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CA 2279962 C 2007/05/22

(11)(21) 2 279 962

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 1998/02/11
(87) Date publication PCT/PCT Publication Date: 1998/08/20
(45) Date de délivrance/Issue Date: 2007/05/22
(85) Entrée phase nationale/National Entry: 1999/08/10
(86) N° demande PCT/PCT Application No.: EP 1998/000812
(87) N° publication PCT/PCT Publication No.: 1998/035648
(30) Priorité/Priority: 1997/02/17 (GB9703261.9)

(51) Cl.Int./Int.Cl. *A61K 8/04* (2006.01)

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(54) Titre : COMPOSITION ANTISUDORALE ANHYDRE COMPRENANT UN PROPULSEUR AU PENTANE
(54) Title: AN ANHYDROUS ANTIPERSPIRANT COMPOSITION COMPRISING A PENTANE PROPELLANT

(57) Abrégé/Abstract:
An aerosol antiperspirant composition for topical application to the human skin, comprising an antiperspirant active and a propellant, characterized in that the propellant comprises pentane.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : A61K 7/32, 7/00 — A1

(11) International Publication Number: **WO 98/35648**

(43) International Publication Date: 20 August 1998 (20.08.98)

(21) International Application Number: PCT/EP98/00812

(22) International Filing Date: 11 February 1998 (11.02.98)

(30) Priority Data:
9703261.9 17 February 1997 (17.02.97) GB

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(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published

With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: ANTIPERSPIRANT COMPOSITION

(57) Abstract

An aerosol antiperspirant composition for topical application to the human skin, comprising an antiperspirant active and a propellant, characterized in that the propellant comprises pentane.

AN ANHYDROUS ANTIPERSPIRANT COMPOSITION COMPRISING A PENTANE PROPELLANT

The present invention relates to antiperspirant compositions. More particularly, the invention relates to aerosol compositions having improved cosmetic characteristics.

Antiperspirant and deodorant compositions can be applied to the skin by a variety of methods. Generally, such compositions comprise a carrier vehicle material in addition to an antiperspirant and/or deodorant active, the carrier and active being selected in accordance with factors such as the method of application, the intended use, the desired rheology and the desired cosmetic characteristics.

Aerosol compositions have gained wide consumer acceptance. Aerosol antiperspirant compositions generally comprise an anhydrous system comprising an antiperspirant salt dispersed in a liquid vehicle together with a liquefied volatile propellant in a pressurised aerosol container.

Consumers can be generally divided into two classes - those who favour the use of antiperspirant aerosol compositions and those who favour deodorant aerosol compositions. The presence of the antiperspirant active in antiperspirant aerosol compositions imparts different cosmetic or sensory properties to the antiperspirant aerosol compositions which are absent from alcoholic deodorant formulations.

Generally, deodorant composition contain high levels (usually 30% or over) of short-chain monohydric alcohol, which has a deodorising effect and which imparts a cold or fresh feeling to the skin.

Conversely, antiperspirant compositions are usually incompatible with high levels of alcohol and/or water, due to the tendency to form corrosive solutions, and therefore generally tend to comprise a relatively high proportion of compounds such as volatile cyclic silicones in their cosmetic vehicles, which have a low heat of evaporation compared to ethanol and water. As such, antiperspirant compositions tend to produce less of a cooling sensation on application, and generally do not impart such a fresh feeling.

Many consumers, therefore, choose deodorants over antiperspirants in order to achieve a cold or fresh feeling on application. However, deodorants unlike antiperspirants fail to prevent sweat generation and also exhibit poor malodour reduction over time.

Accordingly, consumers who select an aerosol deodorant over an antiperspirant for initial freshness fail to enjoy the additional benefits of an antiperspirant.

US 4,152,416 describes aerosol antiperspirant compositions capable of dispensing an astringent solid with low mistiness and dustiness. A polymer gum is used in the aerosol composition to reduce the mistiness and/or dustiness of the aerosol composition.

US 4,806,338 also describes the use of amino functional silicones in antiperspirant aerosol compositions in order to improve the cosmetic properties of the composition. Moreover, US 4,806,338 implies that the use of such silicones helps to prevent undesirable cooling on the skin.

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EP 343,843 of the Mennen Company also describes the use of a substantivity fluid made up of a silicone polymer dissolved in a carrier fluid to prevent clogging of aerosol valves at low delivery rates.

EP 912 156, in the name of the applicants, describes an aerosol antiperspirant composition in which polymers are incorporated in the composition for the purpose of retarding evaporation of propellant gases in the composition, and thereby causing a proportion of the propellant gas to be retained with the composition, and deposited on the skin. The evaporation of this propellant gas on the skin generates a cooling sensation, and thereby provides the composition with this sensory benefit.

In the Derwent Abstract of JP-A-06219902, there is disclosed a cooling spray agent in which pentane is a constituent, but it does not indicate that pentane exhibits cooling properties. Moreover, it does not disclose an antiperspirant.

In Chemical Abstracts vol 115, no 22 (1991) abstract no 239361, there are disclosed compositions containing a high proportion of pentane which can reduce the pressure, with adverse consequences. The abstract is also silent concerning the cooling properties of pentanes.

In Chemical Abstracts vol 104, no 10 (1986) abstract no 75105, there are disclosed compositions containing pentane and a propellant, but there is no disclosure of propellant mixtures in which the pentanes provide cooling properties.

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In Chemical Abstracts vol 115, no 12 (1991) abstract no 119859, there are disclosed compositions containing 35-855 of a solvent which can be pentane or isopentane. Such a high proportion of such a solvent can depress the vapour pressure of the composition with adverse consequences. The abstract is also silent concerning the cooling properties of pentanes.

In US-A-4695451, there are disclosed aqueous emulsions. The presence of water is a cause of corrosion in aerosols.

According to the invention there is provided an aerosol antiperspirant composition for topical application to the human skin, comprising an antiperspirant active and a propellant, characterised in that 5-25% of the propellant comprises pentane and the composition is substantially anhydrous and contains a polymer that is a silicone gum.

Compositions according to the invention typically produce a cool feeling on application.

In highly preferred aspects of the invention, the propellant composition comprises from 1-50% part pentane gas, which can be n-pentane, isopentane or cyclopentane; preferably the propellant comprises 2-40%, more preferably 5-25% pentane. Of the possible pentane species, n-pentane is preferred. Preferably the pentane level is less than 40%, since at levels above this the pentane in the dispensing container causes the vapour pressure to be depressed too much, and the

aerosol container may block due to insufficient vapour pressure in the container.

The compositions according to the invention additionally comprise a polymer that is a silicone gum, and the propellant is conveyed and deposited on the skin by a propellant-polymer mix. An advantage of compositions according to the invention is that sensory benefits can be obtained over compositions which contain only other ordinary propellants, such as isobutane, propane, butane, or mixtures thereof, also without the use of additional polymers to induce cooling.

Conveniently the additional polymer is a polydimethylsiloxane gum, preferably a dimethicone and/or dimethiconol gum.

Accordingly, the present invention provides an antiperspirant composition having the skin cooling benefits of an alcoholic deodorant composition, in a composition which is totally free, or substantially free (i.e. containing less than 1% by weight) of short chain monohydric alcohols such as ethanol or isopropanol, but is also substantially free (i.e. contains less than about 4%) of water.

Accordingly, a consumer can enjoy the sensory benefits of a traditional alcoholic aerosol deodorant composition, while enjoying the deodorant and antiperspirant efficacy of a traditional aerosol antiperspirant composition.

The antiperspirant material of the invention is preferably a particulate antiperspirant, and can be any of the known antiperspirant active materials. Particularly preferred materials are astringent metallic salts, in particular the inorganic and organic salts of aluminium, zirconium and zinc and mixtures thereof. Particularly preferred are the aluminium and zirconium salts such as aluminium halides, aluminium hydroxide halides, zirconium hydroxy halides, zirconium oxide halides and mixtures thereof. Generally, such antiperspirant salts for example comprising aluminium and/or zirconium salts are any of those well known in the art. US patent no. 4,152,416 describes various aluminium zirconium salts which are suitable for use in the present invention. Typically, the antiperspirant active is present at a level of from about 0.1% to about 20% by weight of the composition.

Generally, when they are used, the silicone gums suitable for use in the present invention are as defined in US 4,152,416 and have a viscosity ranging from about 0.5 to 100 m^2sec^{-1} (500,000 to 100,000,000 centistokes) at 25°C. Typical silicone gums are the polydimethylsiloxane polymers such as dimethiconol and dimethicone gums.

The silicone gum if used is preferably present at levels from about 0.01% to about 6% by weight, more preferably from about 0.02% to about 4% by weight of the composition.

Alternatively or in addition to the silicone gum, silicone fluids can also be used to generate an enhanced cooling effect in compositions according to the invention. Suitable fluids are the DC200 series of silicones available from Dow Corning.

The aerosol antiperspirant compositions of the present invention also preferably contain additional solvent or carrier material. Particularly preferred are volatile low viscosity silicones.

The term "volatile" also includes materials that are only slowly volatile and require a longer time to evaporate than e.g. volatile silicones.

A particularly preferred series of volatile liquid carriers are the cyclomethicone liquids. Generally, the volatile low viscosity liquids usable in the present invention have a boiling point of at least 100°C and a viscosity of less than 1×10^{-5} m^2sec^{-1} (10 centistokes) at 25°C. The volatile silicone fluids are utilised at levels of about 1% to about 30%, preferably from about 2.5% to about 14.5% by weight of the composition.

Suitable silicone gums and volatile silicone fluids are available as standard proprietary material mixes or solutions e.g. Q2-1401 available from Dow Corning. SE30, a silicone gum available from the General Electric Company can also be used.

The compositions of the invention also contain one or more volatile aerosol propellant materials which in a gaseous

state carry the other components of the invention in particulate or droplet form, in addition to pentane. Suitable propellants have a boiling point in the range of from -45°C to about 5°C and are present at levels from about 20% to 90% by weight of the composition.

For the further propellant, suitable other aerosol propellants are well known in the art and include the chemically inert hydrocarbons such as propane, n-butane, isobutane, cyclopropane, dimethyl ether and mixtures thereof.

The antiperspirant compositions of the present invention may also comprise a suspending agent to suspend the antiperspirant actives. Suitable suspending agents include colloidal silicas and hydrophobic clays such as the bentonites and hectorites. A particularly preferred bentonite is hydrophobic bentonite e.g. Bentone™, which is commercially available and is a bentonite treated with hydrophobic cationic materials. Typically the suspending agents are utilised at a level of from about 0.3% to 3% by weight of the composition.

In addition, masking agents to conceal antiperspirant active residue suitable for use in the compositions according to the present invention can be included. Suitable masking agents may be selected from aliphatic hydrocarbons (e.g. C8-C30, preferably C10-C16, more preferable C12-C15 linear or branched hydrocarbons), aliphatic esters, aromatic esters and mixtures thereof. The preferred residue masking agents for use in the compositions according to the present invention are C8-C30, preferably C10-C16, more preferably C12-C15 mono- and di-alkyl esters

of aromatic carboxylic acids inclusive of the benzoates and phthalates. Suitable masking agents include isopropyl myristate, isopropyl palmitate, polydecenes, Fluid AP, the Finsolv range of benzoate esters and mixtures thereof which can be used at ranges from 0.5% to 25% by weight of the composition.

In addition to the above mentioned ingredients customary adjuncts of aerosol antiperspirant compositions can also be included in the composition. Such adjuncts include perfumes, bactericides, fungicides, emollients and other skin treating materials.

The following are examples of compositions within the scope of the present invention. In the examples, all percentages of the specified ingredients are weight percentages.

EXAMPLE 1

Material	Chemical	Level (%wt/wt)
Antiperspirant active	Activated aluminium chlorohydrate	5.0
Volatile silicone (DC 245)	Cyclomethicone	6.3
Masking agent (Fluid AP)	PPG-14 butyl ether	2.0
Fragrance		0.7
Suspending agent (Bentone 38)	Quaternium-18 hectorite	1.0
Propellant	n-pentane	10.0
Propellant	Butane/Isobutane/Propane	75.0

EXAMPLE 2

Component	%(w/w)
Antiperspirant active (Aluminium chlorohydrate)	10.0
Volatile silicone (Cyclomethicone)	3.1
Masking agent (Finsolv TN)	5.0
Suspending agent (Bentone 38)	1.0
Fragrance	0.7
Silicone gum (Q2-1401)	0.2
Propellant (n-pentane)	10.0
Propellant (Butane/Isobutane/Propane)	70.0

EXAMPLE 3

Component	%(w/w)
Antiperspirant active (Activated aluminium chlorohydrate)	4.0
Volatile silicone (Cyclomethicone)	3.8
Suspending agent (Bentone 38)	1.0
Fragrance	1.0
Silicone gum (Q2-1401)	0.2
Propellant (n-Pentane)	20.0
Propellant (Butane/Isobutane/Propane)	70.0

Experimental

Temperature measurements were conducted during the spraying of various aerosol compositions. In particular, an instrument comprising three K-type thermocouples arranged in a vertical line was used to measure the temperatures of various sprays. The temperature profile of different compositions of sprays was measured when sprayed at the thermocouple array for a period of 2 seconds, from a distance of 10 cm.

The compositions of Examples 2 and 3 above were sprayed, as were a nominal alcoholic deodorant composition (comprising

50% propane propellant, 0.5% perfume and 49.5% ethanol), and a formulation generally similar to Example 3 above (i.e. containing 20% pentane), but not containing any Q2-1401 silicone gum.

It was generally found that the compositions containing n-pentane had superior cooling properties to those of the alcoholic deodorant in terms of producing a larger initial temperature drop, i.e. larger degree of cooling.

In addition, both the alcoholic deodorant composition and a composition similar to Example 2 containing 10% pentane and silicone gum were tested on a trained panel to assess the sensory properties for each product. For the two formulations, it was found that both formulations achieved similar ratings for the cold feeling on application, degree of stinging, stickiness and freshness feeling. The composition containing pentane scored higher than the alcohol formulation in terms of the dry feeling it produced.

These results demonstrate that in most assessment criteria, in particular those related to "freshness" on application, compositions according to the invention exhibited similar levels of freshness to a conventional alcoholic deodorant, which in turn would be a higher level of freshness than a conventional antiperspirant aerosol composition. In at least one criterion, the antiperspirant aerosol according to the invention actually surpasses the performance of the alcoholic deodorant composition.

Accordingly, the compositions of the invention have the desirable sensory attributes of a an alcoholic deodorant (i.e. cooling and freshness). In addition, a composition

such as Example 1 benefits over an alcoholic deodorant by conferring antiperspirancy (greater than 30% sweat reduction) and significantly greater protection from malodour.

CLAIMS

1. An aerosol antiperspirant composition for topical application to the human skin, comprising an antiperspirant active and a propellant, characterised in that 5-25% of the propellant comprises pentane and the composition is substantially anhydrous and contains a polymer that is a silicone gum.

2. An aerosol antiperspirant composition according to according to claim 1, characterised in that it is substantially free of short chain monohydric alcohol.