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LIQUID ANTIPERSPIRANT COMPOSITION

Ralph Paul Messina, Hackensack, N.J., assignor to Colgate-Palmolive Company, New York, N.Y., a corporation of Delaware

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The present invention relates to an antiperspirant liquid composition which is particularly suitable for use as an antiperspirant spray comprising aluminum chlorhydrate, a surface-active agent and an organopolysiloxane in an aqueous medium, as hereinafter described and claimed.

Antiperspirant liquids which are packaged in a plastic (e.g. polyethylene) squeeze bottle or the like are known in the art. Such packaged products contain a suitable air or head space above the liquid level and are equipped with a dip tube and a small orifice whereby the material is propelled or discharged from the container in the form of a spray or mist by manual pressure upon the bottle.

It has now been discovered that a liquid antipersirant composition suitable for use as an antiperspirant spray comprising aluminum chlorhydrate, perfume, a water-soluble surface-active agent and an organopolysiloxane in an aqueous medium, as described, possesses a number of desirable properties, particularly with respect to spray characteristics. The composition is substantially in the form of a uniform and homogeneous solution in the resilient container except for the organopolysiloxane material. The presence of the organopolysiloxane in the liquid medium modifies the spray characteristics such that, upon atomization, there is ejected a controlled and substantially uniform mist or spray pattern. Various other embodiments of the present invention will be apparent in the following description.

The aluminum chlorhydrate is a known water-soluble antiperspirant ingredient and has been referred to as aluminum chlorhydroxide complex and basic aluminum chloride. In general, it has an approximate atomic ratio of aluminum to chlorine of 2:1 (e.g. 2.1 to 1.9:1) and an empirical formula of $Al_2(OH)_5Cl$ in aqueous solution. It may be employed in granular or solution form. The proportion of this antiperspirant in the final composition is variable but, in general, it should be from about 5 to about 40%, preferably 10 to 30%, by weight dissolved in the solvent medium.

The solvent medium has a water base and may contain varying amounts of a lower aliphatic water-miscible alcohol such as ethanol, isopropanol, propylene glycol or the like, if desired. It is preferred to employ a minor proportion of alcohol, e.g. about 5 to 40% by weight, in the composition to aid in fast drying of the product after application and in the solubilization of water-insoluble perfume and the like. It will be understood that the water and alcohol will be proportioned so as to dissolve the aluminum chlorhydrate and form a suitable solvent medium.

A perfume material should be employed in the product which should be solubilized in the solvent medium. The specific type of perfume is not critical and is used in very small amounts to give the desired fragrance. In general, it is preferred to employ the water-insoluble perfumes or aromatic oils and to solubilize them so as to form a substantially uniform apparent solution without formation of a precipitate by the perfumery oils. The

presence of alcohol in the products aids in the solubilization of the perfume but the presence of a suitable surface-active agent effectively solubilizes the perfume and permitting wide variation and even elimination of the alcohol as part of the solvent medium.

A water-soluble organic surface-active agent should be employed in small proportions in order to effectively solubilize the perfume oil and the like. A suitable surface-active agent may be selected since the desired effect is an observable or easily determinable phenomenon. The surface-active agent is employed in effective amounts from about 0.01 to 5%, and preferably from 0.1 to 3%, by weight of the formulation. It has been found that particularly effective materials are the water-soluble organic non-ionic polyalkylene oxide surface-active agents. Such materials generally are the water-soluble condensates of polyalkylene oxide containing from about 5 to 60 alkylene oxide groups with a hydrophobic organic group, the latter group containing at least about 5 and usually about 8 to 30 carbon atoms. It is preferred to use a polyalkylene oxide ether of higher aliphatic alcohols. Suitable fatty alcohols having a hydrophobic character, and preferably 8 to 22 carbons, are lauryl, tridecyl, myristyl, cetyl, stearyl and oleyl alcohols which may be condensed with an appropriate amount of ethylene oxide, preferably about 6 to 30 moles. A typical product is tridecyl alcohol condensed with about 10 moles of ethylene oxide.

Further suitable non-ionic materials are the polyalkylene oxide condensates of alkyl phenol such as the polyglycol ethers of alkyl phenol wherein the alkyl group has about 6 to 20 carbons and about 5 to 30 moles of ethylene oxide, specific examples of which are Igepal CO–630 and 710.

The composition comprising the aluminum chlorhydrate, perfume and surface-active solubilizing agent in an aqueous medium is in the form of a fine dispersion so as to appear as a homogeneous, single phase liquid product or solution. Upon atomization from a squeeze bottle, it has been noted that the spray pattern is non-homogeneous in character. The spray is a heterogeneous distribution of spray particles as regards droplet diameter with some air entrainment. The occurrence of varying amounts of bubbles of air enclosed in a film of the liquid is due to the unitary effect or interrelationship among the type of package (e.g. squeeze bottle) including the amount of head space, the degree of manual pressure exerted, degree of agitation of the contents, the type of orifice, and the specific liquid composition including the proportion and type of surface-active agent, and other factors.

It has been found that the incorporation of an organopolysiloxane material results in a controlled and uniform spray pattern wherein the spray is characterized by a relatively homogeneous, fine distribution of uniform droplets upon atomization of the liquid. There is no apparent formation of bubbles and the detrimental effect of a number of variables in the squeeze bottle as discussed above has been obviated by the presence of the silicone material. Furthermore, there is insured maximum exhaustion of the contents of the package also.

These organopolysiloxane materials are water-insoluble fluids with the polymer having one or two organic groups attached to each silicon atom. The silicone fluids may have any suitable viscosity, such as within the range of one to one million centistokes at 25° C. The organopolysiloxane fluids having at least one lower aliphatic group (e.g. methyl, ethyl) attached to each silicon atom are particularly suitable and it is preferred to employ the dimethylpolysiloxane fluids.

Examples of suitable silicone fluids are the dimethylpolysiloxanes having as the base the General Electric

SF–96 series and the Dow Corning 200 fluids. Examples of the General Electric SF–96 materials are the dimethylpolysiloxanes having viscosities of about 40, 100, 300, 500 and 1000 centistokes and examples of the Dow fluids are those having viscosities of about 10, 20, 50 100, 200, 350, 500 and 1000 centistokes. In order to promote the dispersibility of the silicone material in the aqueous medium, it is preferred to employ a water-dilutable emulsion or dispersion of the silicone fluid in water containing a small amount of a suitable dispersing (or emulsifying) agent. One particular material is Dow Corning "AF Emulsion" which is a dimethyl silicone fluid to which a few percent of finely divided silica and of a fatty acid ester (e.g. glyceryl monostearate) have been incorporated to form a creamy oil-in-water emulsion of about 30% silicone solids. Other effective materials are the corresponding Dow B emulsion and the GE Velvasil 100 and 500 fluids, SS–66 Antifoam Compound (with filler) and No. 60 dispersion which have as the main ingredient methyl silicone fluids having viscosities between 40 and 100,000 centistokes.

The silicone material should be used in the antiperspirant liquid in extremely small quantities of the order of up to about 1% by weight and preferably from about .0005% to 0.5% of the composition. It may be incorporated in any suitable method such as by slow addition to the liquid with agitation of the aqueous mixture so as to form a substantially homogeneous dispersion upon manufacture. Upon standing there is a slight tendency for some of the silicone material to form a small upper layer which does not adversely affect the desired spraying characteristics.

Various conventional materials may be incorporated in the product in suitable amounts. There is preferably employed a known buffering material, such as an amide compound, e.g. urea, ethyl carbamate or acetamide. Alternatively, an amino carboxy acid, such as glycine or alanine, or the like may be employed for its known effects. Minor amounts of other materials such as sorbitol, coloring material, deodorants, antiseptic, germicidal or bacteriostatic substances, may be added also if desired.

The following formulations are illustrative of the nature of the present invention and it is to be understood that the invention is not limited thereto. All percentages are by weight unless otherwise indicated.

Example I

Ingredient:	Percent
Aluminum chlorhydrate	15
Urea	2.5
Ethanol	20
Surface-active agent	1
Perfume	0.2
Dimethylpolysiloxane	0.01
Water	Balance

The perfume and the solubilizing surface-active agent which is a polyoxyethylene ether of a higher fatty alcohol having about 12 to 14 carbons condensed with about 10 moles of ethylene oxide are dissolved in the ethanol at room temperature. The aluminum chlorhydrate (Reheis Co.) in the form of an aqueous solution, the urea and the water are added with stirring to form a homogeneous liquid. The dimethylpolysiloxane fluid in the form of a 30% aqueous suspension (GE Antifoam 60) is added to the above liquid with constant stirring to form a fine dispersion. The final product is then added to a polyethylene squeeze bottle leaving about ⅓ head space and a plastic dip tube and neck seal are inserted to close the container. Upon squeezing of the plastic bottle for underarm usage, this composition produces a uniform mist or spray without bubble formation.

Example II

Ingredient:	Percent
Aluminum chlorhydrate	20
Urea	5
Ethanol	22
Igepal CO–630 or 710	1.5
Dimethyl polysiloxane (Dow AF Emulsion)	0.1
Perfume	0.2
Water	Balance

The above formulation is prepared as in Example I and results in a product having similar characteristics.

Although the present invention has been described with reference to particular embodiments and examples, it will be apparent to those skilled in the art that variations and modifications of this invention can be made and that equivalents can be substituted therefor without departing from the principles and true spirit of the invention.

Having thus described the invention, what is claimed is:

1. An antiperspirant liquid composition particularly suitable for use as an antiperspirant spray comprising aluminum chlorhydrate, perfume, a water-soluble surface-active agent and an organopolysiloxane in an aqueous medium, said organopolysiloxane being in an amount sufficient to modify the spray characteristics.

2. An antiperspirant liquid composition suitable for use as an antiperspirant spray comprising about 5 to 40% by weight of aluminum chlorhydrate, perfume, about 0.01 to about 5% by weight of a water-soluble organic surface-active agent in an aqueous medium, and up to about 1% by weight of a dimethylpolysiloxane to modify the spraying characteristics.

3. An antiperspirant liquid composition for spraying from a resilient container by squeezing the same which comprises about 5 to 40% by weight of aluminum chlorhydrate, perfume, about 0.1 to 3% by weight of a water-soluble non-ionic polyethylene oxide surface-active agent to solubilize said perfume, up to about 1% by weight of a dimethylpolysiloxane, and an aqueous lower aliphatic alcoholic medium therefor in a resilient container.

4. An antiperspirant liquid composition in accordance with claim 3 which contains about 10 to 30% by weight of aluminum chlorhydrate, perfume, about 0.1 to 3% by weight of a water-soluble polyethylene oxide surface-active agent having about 5 to 60 ethylene oxide groups, about 0.0005 to 0.5% by weight of a dimethylpolysiloxane to render the spraying characteristics uniform in an aqueous ethanol medium having about 5 to 40% by weight of ethanol.

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