition. Nonemulsified antiperspirant compositions that do not require shaking prior to each use, such as an antiperspirant creme or paste, typically include a relatively high percentage of suspending agents, like an organoclay. The presence of an organoclay in an antiperspirant composition is a principal source of the whitening and staining of skin and clothing.

[0006] Investigators have searched for antiperspirant compositions that display the above-listed desirable properties. A roll-on antiperspirant is difficult to formulate and manufacture because the composition requires a sufficient viscosity to adhere to the skin, resists dripping off or running down the skin, and yet is not tacky or sticky. A gel antiperspirant composition is difficult to formulate and manufacture because the composition requires sufficient firmness to withstand rubbing across the skin to deliver a sufficient amount of the antiperspirant compound to the skin. Additional formulation parameters include viscosity control, lack of syneresis, and nontackiness.

[0007] A gel antiperspirant composition which has esthetic and functional properties equal to or better than presently available antiperspirant compositions is highly desired by consumers. However, providing a commercially acceptable gel antiperspirant composition requires overcoming several formulation and manufacturing problems.

[0008] Gelled antiperspirant compositions incorporate a gelling agent to build up the solid structure, or firmness, of the composition. Solid antiperspirant compositions typically are based on solid fatty alcohols containing 14 to 20 carbon atoms as the solidifying agent. In addition, nonvolatile emollients are included in the composition to minimize tackiness and improve sensory properties, thereby improving ease of application, esthetics, and consumer appeal.

[0009] Solid antiperspirant compositions are divided into three main classes, i.e., compressed powder sticks, gel sticks and wax sticks. Each of these classes has advantages, but each class also has particular disadvantages. Compressed powder sticks for example are frequently brittle and hard, and leave a cosmetically unacceptable powdery residue after application. Frequently, wax-based products are cosmetically unacceptable because of such factors as hardness, greasiness and tackiness. The visually observable white residue remaining after application also is esthetically undesirable.

[0010] Gel-type solid antiperspirant compositions have several advantages over both compressed powder sticks
and wax sticks. For example, the gel antiperspirant compositions leave less residue or dust on the skin. The gel antiperspirant compositions also glide easily over the skin surface resulting in an easy and comfortable application of the composition.

[0011] However, the preparation of antiperspirant compositions in the form of an effective and stable gel is difficult. For example, a critical ingredient in gel antiperspirant compositions is the gelling agent. Many prior gel antiperspirant compositions contain gelled hydroalcoholic solutions including a gelling agent, such as sodium stearate, to form the gel. However, common gelling agents cannot be used in the presence of acidic antiperspirant compounds because of an interaction between the gelling agent, which is alkaline, and the antiperspirant compound.

[0012] Prior gel antiperspirant compositions also typically were divided into three main classes. One of these classes is the optically clear gelled emulsion compositions. These compositions include a water phase and an oil phase. The oil phase is suspended in the water phase by using a sufficient amount of an appropriate emulsifier or emulsifiers. The emulsions conventionally contained waxes, silicones, clays and emollients. The optically clear gelled emulsion compositions are illustrated in U.S. Patent Nos. 4,673,570, 4,268,499, 4,278,655, and 4,350,605; EP 0 450 597; and in "Deodorant and Antiperspirant Formulary," Cosmetics & Toiletries, Dec. 12, 1985, vol. 100, p. 65-75.

[0013] The optically clear gelled emulsion compositions often exhibit the disadvantages of composition instability during storage; the development of a hazy or milky appearance during storage; a stringy, tacky, oily consistency and other undesirable esthetics. In addition, the emulsion gel compositions often leave a visible residue, in the form of a white layer, on the skin or clothing. Another disadvantage of optically clear gelled emulsion compositions is the complex method of preparing an optically clear gelled emulsion composition. The method traditionally requires high shear rates during mixing, high processing temperatures, and a series of cooling and heating process steps.

[0014] A second class of gel antiperspirant compositions is antiperspirant compositions thickened with 1,3,2,4-dibenzylidene-sorbitol (DBS) or DBS derivatives. Such transparent antiperspirant compositions are disclosed in U.S. Patent Nos. 4,822,602 and 4,725,430; European Patent Publication 0 512 770; WO 91/15191; and WO 92/19222.

[0015] Gelled antiperspirant compositions thickened with DBS or DBS-type compounds have a major disadvantage in that the compositions are unstable in the presence of highly acidic antiperspirant compounds at elevated temperatures. In addition, other disadvantages are the high temperature required for manufacturing DBS-thickened compositions (i.e., about 230°C to about 240°F corresponding to about 110°C to about 116°C), and leaving a visible residue on the skin and clothing after application.

[0016] The third class of gel antiperspirant compositions is the acid-base complex gels. These antiperspirant compositions are prepared by interacting the active antiperspirant compound with a carboxylic acid salt. Acid-based complex gels are disclosed, for example, in U.S. Patent Nos. 3,255,082 and 2,876,163; and in European Publication No. 0 448 278.

[0017] This third class of antiperspirant compositions has a major disadvantage in that the active antiperspirant compound is partially deactivated by the salt, thereby reducing the efficacy of the antiperspirant compound and, accordingly, the antiperspirant composition. In addition, the resulting gels are very brittle, tacky, and/or possess other undesirable esthetic properties, such as in the compositions disclosed in U.S. Patent No. 3,255,082, which are emulsions or sols.

[0018] The problems associated with gel antiperspirants can be partially overcome by formulating a roll-on antiperspirant. Roll-on antiperspirants typically are viscous liquids to semi-solids. However, roll-on antiperspirants often impart a tacky feel and still have the ability to leave an unsightly white residue on the skin. Similarly, aerosol antiperspirants leave a greasy or tacky feeling, or a white residue, on the skin after application.

[0019] Investigators have continually sought to provide gel antiperspirant compositions having both long-term stability and sufficient esthetic and functional properties for consumer acceptance. These esthetic and functional properties include a sufficient firmness for application to the skin, no visibly observable whitening of the skin and clothing, and the ability to effectively deliver the antiperspirant compound to the skin without providing a tacky or sticky feeling. The present invention is directed to providing gel antiperspirant compositions exhibiting these consumer-acceptable esthetic and functional properties wherein the composition utilizes a nonaqueous carrier and a gelling agent selected from a sterol and a starch hydrolyzate ester of a C9 to C22 carboxylic acid. Surprisingly, the compositions can be admixed with a hydrocarbon propellant to provide an aerosol antiperspirant.


[0021] Saito et al. U.S. Patent No. 3,989,087 and WO 93/23008 disclose gelling a nonaqueous system containing aluminum salts using a combination of an n-acylaminoacid amide and 12-hydroxysestearic acid. However, high processing temperatures were required to achieve gelling, the product was hard to wash off the skin, and the product lacked consumer-acceptable efficacy. Similar products incorporating polyoxyethylene ether compounds and having improved
washes-off properties are disclosed in WO 94/24997. However, the processing temperature required to manufacture the composition offset the improved efficacy.

[0022] EP 0,440,387 discloses gelling a C₁ to C₄ alcohol-based antiperspirant composition with a combination of a hydrophobically-treated clay and sucrose esters of tallow fatty acids. However, the stability of these compositions is low and must be improved to provide a consumer-acceptable antiperspirant composition.


SUMMARY OF THE INVENTION

[0024] The present invention relates to gel antiperspirant compositions having improved efficacy and esthetics, and to methods of using the antiperspirant compositions. The present invention also relates to aerosol antiperspirant compositions. More particularly, the present invention is directed to gel antiperspirant compositions comprising an antiperspirant compound; a gelling agent selected from the group consisting of a sterol, a sugar or carbohydrate ester of a fatty C₈-C₂₂ carboxylic acid, and mixtures thereof; and a carrier comprising a silicone, a hydrocarbon, or a mixture thereof; and optionally, water, a fatty alcohol, a fatty ester, or a mixture thereof. The term "starch hydrolyzate ester" is employed to indicate a "sugar or carbohydrate ester".

[0025] As used here and hereafter, the term "gel" is defined as a composition that retains its shape in the free form (i.e., is unsupported) at room temperature (i.e., 25°C) for at least one hour.

[0026] In particular, the gel antiperspirant compositions comprise:

(a) 1% to 40% by weight of an antiperspirant compound, like an astringent salt;
(b) 2% to 15% by weight of a gelling agent selected from the group consisting of a sterol, a sugar or carbohydrate ester of a fatty C₈-C₂₂ carboxylic acid, and mixtures thereof; and
(c) 10% to 90% by weight of a carrier comprising a silicone, a hydrocarbon, or a mixture thereof.

[0027] The gel antiperspirant compositions are free of a particulate filler, like talc, and, therefore, are nonstaining and nonwhitening to skin and clothing. Particulate fillers typically are added to a gel antiperspirant composition to impart firmness to the composition. Surprisingly, the present antiperspirant compositions have sufficient firmness for product efficacy and consumer esthetics in the absence of a particulate filler. The gelled compositions also effectively deliver the antiperspirant compound to the skin, and exhibit excellent esthetic and functional properties, including sensory properties, for consumer acceptance.

[0028] In a preferred embodiment, the gel antiperspirant and deodorant composition comprises:

(a) 5% to 35% by weight of an aluminum or zirconium astringent salt, or combination thereof;
(b) 3% to 12% by weight of a gelling agent selected from the group consisting of a sterol, a starch hydrolyzate ester of a fatty C₈-C₂₂ carboxylic acid, and mixtures thereof;
(c) 15% to 75% by weight of a carrier selected from the group consisting of a silicone, a hydrocarbon, and mixtures thereof.

[0029] In another embodiment, the gel antiperspirant compositions include 0% to 30% by weight water, 0% to 20% by weight fatty alcohol, 0% to 70% by weight fatty ester, or a mixture thereof.

[0030] In yet another embodiment, the antiperspirant composition comprising (a), (b), and (c) is admixed with a hydrocarbon propellant to provide an aerosol antiperspirant composition. The aerosol antiperspirant composition contains 1 part by weight gel antiperspirant composition and 0.5 to 3 parts by weight of the hydrocarbon propellant.

[0031] The present invention also relates to a method of treating or preventing malodors associated with human perspiration, especially underarm odor. The method comprises topically applying an effective amount of a gel antiperspirant composition to the skin of a human.

[0032] The above and other advantages and novel features of the present invention will become apparent from the following detailed description of the preferred embodiments of the invention.
A gel antiperspirant composition of the present invention comprises an antiperspirant compound, a gelling agent, a carrier, and, optionally, water, a fatty alcohol, a fatty ester, or a mixture thereof. In particular, the gel antiperspirant compositions comprise:

- 1% to 40% by weight of an antiperspirant compound;
- 2% to 15% by weight of a gelling agent; and
- 0% to 30% by weight water; 0% to 20% by weight fatty alcohol, 0% to 70% by weight fatty ester, or a mixture thereof. The gel antiperspirant compositions are free of particulate fillers, like talc.

The gel antiperspirant compositions are stable to phase separation and exhibit exceptional esthetic and functional properties. The antiperspirant compositions are firm, nonstringy and non-tacky, and are capable of effectively delivering the antiperspirant compound to the skin, without leaving a visually observable white residue on the skin or clothing, i.e., are essentially nonwhitening. The antiperspirant compositions also can be diluted with a hydrocarbon propellant to provide an aerosol antiperspirant composition.

The present gel antiperspirant compositions incorporate any of the antiperspirant compounds known in the art, such as the astringent salts. The astringent salts include organic and inorganic salts of aluminum, zirconium, zinc, and mixtures thereof. The anion of the astringent salt can be, for example, sulfate, chloride, chlorohydrate, sulfonate, and mixtures thereof. To achieve the full advantage of the present invention, the antiperspirant compound is present in an amount of 10% to 30% by weight of the antiperspirant composition.


Preferred antiperspirant compounds are the aluminum-zirconium chlorides complexed with an amino acid, like glycine, and the aluminum chlorohydrates. Preferred aluminum-zirconium chloride glycine complexes have an aluminum (Al) to zirconium (Zr) ratio of 1.67 to 12.5, and a total metal (Al+Zr) to chlorine ratio (metal to chlorine) of 0.73 to 1.93.

In addition to the antiperspirant compound, a gel antiperspirant composition of the present invention also includes 2% to 15%, and preferably 3% to 12%, by weight of the composition, of a gelling agent. To achieve the full advantage of the present invention, the gelling agent is present in an amount of 3.5% to 10%, by weight of the composition.

The gelling agent is selected from the group consisting of a starch hydrolyzate ester of a fatty carboxylic acid having 8 to 22 carbon atoms (i.e., a C₈-C₂₂ carboxylic acid), a sterol, and mixtures thereof. The gelling agent acts as a viscosity modifier or thickener to provide an efficacious and consumer-acceptable firmness, and does not contribute to whitening of skin or clothing.
composition can be adjusted by the addition of an optional fatty acid ester and/or an optional fatty alcohol to provide a commercially acceptable product.

[0044] In one embodiment, the gelling agent comprises a starch hydrolyzate ester of a fatty C_{8}-C_{22} carboxylic acid. These gelling agents are prepared by reacting a starch hydrolyzate with a fatty acid having 8 to 22 carbon atoms, under esterifying conditions, to provide a fatty acid esterified with a starch hydrolyzate.

[0045] A starch hydrolyzate is a hydrolysis product of starch having the following repeating units:

\[
\begin{array}{ccc}
\text{O} & \text{H} & \text{OH} \\
\text{H} & \text{H} & \text{O} \\
\text{H} & \text{O} & \text{OH} \\
\text{H} & \text{H} & \text{O} \\
\text{H} & \text{H} & \text{O} \\
\text{H} & \text{H} & \text{O} \\
\end{array}
\]

wherein \( n \) is a number from 1 to 50. A starch hydrolyzate has hydroxyl groups available to esterify a fatty carboxylic acid. The starch hydrolyzates used herein can be linear or cyclic, such as a cyclodextrin.

[0046] An exemplary starch hydrolyzate ester of a C_{8}-C_{22} fatty acid is a dextrin fatty acid ester, illustrated in structural formula II:

\[
\begin{array}{ccc}
\text{CH}_{2} \text{OH} & \text{H} & \text{O} \\
\text{H} & \text{H} & \text{O} \\
\text{H} & \text{H} & \text{O} \\
\text{H} & \text{H} & \text{O} \\
\text{H} & \text{H} & \text{O} \\
\text{H} & \text{H} & \text{O} \\
\end{array}
\]

wherein each \( R \) group, individually, is a hydrogen atom or an acyl group having from 8 to 22 carbon atoms, provided that at least one \( R \) group per glucose unit is an acyl group, and \( m \) is an integer from 20 to 30. The dextrin fatty acid ester can be a partial ester, i.e., at least one \( R \) group is hydrogen; or the dextrin can be completely esterified, i.e., all \( R \) groups are a C_{8}-C_{22} acyl group. In preferred embodiments, the degree of substitution wherein the \( R \) group is a C_{8}-C_{22} alkyl group is at least 2 (i.e., at least two \( R \) groups are C_{8}-C_{22} acyl groups).

[0047] The C_{8}-C_{22} fatty acids that are reacted with the starch hydrolyzate can be saturated or unsaturated acids, and include, for example, capric acid, pelargonic acid, caprylic acid, undecylic acid, undecylenic acid, lauric acid, myristic acid, pentadecylic acid, palmitic acid, heptadecylic acid, stearic acid, nonadecanoic acid, arachidic acid, oleic acid, linoleic acid, linolenic acid, similar acids, and mixtures thereof. The dextrin fatty acid esters are disclosed in Mori et al. U.S. Patent No. 4,780,145, incorporated herein by reference, and are available under the tradename RHEOPEARL from Chiba Flour Milling Co., Ltd., Japan. An example of a dextrin fatty acid ester is dextrin palmitate, available commercially as RHEOPEARL KL and RHEOPEARL FL, for example, from Chiba Flour Milling Co., Ltd. Specific, nonlimiting examples of starch hydrolyzate esters of C_{8}-C_{22} carboxylic acids are dextrin behenate, dextrin laurate, dextrin myristate, dextrin palmitate, dextrin stearate, and mixtures thereof.

[0048] Another exemplary class of starch hydrolyzate esters of a fatty acid is the sucrose fatty acid esters. Sucrose fatty esters have the structure...
wherein the \( R_1 \) groups, individually, are a hydrogen atom or an acyl group having 8 to 22 carbon atoms, provided that at least one \( R_1 \) group is an acyl group. Accordingly, one, two, or three of the methylhydroxyl groups (i.e., \( \text{CH}_2\text{OH} \) groups) of sucrose are esterified with a \( C_8-C_{22} \) fatty acid. Preferred sucrose fatty acid esters have two or three esterified methylhydroxyl groups, i.e., the diester or triester of sucrose. Also contemplated are sucrose derivatives wherein one or more hydrogen atoms of sucrose replaced by an acetyl group, and having at least one \( R_1 \) group.

Examples of sucrose fatty acid esters include, but are not limited to, sucrose distearate, sucrose cocoate, sucrose dilaurate, sucrose oleate, sucrose palmitate, sucrose polyoleate, sucrose polylaurate, sucrose polystearate, sucrose ricinoleate, sucrose stearate, sucrose tribehenate, sucrose tristearate, and mixtures thereof. Sucrose esters are commercially available as the CRODESTA series of sugar esters from Croda Inc., Parsippany, New Jersey.

More generally, the starch hydrolyzate of a fatty acid ester can be any sugar or carbohydrate ester of a fatty \( C_8-C_{22} \) carboxylic acid that is capable of gelling a silicone or a hydrocarbon. Other starch hydrolyzates, in addition to sucrose and dextrin, that can be used to esterify a \( C_8-C_{22} \) carboxylic acid include, but are not limited to, monosaccharides, like glucose, fructose, and mannose; disaccharides, like sucrose, maltose, and lactose; trisaccharides, like maltotriose, raffinose, and melezitose; polysaccharides, like cellulose and chitin; and cyclodextrins, like \( \alpha, \beta \), and \( \alpha \)-cyclo-dextrin.

In addition to the starch hydrolyzate fatty acid esters, a sterol can be used as the gelling agent of the present antiperspirant compositions. In particular, sterols are isocyclic compounds having a tetracyclic cyclopentenophenan-threne skeleton (III):

The sterols can contain hydroxyl or keto groups, ring unsaturation, and methyl or aliphatic side chains. Exemplary, but nonlimiting, sterols include dihydrolanosterol, lanosterol, cholesterol, sitosterol, campesterol, cholecalciferol, cholesteryl hydroxystearate, dihydrocholesterol, stigmasterol, \( \beta \)-sitosterol, lanolin alcohol, soy sterol, and tall oil sterol.

Sterols and unsaponifiables are commercially available products, such as NIKKOL® Isocholesterol EX (dihydrolanosterol and lanosterol), Nikko Chemicals Co., Tokyo, Japan, CRODAROM Avocadin (avocado oil unsaponifiables), Croda, Inc., Parsippany, New Jersey. CRODAROM Avocadin contains \( \beta \)-sitosterol, campesterol, and stigmasterol.

The gel antiperspirant compositions also contain 10% to 90%, and preferably 15% to 75%, by weight of the composition, of a carrier. To achieve the full advantage of the present invention, the composition includes 30% to 60%,
by weight, of a carrier.

[0055] The carrier is nonaqueous and comprises a volatile silicone, a volatile hydrocarbon, a nonvolatile silicone, a nonvolatile hydrocarbon, or a mixture thereof. Preferably, the carrier comprises a volatile silicone, a volatile hydrocarbon, or a mixture thereof.

[0056] In a preferred embodiment, the volatile silicone is a low molecular weight polydimethylsiloxane having a viscosity of 0.5 to 5 centistokes (cs) at 25°C and a boiling point of up to about 300°C at atmospheric pressure. A low molecular weight polydimethylsiloxane having phenyl substituents also is useful in the compositions of the present invention. Furthermore, the low molecular weight polydimethylsiloxane compound can be a linear or a cyclic polydimethylsiloxane compound.

[0057] An example of a linear, low molecular weight, volatile polydimethylsiloxane compound useful in the composition and method of the present invention is hexamethyldisiloxane, available commercially under the tradename DOW CORNING 200 FLUID, from Dow Corning Corp., Midland, Michigan. Hexamethyldisiloxane has a viscosity of 0.65 cs (centistokes), is highly volatile, is nongreasy, and does not leave the skin with a sticky or tacky feeling. Other linear polydimethylsiloxanes, such as decamethyltetrasiloxane, having a boiling point of about 195°C at atmospheric pressure, and a viscosity of 1.5 centistokes; octamethyltrisiloxane; and dodecamethylpentasiloxane, also are useful in the composition of the present invention.

[0058] In addition, the cyclic, low molecular weight, volatile polydimethylsiloxanes, having the Cosmetic, Toiletry and Fragrance Association (CTFA) designation cyclomethicone, also are useful in the composition and method of the present invention. The cyclomethicones are low molecular weight, water-insoluble cyclic compounds having an average of about 3 to about 6-[O-Si(CH₃)₂]ₙ-repeating group units per molecule and boil at atmospheric pressure in a range of from 150°C to 250°C. Suitable cyclomethicones are available commercially under the tradenames SILICONE SF-1173 (octamethylcyclotetrasiloxane) and SILICONE SF-1202 (decamethylcyclopentasiloxane) from General Electric, Waterford, New York, and SILICONE 344 FLUID and SILICONE 345 FLUID from Dow Corning Corporation, Midland, Michigan, the tetramer being listed first in each instance. The volatile cyclic silicones can be used in combination with a linear volatile silicone, and the volatile silicones can be used in conjunction with a nonvolatile silicone or a hydrocarbon.

[0059] In addition to the volatile silicones, a volatile hydrocarbon can be included in the composition, either alone or in conjunction with other nonaqueous carriers. The volatile hydrocarbon, such as a hydrocarbon including 10 carbon atoms to 26 carbon atoms, has sufficient volatility to avoid leaving a sticky or tacky feeling on the skin. A volatile hydrocarbon, therefore, provides essentially the same benefits as the volatile silicone.

[0060] A preferred volatile hydrocarbon is an aliphatic hydrocarbon including from about 12 to about 24 carbon atoms, and has a boiling point in the range of from 100°C to 300°C. Exemplary volatile hydrocarbons are depicted in general structural formula (IV), wherein n ranges from 2 to 5.

```
CH₃
H₂C - (C - CH₂)ₙ - CH - CH₃
CH₃
```

Examples of volatile hydrocarbons useful in the compositions of the present invention are the commercially-available compounds such as PERMETHYL 102A, or PERMETHYL 99A and PERMETHYL 101A, corresponding to compound of general structural formula (IV) wherein n is 2 and 3, respectively, from Presperse, Inc., South Plainfield, New Jersey. Other volatile hydrocarbons include isohexadecene, 1-decene dimer, and C₁₃₋₁₄ isoparaffins. A volatile hydrocarbon is useful in the gel antiperspirant composition either alone, in combination with another volatile or nonvolatile hydrocarbon, or in combination with a volatile or nonvolatile silicone.

[0061] In another embodiment, the gel antiperspirant composition contains a carrier comprising a nonvolatile silicone, like a polydimethylsiloxane compound. Preferred nonvolatile silicone compounds include linear and branched polydimethylsiloxanes of the following general formula:

```
(CH₃)₃SiO - [Si(CH₃)₂O]ₙ - Si(CH₃)₃ ,
```

wherein n is a number from 25 to 200, and preferably from 50 to 100. Phenyl-substituted silicones also are useful.
Silicone fluids, useful in compositions of the present invention are available from numerous commercial sources, including General Electric Company, Waterford, NY, and Dow Corning Corp., Midland, MI. The nonvolatile polydimethylsiloxane compounds are nonfunctional siloxanes having a viscosity of from 5 to 1,000 cs, and preferably from 25 to 350 cs, at 25°C.

Another suitable carrier that can be included in the composition of the present invention is a nonvolatile hydrocarbon, such as mineral oil. The nonvolatile hydrocarbons provide many of the same benefits as the silicone conditioning agents, and can be included in the composition in conjunction with a silicone conditioning agent.

In addition to the essential ingredients, the present gel antiperspirant compositions also can include optional ingredients traditionally included in antiperspirant compositions. These optional ingredients include, but are not limited to, dyes, fragrances, preservatives, antioxidants, detoxifying agents, deodorizing agents, and similar types of compounds. These optional ingredients typically are included in the antiperspirant composition in an amount of 0.01% to 10% by weight of the composition.

Accordingly, fatty (C_{8} to C_{22}) esters of C_{1} to C_{12} carboxylic acids useful in the composition and method of the present invention include, but are not limited to, cetyl octanoate, stearyl heptanoate, stearyl caprylate, stearyl octanoate, lauryl octanoate, myristyl heptanoate, oleyl octanoate, myristyl propionate, cetyl acetate, cetyl propionate, cetyl octanoate, and mixtures thereof.

Another optional ingredient is a fatty ester, present in an amount of 0% to 70%, and preferably 2% to 50%, by weight of the composition. To achieve the full advantage of the present invention, water is present in an amount of 0% to 10% by weight of the composition. Water is present in a sufficient amount such that the feel of the composition is not adversely affected, and the composition does not leave a tacky feel on the skin. The addition of water to the composition leads to the formation of a water-in-oil microemulsion, which helps decrease the tacky skin feeling attributed to the water.

Another optional ingredient included in the gel antiperspirant composition can be a fatty alcohol. The fatty alcohol is present in an amount of 0% to 20%, and preferably 0% to 15%, by weight of the composition. To achieve the full advantage of the present invention, the fatty alcohol is present at 1% to 15% by weight of the composition. The fatty alcohol helps adjust the firmness of the antiperspirant composition to a desired level and increase phase stability. The presence of a fatty alcohol above 20% by weight provides a composition that is too firm, and, therefore, is difficult to apply to the skin.

The fatty alcohol has on average 8 to 26 carbon atoms, and preferably 12 to 22 carbon atoms. The term "on average" recognizes that the fatty alcohols often are available as mixtures of alcohols containing predominantly one or two fatty alcohols and minor portions of several other fatty alcohols. Therefore, for example, a commercial fatty alcohol having 8 carbon atoms typically includes alcohols having more than, and less than, 8 carbon atoms. Examples of fatty alcohols include, but are not limited to, lauryl alcohol, oleyl alcohol, myristil alcohol, tallow alcohol, cetyl alcohol, stearyl alcohol, cetearyl alcohol, caprylic alcohol, C_{9-11} alcohols, C_{12-13} alcohols, C_{12-15} alcohols, C_{12-16} alcohols, C_{14-15} alcohols, coconut alcohol, decyl alcohol, isocetyl alcohol, isostearyl alcohol, palm kernel alcohol, tridecyl alcohol, beheny alcohol, decytiltridecanol, heptylundecanol, octylldodecanol, undecylenyl alcohol, undecylpentadecanol, and mixtures thereof.

Another optional ingredient is a fatty ester, present in an amount of 0% to 70%, and preferably 2% to 50%, by weight of the composition. To achieve the full advantage of the present invention, the fatty ester is present in an amount of 3% to 25%, by weight of the composition. The fatty ester is included in the antiperspirant composition as an emollient to improve composition esthetics, especially feel and ease of application.

The fatty ester is a liquid or a solid compound. Preferably, the fatty ester is a liquid compound. The fatty component of the fatty ester can be derived from a fatty acid or a fatty alcohol, or a combination thereof. In addition, the fatty ester can be a straight chain fatty ester, like isopropyl myristate; a branched chain fatty ester, like Purcellin Oil; a benzoate ester, like C_{12-15} alcohols benzoate; or a combination thereof.

One useful class of fatty esters is derived from carboxylic acids having 1 to about 12 carbon atoms, including both branched and straight chain carboxylic acids. In general, the C_{1} to C_{12} carboxylic acid is esterified with a fatty alcohol including 8 to 22 carbon atoms to provide a fatty (C_{8} to C_{22}) ester of a C_{1} to C_{12} carboxylic acid that is useful in the present invention. Such fatty alcohols include, but are not limited to, lauryl alcohol, myristil alcohol, cetyl alcohol, cetearyl alcohol, stearyl alcohol, isostearyl alcohol, oleyl alcohol, tallow alcohol, behenyl alcohol, and mixtures thereof. Accordingly, fatty (C_{8} to C_{22}) esters of C_{1} to C_{12} carboxylic acids useful in the composition and method of the present invention include, but are not limited to, cetyl octanoate, stearyl heptanoate, stearyl caprylate, stearyl octanoate, lauryl octanoate, myristyl heptanoate, oleyl octanoate, myristyl propionate, cetyl acetate, cetyl propionate, cetyl octanoate,
isodecyl neopentanoate, and mixtures thereof. These fatty esters can occur naturally or can be synthesized.

[0072] In place of, or in combination with, the fatty (C<sub>6</sub> to C<sub>22</sub>) ester of a C<sub>1</sub> to C<sub>12</sub> carboxylic acid, a fatty ester derived from a fatty acid including 8 to 22 carbon atoms esterified with an alcohol including 1 to 22 carbon atoms can be included in the composition of the present invention. Examples of such fatty esters include, but are not limited to, isopropyl myristate, isopropyl palmitate, isopropyl laurate, isopropyl linoleate, isopropyl tallowate, isopropyl ricinoleate, methyl laurate, methyl linoleate, methyl myristate, methyl stearate, methyl ricinoleate, methyl car yrlylate, methyl oleate, methyl palmitate, methyl stearate, methyl behenate, methyl soyate, methyl tallowate, isopropyl behenate, isopropyl isostearate, isopropyl soyate, propyl oleate, butyl oleate, butyl stearate, methyl coconate, methyl lardate, isobutyl palmitate, butyl myristate, ethyl palmitate, ethyl myristate, ethyl oleate, ethyl stearate, isobutyl stearate, isobutyl myristate, and mixtures thereof.

[0073] Another class of fatty esters that can be included in the composition of the present invention, either alone or in combination with the fatty esters described above, is the benzoate esters. Suitable benzoate esters include esters of benzoic acid wherein the esterifying alcohol includes 8 to 22 carbon atoms. Examples of suitable benzoate esters include, but are not limited to, the commercial products FINSOLV TN, benzoic acid esterified with fatty alcohols including 12 to 15 carbon atoms; FINSOLV SB, isostearyl benzoate; FINSOLV P, PPG-15 stearyl ether benzoate; or combinations thereof, all available from Finetex Inc., Elmwood Park, New Jersey.


[0075] To demonstrate the gel antiperspirant compositions of the present invention, the following nonlimiting examples were prepared. An antiperspirant composition of the present invention is a soft solid gel that leaves no visually-observable, white residue on skin or clothing after application. The antiperspirant compositions also can include, or be diluted with, a hydrocarbon propellant to provide a two-phase aerosol antiperspirant composition.

[0076] In general, an antiperspirant composition of the present invention is prepared by first dissolving the gelling agent in the carrier by heating an admixture of the gelling agent and carrier to about 85°C, then maintaining the admixture at 85°C, with agitation, until the mixture is homogeneous. The resulting homogeneous solution is allowed to cool to 65°C, then the optional fatty alcohol and the optional fatty acid ester, if present, are added to the solution. The resulting mixture is stirred until homogeneous, then the antiperspirant compound and the optional water, if present, are added to the solution, under continued agitation. The resulting antiperspirant composition was stirred at a moderate rate of about 20 to 100 rpm, then allowed to cool to 55°C to 60°C until homogeneous. The antiperspirant composition then is cast into a mold, and allowed to cool to room temperature. If other optional oil-soluble components are present in the antiperspirant composition, these components are added to the composition in conjunction with the optional fatty alcohol and fatty ester. If other optional water-soluble components are present in the antiperspirant composition, these components are added to the composition in conjunction with the optional water.

[0077] The antiperspirant compositions of the present invention are soft, opaque solid sticks having a penetrometer reading of about 5 to about 40, and preferably about 10 to about 20. The penetrometer reading is determined in accordance with ASTM No. D937-58, "Penetration of Petrolatum." The antiperspirant compositions are sufficiently firm for easy application to the skin without drag. The antiperspirant compositions do not contain a particulate filler, like talc, or a solid inorganic gelling agent, like bentonite, and, therefore, do not leave an esthetically unacceptable white residue on skin or clothing.

[0078] As will be demonstrated in the following examples, the antiperspirant compositions were phase-stable over the life of the product, were firm (gel), were easy to apply and effectively delivered the antiperspirant compound to the skin, and did not whiten the skin or clothing after application. Each of the following examples was prepared by the above-described method.

### EXAMPLE 1

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Chlorohydrate (ACH)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>30</td>
</tr>
</tbody>
</table>

<sup>1</sup> the amount of each ingredient is expressed as % by weight of the total composition, all percents set forth the amount of active ingredient present in the composition;

<sup>2</sup> CHLOROHYDROL Powder, available commercially from Reheis, Inc., Berkeley Heights, New Jersey, as a 100% active material;
The composition of Example 1 was an opaque (i.e., white), soft gel composition which spread easily on the skin and dried quickly, leaving behind an antiperspirant film. In storage stability tests, the composition of Example 1 was phase stable at 26.7°C (80°F) and at 38.9°C (120°F) for at least two months. During the storage tests, no separation of solid antiperspirant compound particles was observed. The composition of Example 1 did not leave a visible white residue on the skin 30 minutes or 120 minutes after application.

Compositions including a relatively low amount of antiperspirant compound, e.g., 5% to 15% by weight, are termed deodorants as opposed to antiperspirants. Deodorant compositions also can be made by incorporating a sufficient amount of gelling agent into the composition. An optional fatty alcohol or optional fatty acid ester also can be included to enhance composition esthetics. A sufficient amount of gelling agent, and, if desired optional fatty alcohol and/or fatty acid ester, in the composition provide a gel composition of desired consistency. The amount of gelling agent required to provide the desired composition consistency varies with the identity and the amount of carrier in the composition.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropyl Myristate²</td>
<td>10</td>
</tr>
<tr>
<td>Dextrin Palmitate⁴</td>
<td>10</td>
</tr>
<tr>
<td>Cyclomethicone⁵</td>
<td>50</td>
</tr>
</tbody>
</table>

¹ the amount of each ingredient is expressed as % by weight of the total composition, all percents set forth the amount of active ingredient present in the composition;
² optional fatty ester;
³ RHEOPEARL FL, available commercially from Chiba Flour Milling Co., Ltd., Chiba, Japan, as a 100% active material; and
⁴ volatile silicone carrier, DOW CORNING 245 FLUID, available commercially from Dow Corning Corp., Midland, Michigan, as a 100% active material.

The composition of Example 1 was an opaque (i.e., white), soft gel composition which spread easily on the skin and dried quickly, leaving behind an antiperspirant film. In storage stability tests, the composition of Example 1 was phase stable at 26.7°C (80°F) and at 38.9°C (120°F) for at least two months. During the storage tests, no separation of solid antiperspirant compound particles was observed. The composition of Example 1 did not leave a visible white residue on the skin 30 minutes or 120 minutes after application.

Compositions including a relatively low amount of antiperspirant compound, e.g., 5% to 15% by weight, are termed deodorants as opposed to antiperspirants. Deodorant compositions also can be made by incorporating a sufficient amount of gelling agent into the composition. An optional fatty alcohol or optional fatty acid ester also can be included to enhance composition esthetics. A sufficient amount of gelling agent, and, if desired optional fatty alcohol and/or fatty acid ester, in the composition provide a gel composition of desired consistency. The amount of gelling agent required to provide the desired composition consistency varies with the identity and the amount of carrier in the composition.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Zirconium Tetrachlorohydrex Gly⁶</td>
<td>15</td>
</tr>
<tr>
<td>C₁₂-₁₅ Alkyl Benzoate⁷</td>
<td>62</td>
</tr>
<tr>
<td>Dextrin Palmitate⁸</td>
<td>8</td>
</tr>
<tr>
<td>Mineral Oil⁹</td>
<td>15</td>
</tr>
</tbody>
</table>

⁶ REACH AZP-908SUF, available commercially from Reheis, Inc., Berkeley Heights, New Jersey, as a 100% active material
⁷ fatty ester, FINSOLV TN, Finetex, Inc., Elmwood Park, New Jersey, as a 100% active material
⁸ RHEOPEARL KL, available from Chiba Flour Milling Co., Ltd., Chiba, Japan, as a 100% active material; and
⁹ nonvolatile hydrocarbon carrier.

The composition of Example 2 was an opaque, soft solid having a slightly yellowish color. The composition was easily applied to the skin to effectively deliver the antiperspirant compound and was nonwhitening to skin and clothing. The composition was stable for at least two months in accelerated stability tests performed at 26.7°C (80°F) and 38.9°C (120°F).

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Chlorohydrate²</td>
<td>30.0</td>
</tr>
<tr>
<td>Isopropyl Myristate³</td>
<td>6.0</td>
</tr>
<tr>
<td>Dextrin Palmitate⁴</td>
<td>1.0</td>
</tr>
<tr>
<td>Sucrose Distearate¹⁰</td>
<td>2.5</td>
</tr>
</tbody>
</table>

¹⁰ CRODESTA F-10, available commercially from Croda, Inc., Parsippany, New Jersey, as a 100% active material; and
The compositions of Examples 4-6 contained water, and were opaque, soft solid gels having good phase stability and an effective delivery of the antiperspirant composition upon application.

### EXAMPLE 3

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behenyl Alcohol(^{11})</td>
<td>10.0</td>
</tr>
<tr>
<td>Cyclomethicone(^{5})</td>
<td>50.5</td>
</tr>
</tbody>
</table>

\(^{11}\) a C\(_{22}\) fatty alcohol, NACOL 22-98, available commercially from Vista Chemical Co., Austin, Texas.

### EXAMPLE 4

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Chlorohydrate(^{2})</td>
<td>30</td>
</tr>
<tr>
<td>Isopropyl Myristate(^{3})</td>
<td>9</td>
</tr>
<tr>
<td>Dextrin Palmitate(^{4})</td>
<td>10</td>
</tr>
<tr>
<td>Water</td>
<td>5</td>
</tr>
<tr>
<td>Cyclomethicone(^{5})</td>
<td>46</td>
</tr>
</tbody>
</table>

### EXAMPLES 5 & 6

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Example 5(^{1})</th>
<th>Example 6(^{1})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Chlorohydrate(^{2})</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>Isopropyl Myristate(^{3})</td>
<td>5.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Dextrin Palmitate(^{4})</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Sucrose Distearate(^{10})</td>
<td>4.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Behenyl Alcohol(^{11})</td>
<td>9.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Water</td>
<td>5.0</td>
<td>30.0</td>
</tr>
<tr>
<td>Cyclomethicone(^{5})</td>
<td>44.1</td>
<td>27.1</td>
</tr>
</tbody>
</table>

### EXAMPLES 7-9

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Example 7(^{1})</th>
<th>Example 8(^{1})</th>
<th>Example 9(^{1})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Chlorohydrate(^{2})</td>
<td>15</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>C(_{12-15}) Alkyl Benzoate(^{7})</td>
<td>60</td>
<td>48</td>
<td>25</td>
</tr>
<tr>
<td>Isopropyl Myristate(^{3})</td>
<td>--</td>
<td>--</td>
<td>5</td>
</tr>
<tr>
<td>Dextrin Palmitate(^{4})</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Mineral Oil(^{9})</td>
<td>15</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Cyclomethicone(^{5})</td>
<td>--</td>
<td>--</td>
<td>25</td>
</tr>
</tbody>
</table>

### EXAMPLE 10

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Chlorohydrate(^{2})</td>
<td>30</td>
</tr>
</tbody>
</table>
The composition of Example 10, which contains a volatile hydrocarbon carrier, had the same physical characteristics as the composition of Example 1, which contained a volatile silicone carrier. The composition of Example 10 was esthetically acceptable and effectively delivered the antiperspirant compound to the skin.

The compositions of Examples 12-14 were soft solid gels that were stable and performed well as antiperspirant compositions.

EXAMPLE 10

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isopropyl Myristate³</td>
<td>10</td>
</tr>
<tr>
<td>Dextrin Palmitate⁸</td>
<td>10</td>
</tr>
<tr>
<td>Isohexadecane¹²</td>
<td>50</td>
</tr>
</tbody>
</table>

¹² volatile hydrocarbon carrier, PERMETHYL 101A, available from Presperse, Inc., South Plainfield, New Jersey, as a 100% active material.

EXAMPLE 11

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Zirconium Tetrachlorohydrex Gly¹³</td>
<td>30</td>
</tr>
<tr>
<td>Isopropyl Myristate³</td>
<td>10</td>
</tr>
<tr>
<td>Dextrin Palmitate⁸</td>
<td>2</td>
</tr>
<tr>
<td>Sucrose Distearate¹⁰</td>
<td>10</td>
</tr>
<tr>
<td>Cyclomethicone⁵</td>
<td>48</td>
</tr>
</tbody>
</table>

¹³ REACH AZZ-902SUF, available commercially from Reheis, Inc., Berkeley Heights, New Jersey, available as a 100% active material.

EXAMPLES 12-14

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Example 12¹</th>
<th>Example 13¹</th>
<th>Example 14¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Zirconium Trichlorohydrex Gly¹⁴</td>
<td>26.5</td>
<td>26.5</td>
<td>--</td>
</tr>
<tr>
<td>Aluminum Chlorohydrate²</td>
<td>--</td>
<td>--</td>
<td>26.5</td>
</tr>
<tr>
<td>Isopropyl Myristate³</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Dextrin Palmitate⁸</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Sucrose Distearate¹⁰</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Behenyl Alcohol¹¹</td>
<td>10.0</td>
<td>12.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Cyclomethicone⁵</td>
<td>54.0</td>
<td>52.0</td>
<td>54.0</td>
</tr>
</tbody>
</table>

¹⁴ WESTCHLOR ZR30BDMCP, available commercially from Westwood Chemical Corp., Middletown, New York, as a 100% active material.

EXAMPLE 15

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight percent¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Zirconium Trichlorohydrex Gly¹⁴</td>
<td>30</td>
</tr>
<tr>
<td>Isopropyl Myristate³</td>
<td>10</td>
</tr>
<tr>
<td>Dihydrolanosterol and Lanosterol¹⁵</td>
<td>10</td>
</tr>
<tr>
<td>Cyclomethicone⁵</td>
<td>50</td>
</tr>
</tbody>
</table>

¹⁵ NIKKOL® ISOCHOLESTEROL EX, available commercially from Nikko Chemical Co., Ltd., Tokyo, Japan, as a 100% active material containing dihydrolanosterol and lanosterol.
The composition of Example 15 was a soft gel composition that was stable 26.7°C (80°F) and 38.9°C (120°F) for at least one month. The solid gel composition was sufficiently firm to perform as an antiperspirant composition and effectively delivered the antiperspirant compound to the skin without leaving a tacky or sticky feeling on the skin and without leaving a white residue on the skin or clothing.

<table>
<thead>
<tr>
<th>EXAMPLE 16</th>
<th>Ingredient</th>
<th>Weight percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Zirconium Trichlorohydrex Gly</td>
<td>26.50</td>
<td></td>
</tr>
<tr>
<td>Isopropyl Myristate</td>
<td>6.00</td>
<td></td>
</tr>
<tr>
<td>Dihydrolanosterol and Lanosterol</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Sucrose Distearate</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>Behenyl Alcohol</td>
<td>10.00</td>
<td></td>
</tr>
<tr>
<td>Cyclomethicone</td>
<td>55.25</td>
<td></td>
</tr>
</tbody>
</table>

The compositions of Examples 16 and 17 were white, solid vanishing creams having a stability of at least one month at 26.7°C (80°F) and at 38.9°C (120°F). The compositions of Examples 16 and 17 effectively delivered the antiperspirant compound to the skin.

As stated above, one part by weight of the gel antiperspirant compositions can be admixed with 0.5 to 3 parts by weight of a hydrocarbon propellant to provide an aerosol antiperspirant composition. Aerosol antiperspirant compositions are illustrated in Examples 18 and 19.

<table>
<thead>
<tr>
<th>EXAMPLE 17</th>
<th>Ingredient</th>
<th>weight percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Zirconium Trichlorohydrex Gly</td>
<td>26.5</td>
<td></td>
</tr>
<tr>
<td>Isopropyl Myristate</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Avocado Oil Unsaponifiables</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>Behenyl Alcohol</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Cyclomethicone</td>
<td>52.5</td>
<td></td>
</tr>
</tbody>
</table>

CRODAROM AVOCADIN, available commercially from Croda, Inc., Parsippany, New Jersey, as a 100% active material.

The compositions of Examples 16 and 17 were white, solid vanishing creams having a stability of at least one month at 26.7°C (80°F) and at 38.9°C (120°F). The compositions of Examples 16 and 17 effectively delivered the antiperspirant compound to the skin.

As stated above, one part by weight of the gel antiperspirant compositions can be admixed with 0.5 to 3 parts by weight of a hydrocarbon propellant to provide an aerosol antiperspirant composition. Aerosol antiperspirant compositions are illustrated in Examples 18 and 19.

<table>
<thead>
<tr>
<th>EXAMPLES 18-19</th>
<th>Ingredient</th>
<th>Example 18</th>
<th>Example 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Chlorohydrate</td>
<td>10.0</td>
<td>10.00</td>
<td></td>
</tr>
<tr>
<td>Isopropyl Myristate</td>
<td>2.5</td>
<td>2.50</td>
<td></td>
</tr>
<tr>
<td>Dextrin Palmitate</td>
<td>1.0</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Sucrose Distearate</td>
<td>2.5</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>Cyclomethicone</td>
<td>24.0</td>
<td>25.75</td>
<td></td>
</tr>
<tr>
<td>Propellant Blend</td>
<td>60.0</td>
<td>60.00</td>
<td></td>
</tr>
</tbody>
</table>

17 hydrocarbon propellant blend containing about 61% n-butane, about 22% isobutane, and about 16% propane, by weight.

The aerosol compositions of Examples 18 and 19 were two-phase compositions that effectively dispersed the pressurized antiperspirant composition. The aerosol antiperspirant composition was soft and nongreasy. A slight white residue was observed immediately after the aerosol composition was applied to the skin, but the white residue vanished with one to five minutes.

As illustrated by the above examples, the antiperspirant compositions of the present invention have excellent esthetic and functional properties, such as delivery, viscosity, firmness, and low tack. The compositions have an ex-
cellent stability at room temperature and at elevated temperatures.

[0090] The antiperspirant compositions of the present invention exhibited excellent sensory properties upon topical application to skin. The improved physical and sensory properties include a consistency to effectively deliver the antiperspirant compound to the skin, storage stability, and essentially no whitening of the skin and clothing after topical application.

[0091] It should be understood that the foregoing detailed description of the preferred embodiments is given merely by way of illustration. The invention is limited as indicated by the appended claims.

Claims

1. A gel antiperspirant composition comprising:
   (a) 1% to 40% by weight of an antiperspirant compound;
   (b) 2% to 15% by weight of gelling agent selected from the group consisting of a sugar or carbohydrate ester of a fatty carboxylic acid having 8 to 22 carbon atoms, a sterol, and mixtures thereof; and
   (c) 10% to 90% by weight of a carrier comprising a silicone, a hydrocarbon, or a mixture thereof.

2. The antiperspirant composition of claim 1 further comprising 0% to 30% by weight water.

3. The antiperspirant composition of claim 1 or 2 further comprising 0% to 20% by weight of a fatty alcohol having 8 to 26 carbon atoms.

4. The antiperspirant composition of claim 1, 2 or 3 further comprising 0% to 70% by weight of a fatty ester.

5. The antiperspirant composition of any preceding claim further comprising 0% to 30% by weight water, 0% to 20% by weight of a fatty alcohol having 8 to 26 carbon atoms, 0% to 70% by weight of a fatty ester, and mixtures thereof.

6. The antiperspirant composition of any preceding claim having a penetrometer reading of 5 to 40.

7. The antiperspirant composition of any preceding claim wherein the antiperspirant compound is an astringent salt comprising aluminum, zirconium, zinc, or a mixture thereof.


9. The antiperspirant composition of any preceding claim wherein the gelling agent comprises a sugar or carbohydrate ester of a fatty carboxylic acid having 8 to 22 carbon atoms.

10. The antiperspirant composition of claim 9 wherein the sugar or carbohydrate ester comprises a dextrin fatty acid ester having the formula
wherein R, individually, is a hydrogen atom or an acyl group having 8 to 22 carbon atoms, provided that at least one R group per repeating unit is an acyl group, and m is an integer from 20 to 30.

11. The antiperspirant composition of claim 10 wherein at least two R groups are an acyl group having 8 to 22 carbon atoms.

12. The antiperspirant composition of claim 10 or 11 wherein the acyl group having 8 to 22 carbon atoms is derived from capric acid, pelargonic acid, caprylic acid, undecylic acid, undecylenic acid, lauric acid, myristic acid, pentadecylic acid, palmitic acid, heptadecylic acid, stearic acid, nonadecanoic acid, arachidic acid, oleic acid, linoleic acid, linolenic acid, or mixtures thereof.

13. The antiperspirant composition of claim 10, 11 or 12 wherein the dextrin acid ester comprises dextrin behenate, dextrin laurate, dextrin myristate, dextrin palmitate, dextrin stearate, or mixtures thereof.

14. The antiperspirant composition of claim 9 wherein the sugar or carbohydrate ester comprises a sucrose fatty acid ester having the structure

wherein R₁, individually, is a hydrogen atom or an acyl group having 8 to 22 carbon atoms, provided that at least one R₁ group is an acyl group.

15. The antiperspirant composition of claim 14 wherein at least two R₁ groups are acyl groups having 8 to 22 carbon atoms.

16. The antiperspirant composition of claim 14 or 15 wherein the sucrose fatty acid ester comprises sucrose distearate, sucrose cocoate, sucrose dilaurate, sucrose oleate, sucrose palmitate, sucrose polyaurate, sucrose polylinoleate, sucrose polyoleate, sucrose polystearate, sucrose ricinoleate, sucrose stearate, sucrose tribehenate, sucrose tri-stearate, or mixtures thereof.

17. The antiperspirant composition of claim 9 wherein the sugar or carbohydrate ester is selected from the group consisting of a monosaccharide, a disaccharide, a trisaccharide, a polysaccharide, a cyclodextrin, and mixtures thereof.
18. The antiperspirant composition of claim 9 wherein the sugar or carbohydrate ester is selected from the group consisting of an α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, glucose, fructose, mannose, sucrose, maltose, lactose, maltotriose, raffinose, melezitose, cellulose, chitin, and mixtures thereof.

19. The antiperspirant composition of any of claims 1 to 8 wherein the gelling agent comprises a sterol.

20. The antiperspirant composition of claim 19 wherein the sterol comprises dihydrolanosterol, lanosterol, cholesterol, sitosterol, campsterol, cholecalciferol, cholesteryl hydroxystearate, dihydrocholesterol, stigmasterol, β-sitosterol, lanolin alcohol, soy sterol, tall oil sterol, avocado oil unsaponifiables, olive oil unsaponifiables, rapeseed oil unsaponifiables, shea butter unsaponifiables, soybean oil unsaponifiables, or mixtures thereof.

21. The antiperspirant composition of any preceding claim wherein the carrier comprises a volatile silicone compound.

22. The antiperspirant composition of claim 21 wherein the volatile silicone compound is a linear volatile silicone having methyl groups, phenyl groups, or a mixture thereof, a viscosity of 0.5 to 5 centistokes, and a boiling point of up to 300°C at atmospheric pressure.

23. The antiperspirant composition of claim 21 wherein the volatile silicone compound is a cyclic volatile silicone having an average of 3 to 6 -[O-Si(CH₃)₂]- repeating group units per molecule and a boiling point at atmospheric pressure in a range of 150°C to 250°C.

24. The antiperspirant composition of claim 1 wherein the carrier comprises a volatile hydrocarbon compound.

25. The antiperspirant composition of claim 24 wherein the volatile hydrocarbon compound has 10 to 26 carbon atoms and a boiling point at atmospheric pressure of 100°C to 300°C.

26. The antiperspirant composition of claim 24 wherein the volatile hydrocarbon compound as the structure

$$\text{CH}_3 \quad \text{CH}_3$$

$$\text{H}_2\text{C} = \left(\text{C} - \text{C} - \text{C}_\text{H}_2\right)_n - \text{CH} - \text{CH}_3$$

wherein n ranges from 2 to 5.

27. The antiperspirant composition of claim 24 wherein the volatile hydrocarbon compound comprises isohexadecene, 1-decene dimer, a C₁₃⁻₁₄ isoparaffin, or a mixture thereof.

28. The antiperspirant composition of claim 1 wherein the carrier comprises a nonvolatile hydrocarbon, a nonvolatile silicone, or a mixture thereof.

29. The antiperspirant composition of claim 28 wherein the nonvolatile silicone comprises a polydimethylsiloxane compound, and the nonvolatile hydrocarbon comprises mineral oil.

30. The antiperspirant composition of claim 3 wherein the fatty alcohol is present in an amount of 1% to 15% by weight of the composition.

31. The antiperspirant composition of claim 3 wherein the fatty alcohol is selected from the group consisting of lauril alcohol, oleyl alcohol, myristyl alcohol, tallow alcohol, cetyl alcohol, stearyl alcohol, cetearyl alcohol, caprylic alcohol, a C₉⁻₁₁ alcohol, a C₁₂⁻₁₃ alcohol, a C₁₂⁻₁₅ alcohol, a C₁₂⁻₁₆ alcohol, C₁₄⁻₁₅ alcohol, decyl alcohol, isocetyl alcohol, isostearyl alcohol, palm kernel alcohol, tridecyl alcohol, behenyl alcohol, decytladecanol, heptylundecanol, octyldodecanol, undecylpentadecanol, and mixtures thereof.

32. The antiperspirant composition of claim 4 wherein the fatty ester is present in an amount of 3% to 25% by weight.
of the composition.

33. The antiperspirant composition of claim 4 wherein the fatty ester is derived from a carboxylic acid having 1 to 12 carbon atoms and an alcohol having 8 to 22 carbon atoms.

34. The antiperspirant composition of claim 4 wherein the fatty ester is derived from a carboxylic acid having 8 to 22 carbon atoms and an alcohol having 1 to 22 carbon atoms.

35. The antiperspirant composition of claim 4 wherein the fatty ester comprises benzoic acid esterified with an alcohol having 8 to 22 carbon atoms.

36. The antiperspirant composition of claim 4 wherein the fatty ester is derived from a carboxylic acid having 8 to 22 carbon atoms and an alcohol having 1 to 22 carbon atoms.

37. The antiperspirant composition of claim 1 wherein the composition is free of a particulate filler.

38. A gel antiperspirant composition comprising:

(a) 5% to 35% by weight of an aluminum halide, an aluminum hydroxyhalide, a zirconyl oxyhalide, a zirconyl hydroxyhalide, an aluminum zirconium glycinate, or a mixture thereof;
(b) 3% to 12% by weight of a gelling agent selected from the group consisting of a sucrose distearate, dextrin palmitate, dihydrolanosterol, lanosterol, avocado oil unsaponifiables, and mixtures thereof; and
(c) 15% to 75% by weight of a carrier selected from the group consisting of a volatile silicone, a volatile hydrocarbon, and mixtures thereof.

39. The antiperspirant composition of claim 38 further comprising 0% to 20% by weight water, 0% to 15% by weight of a fatty alcohol selected from the group consisting of behenyl alcohol and stearyl alcohol, and 2% to 50% by weight of a fatty ester selected from the group consisting of isopropyl myristate, a C12-15 alkyl benzoate, and mixtures thereof.

40. An aerosol antiperspirant composition comprising:

(a) 1 part by weight of the gel antiperspirant composition of claim 1, and
(b) 0.5 to 3 parts by weight of a hydrocarbon propellant.

41. A method of treating or preventing malodors associated with human perspiration comprising topically applying an effective amount of an antiperspirant composition to human skin, said composition comprising:

(a) 1% to 40% by weight of an antiperspirant compound;
(b) 2% to 15% by weight of a gelling agent selected from the group consisting of a sugar or carbohydrate ester of a fatty carboxylic acid having 8 to 22 carbon atoms, a sterol, and mixtures thereof; and
(c) 10% to 90% by weight of a carrier comprising a silicone, a hydrocarbon, or a mixture thereof.

42. The method of claim 41 wherein the human skin having the antiperspirant composition applied thereon has no visually observable white residue.

Patentansprüche

1. Gel-Antiperspiranzzusammensetzung umfassend

(a) 1 bis 40 Gew.-% einer Antiperspiransverbindung;
(b) 2 bis 15 Gew.-% Geliermittel ausgewählt aus der Gruppe bestehend aus einem Zucker- oder Kohlenhydratester einer Fettcarbonsäure mit 8 bis 22 Kohlenstoffatomen, einem Sterol und Mischungen davon und
(c) 10 bis 90 Gew.-% eines Trägers, umfassend ein Silicon, einen Kohlenwasserstoff oder eine Mischung davon.
2. Antiperspiranzusammensetzung nach Anspruch 1, die weiterhin 0 bis 30 Gew.-% Wasser enthält.

3. Antiperspiranzusammensetzung nach Anspruch 1 oder Anspruch 2, die weiterhin 0 bis 20 Gew.-% eines Fettalkohols mit 8 bis 26 Kohlenstoffatomen enthält.

4. Antiperspiranzusammensetzung nach Anspruch 1, 2 oder 3, die weiter 0 bis 70 Gew.-% eines Fettesters enthält.

5. Antiperspiranzusammensetzung nach Anspruch 1, 2 oder 3, die weiterhin 0 bis 20 Gew.-% eines Fettalkohols mit 8 bis 26 Kohlenstoffatomen enthält.

6. Antiperspiranzusammensetzung nach einem der vorhergehenden Ansprüche, die weiterhin 0 bis 20 Gew.-% eines Fettesters und Mischungen davon enthält.

7. Antiperspiranzusammensetzung nach einem der vorhergehenden Ansprüche, die weiterhin 0 bis 30 Gew.-% Wasser, 0 bis 20 Gew.-% eines Fettalkohols mit 8 bis 26 Kohlenstoffatomen, 0 bis 70 Gew.-% eines Fettesters und Mischungen davon enthält.

8. Antiperspiranzusammensetzung nach einem der vorhergehenden Ansprüche, die weiterhin 0 bis 30 Gew.-% Wasser, 0 bis 20 Gew.-% eines Fettalkohols mit 8 bis 26 Kohlenstoffatomen, 0 bis 70 Gew.-% eines Fettesters und Mischungen davon enthält.


10. Antiperspiranzusammensetzung nach Anspruch 9, wobei der Zucker- oder Kohlenhydratester einen Dextrinfettsäureester der Formel

   umfasst, worin R einzeln ein Wasserstoffatom oder eine Acylgruppe mit 8 bis 22 Kohlenstoffatomen ist, vorausgesetzt, dass mindestens eine Gruppe R pro sich wiederholender Einheit eine Acylgruppe ist und m eine ganze Zahl von 20 bis 30 ist.


13. Antiperspiranszusammensetzung nach Anspruch 10, 11 oder 12, wobei der Dextrinfettsäureester Dextrinbehenat, Dextrinlaurate, Dextrinmyristat, Dextrinpalmitat, Dextrinsebacat oder Mischungen davon umfasst.

14. Antiperspiranszusammensetzung nach Anspruch 9, wobei der Zucker- oder Kohlenhydratester einen Saccharosefettsäureester mit der Strukturformel

\[
\text{CH}_2\text{OR}_1
\]

umfasst, worin \( R_1 \) unabhängig ein Wasserstoffatom oder eine Acylgruppe mit 8 bis 22 Kohlenstoffatomen ist, mit dem Vorbehalt, dass mindestens eine der Gruppen \( R_1 \) eine Acylgruppe ist.

15. Antiperspiranszusammensetzung nach Anspruch 14, wobei mindestens zwei Gruppen \( R_1 \) Acylgruppen mit 8 bis 22 Kohlenstoffatomen sind.


17. Antiperspiranszusammensetzung nach Anspruch 9, wobei der Zucker oder Kohlenhydratester ausgewählt ist aus der Gruppe bestehend aus einem Monosaccharid, Disaccharid, Trisaccharid, Polysaccharid, Cyclodextrin und Mischungen davon.

18. Antiperspiranszusammensetzung nach Anspruch 9, wobei der Zucker- oder Kohlenhydratester ausgewählt ist aus der Gruppe bestehend aus einem \( \alpha \)-Cyclodextrin, \( \beta \)-Cyclodextrin, \( \delta \)-Cyclodextrin, Glucose, Fructose, Mannose, Saccharose, Maltose, Lactose, Maltotriose, Raffinose, Melezitose, Cellulose, Chitin und Mischungen davon.

19. Antiperspiranszusammensetzung nach einem der Ansprüche 1 bis 8, wobei das Geliermittel ein Sterol umfasst.

20. Antiperspiranszusammensetzung nach Anspruch 19, wobei das Sterol Dihydrolanosterol, Lanosterol, Cholesterol, Sitosterol, Campesterol, Cholecalciferol, Cholesterolhydroxystearat, Dihydrocholesterol, Stigmasterol, \( \beta \)-Sitosterol, Lanolinalkohol, Sojasterol, Tailösterol, das Unverseifbare von Avocadoöl, Olivenöl, Rapsöl, Sheabutter, Sojaöl, oder Mischungen davon umfasst.


22. Antiperspiransverbindung nach Anspruch 21, wobei die flüchtige Siliconverbindung ein lineares flüchtiges Silicon mit Methylgruppen, Phenylgruppen oder einer Mischung davon ist, mit einer Viskosität von 0,5 bis 5 Centistoke und einem Siedepunkt von bis zu 300°C bei atmosphärischem Druck.

23. Antiperspiranszusammensetzung nach Anspruch 21, wobei die flüchtige Siliconverbindung ein cyclisches flüchtiges Silicon mit durchschnittlich 3 bis 6 sich wiederholenden \( \text{[O-Si(CH}_3]_n \text{]} \)-Einheiten pro Molekül und mit einem Siedepunkt bei atmosphärischem Druck im Bereich von 150 bis 250°C ist.


25. Antiperspiranszusammensetzung nach Anspruch 24, wobei die flüchtige Kohlenwasserstoffverbindung 10 bis 26
Kohlenstoffatome aufweist und einen Siedepunkt bei atmosphärischem Druck von 100 bis 300°C hat.

26. Antiperspiranzusammensetzung nach Anspruch 24, wobei die flüchtige Kohlenwasserstoffverbindung die Strukturformel

\[
\begin{align*}
\text{CH}_3 & \quad \text{CH}_3 \\
\text{H}_2\text{C} & \quad \text{C} \quad \text{C} \quad \text{C} \\
\text{CH}_2 & \quad \text{CH}_2 & \quad \text{CH} & \quad \text{CH}
\end{align*}
\]

hat, worin \(n\) im Bereich von 2 bis 5 ist.

27. Antiperspiranzusammensetzung nach Anspruch 24, wobei die flüchtige Kohlenwasserstoffverbindung Isohexadecen, 1-Decendimer, ein C\(_{13}\)-C\(_{14}\)-Isoparaffin oder eine Mischung davon umfasst.

28. Antiperspiranzusammensetzung nach Anspruch 1, wobei der Träger einen nicht flüchtigen Kohlenwasserstoff, ein nicht flüchtiges Silicon oder eine Mischung davon umfasst.

29. Antiperspiranzusammensetzung nach Anspruch 28, wobei das nicht flüchtige Silicon eine Polydimethylsiloxanverbindung und der nicht flüchtige Kohlenwasserstoff Mineralöl umfasst.

30. Antiperspiranzusammensetzung nach Anspruch 3, wobei der Fettalkohol in einer Menge von 1 bis 15 Gew.-%, bezogen auf die Zusammensetzung, vorhanden ist.


32. Antiperspiranzusammensetzung nach Anspruch 4, wobei der Fettester in einer Menge von 3 bis 25 Gew.-%, bezogen auf die Zusammensetzung, vorhanden ist.

33. Antiperspiranzusammensetzung nach Anspruch 4, wobei der Fettester von einer Carbonsäure mit 1 bis 12 Kohlenstoffatomen und einem Alkohol mit 8 bis 22 Kohlenstoffatomen abgeleitet ist.

34. Antiperspiranzusammensetzung nach Anspruch 4, wobei der Fettester von einer Carbonsäure mit 8 bis 22 Kohlenstoffatomen und einem Alkohol mit 1 bis 22 Kohlenstoffatomen abgeleitet ist.

35. Antiperspiranzusammensetzung nach Anspruch 4, wobei der Fettester Benzoesäure, die mit einem Alkohol mit 8 bis 22 Kohlenstoffatomen verestert ist, umfasst.


37. Antiperspiranzusammensetzung nach Anspruch 1, wobei die Zusammensetzung frei ist von teilchenförmigem Füllstoff.

38. Gel-Antiperspiranzusammensetzung umfassend
(a) 5 bis 35 Gew.-% eines Aluminiumhalogenids, Aluminiumhydroxyhalogenids, Zirkonyloxyhalogenids, Zirkonyhydroxyhalogenids, Aluminiumzirkoniumglycinats oder einer Mischung davon;
(b) 3 bis 12 Gew.-% eines Geliermittels ausgewählt aus der Gruppe bestehend aus Saccharosedistearat, Dextrinpalmitat, Dihydrolanosterol, Lanosterol, dem Unverseifbaren von Avocadoöl und Mischungen davon und
(c) 15 bis 75 Gew.-% eines Trägers ausgewählt aus der Gruppe bestehend aus einem flüchtigen Silicon, einem flüchtigen Kohlenwasserstoff und Mischungen davon.


40. Aerosol-Antiperspiranzusammensetzung umfassend:
   (a) 1 Gewichtsteil der Gel-Antiperspiranzusammensetzung nach Anspruch 1 und 
   (b) 0,5 bis 3 Gewichtsteile eines Kohlenwasserstofftreibmittels.

41. Verfahren zur Behandlung oder Verhütung von Geruch, der mit menschlicher Schweißbildung verbunden ist, umfassend, dass man eine wirksame Menge einer Antiperspiranzusammensetzung auf die menschliche Haut topisch aufträgt, wobei die Zusammensetzung
   (a) 1 bis 40 Gew.-% einer Antiperspiransverbindung;
   (b) 2 bis 15 Gew.-% eines Geliermittels ausgewählt aus der Gruppe bestehend aus einem Zucker- oder Kohlenhydratester einer Fettsäure mit 8 bis 22 Kohlenstoffatomen, einem Sterol und Mischungen davon und
   (c) 10 bis 90 Gew.-% eines Trägers umfassend ein Silicon, einen Kohlenwasserstoff oder eine Mischung davon, umfasst.

42. Verfahren nach Anspruch 41, wobei die menschliche Haut, auf die die Antiperspiranzusammensetzung aufgetragen wurde, keinen visuell sichtbaren weißen Rückstand aufweist.

Revendications

1. Composition antisudorale sous forme de gel comprenant :
   (a) de 1 % à 40 % en poids d'un composé antisudoral ;
   (b) de 2 % à 15 % en poids d'agent gélifiant sélectionné à partir du groupe composé d'un ester de sucre ou d'hydrate de carbone d'un acide gras carboxylique ayant de 8 à 22 atomes de carbone, d'un stérol, et de mélanges de ceux-ci ;
   (c) de 10 % à 90 % en poids d'un matériau formant support comprenant la silicone, un hydrocarbure ou un mélange de ceux-ci.

2. Composition antisudorale selon la revendication 1. comprenant en outre de 0 % à 30 % d'eau.

3. Composition antisudorale selon la revendication 1 ou 2, comprenant en outre de 0 % à 20 % en poids d'un alcool gras ayant de 8 à 22 atomes de carbone.

4. Composition selon la revendication 1, 2 ou 3, comprenant en outre de 0 % à 70 % en poids d'un ester gras.

5. Composition antisudorale selon l'une quelconque des revendications précédentes, comprenant en outre de 0 % à 30 % en poids d'eau, de 0 % à 20 % en poids d'un alcool gras ayant de 8 à 26 atomes de carbone, de 0 % à 70 % en poids d'un ester gras, et des mélanges de ceux-ci.

6. Composition antisudorale selon l'une quelconque des revendications précédentes, ayant une valeur au pénétrô- mètre allant de 5 à 40.

7. Composition antisudorale selon l'une quelconque des revendications précédentes, dans laquelle le composé an-
tisudoral est un sel astringent comprenant l'aluminium, le zirconium, le zinc ou des mélanges de ceux-ci.

8. Composition antisudorale selon la revendication 7, dans laquelle le composé antisudoral est sélectionné à partir du groupe constitué du chlorhydrate d'aluminium, du tetrachlorhydrate d'aluminium - zirconium, du trichlorhydrate d'aluminium - zirconium, de l'octachlorhydrate d'aluminium - zirconium, du sesquichlorhydrate d'aluminium, du sesquichlorhydrex PG d'aluminium, du chlorhydrex PEG d'aluminium, du polychlorhydrate d'aluminium - zirconium complexé avec de la glycine, de préférence un complexe de glycine et d'octachlorhydrex d'aluminium - zirconium, un complexe de glycine et de pentachlorhydrex d'aluminium - zirconium, un complexe de glycine et de pentachlorhydrex d'aluminium - zirconium, un complexe de glycine et de tetrachlorhydrex d'aluminium - zirconium, un complexe de glycine et de trichlorhydrex d'aluminium - zirconium, un chlorhydrate PG d'aluminium, un chlorhydrate de zirconium, un dichlorhydrate d'aluminium, un dichlorhydrex PEG d'aluminium, un dichlorhydrex PG d'aluminium, un sesquichlorhydrex PG d'aluminium, un chlorure d'aluminium, un pentachlorhydrate d'aluminium-zirconium, et des mélanges de ceux-ci.

9. Composition antisudorale selon l'une quelconque des revendications précédentes, dans lequel l'agent gélifiant comprend un ester de sucre ou d'hydrate de carbone d'un acide gras carboxylique ayant de 8 à 22 atomes de carbone.

10. Composition antisudorale selon la revendication 9, dans laquelle l'ester de sucre ou d'hydrate de carbone comprend un ester d'acide gras de dextrine d'acide ayant la formule :

![Diagram](image)

dans laquelle R, individuellement, est un atome d'hydrogène ou un groupe acyle ayant de 8 à 22 atomes de carbone, à condition que au moins un groupe R par unité répétitive est un groupe acyle, et m est un nombre entier allant de 20 à 30.

11. Composition antisudorale selon la revendication 10, dans laquelle au moins deux groupes R sont un groupe acyle ayant de 8 à 22 atomes de carbone.

12. Composition antisudorale selon la revendication 10 ou 11, dans laquelle le groupe acyle ayant de 8 à 22 atomes de carbone est dérivé de l'acide caprique, de l'acide pélargonique, de l'acide undécylénique, de l'acide laurique, de l'acide myristique, de l'acide pentadécylénique, de l'acide palmitique, de l'acide heptadécylénique, de l'acide stéarique, de l'acide nonadécanoïque, de l'acide arachidique, de l'acide oléique, de l'acide linoléique, de l'acide linoléïque ou des mélanges de ceux-ci.

13. Composition antisudorale selon la revendication 10. 11 ou 12, dans laquelle l'ester d'acide gras de dextrine comprend du béhénate de dextrine, du laurate de dextrine, du myristate de dextrine, du palmitate de dextrine, du stéarate de dextrine ou des mélanges de ceux-ci.

14. Composition antisudorale selon la revendication 9, dans laquelle l'ester de sucre ou d'hydrate de carbone comprend un ester d'acide gras de saccharose ayant la structure :

![Diagram]
dans laquelle $R_1$, individuellement, est un atome d'hydrogène ou un groupe acyle ayant de 8 à 22 atomes de carbone, à condition qu'au moins un groupe $R_1$ soit un groupe acyle.

15. Composition antisudorale selon la revendication 14, dans laquelle au moins deux groupes $R_1$ sont des groupes acyles ayant de 8 à 22 atomes de carbone.

16. Composition antisudorale selon la revendication 14 ou 15, dans laquelle l'ester d'acide gras de saccharose comprend du distéarate de saccharose, du cocoate de saccharose, du dilaurate de saccharose, de l'oléate de saccharose, du palmitate de saccharose, du polylaurate de saccharose, du polyoléate de saccharose, du polyoléate de saccharose, du ricinoléate de saccharose, du stéarate de saccharose, du tribéhénate de saccharose, du tristéarate de saccharose, ou des mélanges de ceux-ci.

17. Composition antisudorale selon la revendication 14, dans laquelle l'ester de sucre ou d'hydrate de carbone est sélectionné à partir du groupe composé d'un monosaccharide, d'un disaccharide, d'un trisaccharide, d'un polysaccharide, d'une cyclodextrine et de mélanges de ceux-ci.

18. Composition antisudorale selon la revendication 15, dans laquelle l'ester de sucre ou d'hydrate de carbone est sélectionné à partir du groupe composé d'un α-cyclodextrine, d'une β-cyclodextrine, d'une δ-cyclodextrine, du glucose, du fructose, du mannose, du saccharose, du maltose, du lactose, du maltotriose, du raffinose, du méliglitose, de la cellulose, de la chitine et de mélanges de ceux-ci.

19. Composition antisudorale selon l'une quelconque des revendications 1 à 8, dans laquelle l'agent gélifiant comprend un stérol.

20. Composition antisudorale selon la revendication 19, dans laquelle le stérol comprend le dihydrolanostérol, le lanostérol, le cholestérol, le sitostérol, le campestérol, le cholécalciférol, l'hydroxystéarate de cholestéryle, le dihydrocholestérol, le stigmastérol, le β-sitostérol, l'alcool de lanoline, le stérol de soya, le stérol d'huile de suif, les composés non saponifiables d'huile d'avocat, les composés non saponifiables d'huile de colza, les composés non saponifiables d'huile d'olive, les composés non saponifiables de beurre de karité, les composés non saponifiables d'huile de soja, ou les mélanges de ceux-ci.

21. Composition antisudorale selon l'une quelconque des revendications précédentes, dans laquelle le matériau formant support comprend un composé de silicone volatile.

22. Composition antisudorale selon la revendication 21, dans laquelle le composé de silicone volatile est une silicone volatile linéaire ayant des groupes méthyles, des groupes phényles ou un mélange de ceux-ci, une viscosité de 0,5 à 5 centistokes et un point d'ébullition allant jusqu'à 300°C à la pression atmosphérique.

23. Composition antisudorale selon la revendication 21, dans laquelle le composé de silicone volatile est une silicone volatile cyclique ayant en moyenne de 3 à 6 unités de groupe répétitifs -[O - Si (CH₃)₂]- par molécule et un point d'ébullition à pression atmosphérique qui est compris dans la gamme allant de 150°C à 250°C.

24. Composition antisudorale selon la revendication 1, dans laquelle le matériau formant support comprend un composé hydrocarbure volatile.

25. Composition antisudorale selon la revendication 24, dans laquelle le composé hydrocarbure volatile a de 10 à 26 atomes de carbone et un point d'ébullition à la pression atmosphérique de 100°C à 300°C.
26. Composition antisudorale selon la revendication 24, dans laquelle le composé hydrocarbure volatile a la structure suivante :

\[
\begin{align*}
\text{CH}_3 & \quad \text{CH}_3 \\
\text{H}_3\text{C} \cdot \text{(C - CH}_2)_n \cdot \text{CH} \cdot \text{CH}_3 \\
\text{CH}_3
\end{align*}
\]

dans laquelle n est compris dans la gamme allant de 2 à 5.

27. Composition antisudorale selon la revendication 24, dans laquelle le composé hydrocarbure volatile comprend l’isohexadécène, le dimère de 1-décène, une isoparaffine en C\textsubscript{13} - C\textsubscript{14}, ou un mélange de ceux-ci.

28. Composition antisudorale selon la revendication 1, dans laquelle le matériau formant support comprend un hydrocarbure non volatile, une silicone non volatile ou un mélange de ceux-ci.

29. Composition antisudorale selon la revendication 28, dans laquelle la silicone non volatile comprend un composé polydiméthylsiloxane et l’hydrocarbure non volatile comprend de l’huile minérale.

30. Composition antisudorale selon la revendication 3, dans laquelle l’alcool gras est présent dans une quantité allant de 1 % à 15 % en poids de la composition.


32. Composition antisudorale selon la revendication 4, dans laquelle l’ester gras est présent dans une quantité allant de 3 % à 25 % en poids de la composition.

33. Composition antisudorale selon la revendication 4, dans laquelle l’ester gras est dérivé d’un acide carboxylique ayant de 1 à 12 atomes de carbone et d’un alcool ayant de 8 à 22 atomes de carbone.

34. Composition antisudorale selon la revendication 4, dans laquelle l’ester gras est dérivé d’un acide carboxylique ayant de 8 à 22 atomes de carbone et d’un alcool ayant de 1 à 22 atomes de carbone.

35. Composition antisudorale selon la revendication 4, dans laquelle l’ester gras comprend de l’acide benzoïque estérifié avec un alcool ayant de 8 à 22 atomes de carbone.


37. Composition antisudorale selon la revendication 1, dans laquelle la composition ne contient pas de matériau de remplissage particulier.
38. Composition antisudorale comprenant :

(a) de 5 % à 35 % en poids d'un halogénure d'aluminium, d'un hydroxyhalogénure d'aluminium, d'un oxyhalogénure d'aluminium, d'un hydroxyhalogénure de zirconyle, d'un glycinate d'aluminium-zirconium, ou d'un mélange de ceux-ci ;
(b) de 3 % à 12 % en poids d'un agent gélifiant sélectionné à partir du groupe constitué d'un distéarate de saccharose, d'un palmitate de dextrine, d'un dihydrolanostérol, d'un lanostérol. des composés non saponifiables d'huile d'avocat. et de mélanges de ceux-ci ; et
(c) de 15 % à 75 % en poids d'un matériau formant support sélectionné à partir du groupe constitué d'une silicone volatile, d'un hydrocarbure volatile et de mélanges de ceux-ci ;

39. Composition antisudorale selon la revendication 38, comprenant en outre de 0 % à 20 % en poids d'eau, de 0 % à 15 % en poids d'un alcool gras sélectionné à partir du groupe constitué de l'alcool béhénique et de l'alcool stéarylique, et de 2 % à 50 % en poids d'un ester gras sélectionné à partir du groupe constitué de l'isopropyle myristate, d'un benzoate d'alkyle en C₁₂ - C₁₅ et de mélanges de ceux-ci.

40. Composition antisudorale en aérosol comprenant :

(a) 1 partie en poids de la composition antisudorale sous forme de gel selon la revendication 1, et
(b) de 0,5 à 3 % en poids d'un propulseur hydrocarbure.

41. Procédé de traitement ou de prévention des mauvaises odeurs associées à la transpiration humaine comprenant le fait d'appliquer de façon topique une quantité efficace d'une composition antisudorale sur la peau humaine, ladite composition comprenant :

(a) de 1 % à 40 % en poids d'un composé antisudoral ;
(b) de 2 % à 15 % en poids d'un agent gélifiant sélectionné à partir du groupe constitué d'un ester de sucre ou d'hydrate de carbone d'un acide gras carboxylique ayant de 8 à 22 atomes de carbone, d'un stérol et d'un mélange de ceux-ci ; et
(c) de 10 à 90 % en poids d'un matériau formant support comprenant une silicone, un hydrocarbure ou un mélange de ceux-ci.

42. Procédé selon la revendication 41, dans lequel la peau humaine sur laquelle est appliquée la composition antisudorale ne laisse apparaître aucun résidu blanc pouvant être observé à l'œil.