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(54) Title: DEODORANT CONTAINING MAGNESIUM SALTS

(57) **Abstract:** A stable deodorant anhydrous stick is provided. The stick comprises a magnesium salt, calcium hydroxide, a wax, an oil, a surfactant, a filler and a silicon. The stick is free of an aluminum salt. Also provided is a method of treating body odor with the stable deodorant anhydrous stick.



DEODORANT CONTAINING MAGNESIUM SALTS

FIELD OF THE INVENTION

The invention relates to stable deodorant anhydrous sticks comprising a magnesium salt and uses thereof.

BACKGROUND OF THE INVENTION

Body odor is caused by degradation of sweat by bacteria. Currently, body odor can be treated using aluminum salts, which act on the odor as an active bactericide and in sweat reduction as an antiperspirant. Fighting odor is critical for the Body Hygiene métier. Other antiodor actives are also available in the market, like zinc gluconate, and technologies like glycolic sticks, however, they do not reach the level of efficacy of aluminum salts.

Deodorant products are available in the form of solid compositions such as anhydrous sticks for topical application to skin, for example, of an armpit. Due to the absence of water, anhydrous deodorant sticks often present an unpleasant feeling of powdery and rough and/or fail to provide a feeling of freshness.

Even though there is no approved scientific evidence that aluminum salts are harmful to health, they have a reputation of “nasties”. Other effective deodorant active substances have been explored. Magnesium salts such as magnesium oxide and magnesium hydroxide have been shown to have the same level of antiodor efficacy as aluminum salts in aerosols. Magnesium oxide and magnesium hydroxide are however very difficult to stabilize, especially in deodorant anhydrous sticks without the drawbacks commonly associated with deodorant anhydrous sticks.

There remains a need for stable, well dispersed, hard and integrate deodorant anhydrous sticks comprising a magnesium salt instead of, for example, an aluminum salt.

SUMMARY OF THE INVENTION

The present invention relates to stable deodorant anhydrous sticks comprising a magnesium salt and uses thereof. The inventors have unexpectedly discovered that the stable deodorant anhydrous sticks have a good sensorial profile, improved stability, great dispersion, optimal hardness, excellent payload, and a statistically superior antiodor efficacy.

A stable deodorant anhydrous stick is provided. The stick comprises about 0.5-20 wt%, 0.5-10 wt% or 2-10 wt% of a magnesium salt selected from the group consisting of magnesium oxide, magnesium hydroxide and a combination

thereof, about 0.4-0.6 wt% of calcium hydroxide, about 13-16 wt% of a wax selected from the group consisting of polyethylene, ozokerite and a combination thereof, about 36-40 wt% of an oil selected from the group consisting of isopropyl palmitate, PPG-14 butyl ether and a combination thereof, about 5-8 wt% of a surfactant, a filler and a silicon. The stick is free of an aluminum salt.

The stick may comprise about 0.5-20 wt%, 0.5-10 wt%, 2-10 wt% or 2-3 wt% of magnesium oxide, about 0.5-20 wt%, 0.5-10 wt%, 2-10 wt% or 10 wt% of magnesium hydroxide, or a combination thereof.

The wax may be a combination of polyethylene and ozokerite. The stick may comprise about 11-13 wt% of polyethylene, about 2-3 wt% of ozokerite or a combination thereof.

The oil may be a combination of isopropyl palmitate and PPG-14 butyl ether. The stick may comprise about 30-33 wt% of isopropyl palmitate, about 6-7 wt% of PPG-14 butyl ether, or a combination thereof.

The stick may be free of a fragrance, a clay, or a combination thereof.

A method of treating body odor on skin is also provided. The method comprises applying to the skin the stable deodorant stick in an amount effective for providing an antiodor effect to the skin.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides stable deodorant anhydrous sticks comprising a magnesium salt and their preparation and uses. Magnesium salts such as magnesium oxide and magnesium hydroxide are in a powder form. Incorporation of a magnesium salt such as magnesium oxide and magnesium hydroxide into deodorant anhydrous stick formulations brought some challenges regarding dispersion of the magnesium salt, the hardness of the sticks, the amount of the product applied and the stability of the formulations. Surprisingly, the inventors have discovered that addition of calcium hydroxide to the anhydrous sticks comprising a magnesium salt improves the characteristics of the sticks, resulting in a good sensorial profile, improved stability, great dispersion, optimal hardness, excellent payload, and a statistically superior antiodor efficacy. When calcium hydroxide is removed from the sticks, the sticks become soapy and release too much of the product from the sticks when applied.

Unless stated otherwise, a wt% figure for an ingredient of a composition is relative to the total weight of the composition.

The term "antiperspirant" used herein refers to a cosmetic composition comprising ingredients that control perspiration and therefore body odor. An antiperspirant can prevent sweat from reaching the skin surface and reduce bacteria that cause body odor. An antiperspirant is applied to skin, for example, of an armpit, to
5 reduce or prevent sweat formation on the skin. An antiperspirant may be in the form of a stick, aerosol (or spray), roll-on, wipe or cream.

The term "deodorant" used herein refers to a cosmetic composition comprising ingredients that control body odor caused by degradation of sweat by bacteria, but not perspiration. A deodorant can inhibit growth of the bacteria or kill the
10 bacteria and thereby reduce or prevent the body odor. Among various deodorant active ingredients, aluminum salts are commonly used and most effective bactericides. A deodorant may be in the form of a stick, aerosol (or spray), roll-on, wipe or cream.

The terms "antiodor efficacy" and "efficacy of a deodorant" are used herein interchangeably and refer to the effectiveness of a deodorant in controlling body
15 odor caused by degradation of sweat by bacteria.

The term "stable" used herein refers to a physical or chemical property of a cosmetic composition such as a deodorant anhydrous stick that does not change significantly over time. For example, no significant amount of precipitation, color change or exudation of an oil (e.g., less than about 10, 5, 1, 0.5 or 0.1 wt%) is observed
20 in a deodorant anhydrous stick during a predetermined time period, for example, within about 1, 3, 6, 12, 18 or 24 months.

The term "anhydrous" used herein refers to a composition containing no or very little (e.g., less than about 3, 2, 1 or 0.5 wt%) water, which corresponds to residue water provided by mixed ingredients in the composition, not water added
25 during preparation of the composition.

A stable deodorant anhydrous stick is provided. The stick comprises a magnesium salt, calcium hydroxide, a wax, an oil, a surfactant, a filler and a silicon. The stick is free of an aluminum salt.

The stick may comprise about 0.5-20 wt%, 0.5-10 wt% or 2-10 wt% of
30 the magnesium salt. The magnesium salt may be selected from the group consisting of magnesium oxide, magnesium hydroxide and a combination thereof. The magnesium salt may be magnesium oxide. The stick may comprise about 0.5-20 wt%, 0.5-10 wt% or 2-3 wt% of magnesium oxide. The magnesium salt may be magnesium

hydroxide. The stick may comprise about 0.5-20 wt%, 0.5-10 wt% or 10 wt% of magnesium hydroxide.

The stick may comprise about 0.4-0.6 wt% of calcium hydroxide.

The wax may be any cosmetically acceptable polymer suitable as a structuring agent responsible for harness of the stick. The wax may be chosen from animal, fossil, plant, mineral and synthetic waxes. For example, the wax may be chosen from vegetable waxes, fatty alcohols, paraffin waxes, or combinations thereof. The wax may be selected from the group consisting of polyethylene, ozokerite, and a combination thereof. The stick may comprise about 13-16 wt% of the wax. The wax may be polyethylene, ozokerite or a combination thereof. The stick may comprise about 11-13 wt% of polyethylene, about 2-3 wt% of ozokerite, or a combination thereof.

The oil may be any cosmetically acceptable fatty substance suitable for providing emolience to the stick and effective for keeping the same or similar deposit quantity of the stick when applied despite of the hardness of the stick. The oil may be liquid at room temperature (25°C) and atmospheric pressure (760 mmHg, i.e., 105 Pa). The oil may be mineral oil, animal oil, plant oil, synthetic oil or a combination thereof. The oil may be chosen from silicones like D5, dimethine, vegetable oils, petroleum based oils like petrolatum, esthers, or combinations thereof. The oil may be selected from the group consisting of isopropyl palmitate, PPG-14 butyl ether, and a combination thereof. The stick may comprise 36-40 wt% of the oil. The oil may be isopropyl palmitate, PPG-14 butyl ether or a combination thereof. The stick may comprise about 30-33 wt% of isopropyl palmitate, about 6-7 wt% of PPG-14 butyl ether, or a combination thereof.

The surfactant may be any cosmetically acceptable compound suitable for lowering the surface tension (or interfacial tension) between two liquids, between a gas and a liquid, or between a liquid and a solid. Surfactants may act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants. The stick may comprise about 5-8 wt% of the surfactant. The surfactant may be PEG-8 distearate.

The filler may be any cosmetically acceptable compound suitable for increasing bulk, weight, viscosity, opacity, or strength of the stick. The filler may be solid at room temperature (25°C) and atmospheric pressure (760 mmHg, i.e., 105 Pa). The stick may comprise about 0.1-0.3 wt% of the filler. The filler may be chosen from mineral powders like talc, kaolin and silicas, and clays like hectorite and bentonite. The

filler may be perlite. The stick may comprise about 30-40 wt% of the silicon. The silicon may be dimethicone.

The stick may be free of a fragrance. The presence of a fragrance may cause a color change in the stick.

5 The stick of the present invention may be free of a clay.

For each stable deodorant anhydrous stick of the present invention, a method of preparing the stick without precipitation is provided. The stick comprises a magnesium salt, calcium hydroxide, a wax, an oil, a surfactant, a filler and a silicon. The stick is free of an aluminum salt. The magnesium salt is selected from the group
10 consisting of magnesium oxide, magnesium hydroxide and a combination thereof. The preparation method comprises mixing the wax, the oil and the surfactant to form a first oil phase, adding the calcium hydroxide to the first oil phase to form a second oil phase, adding and dispersing the magnesium salt in the second oil phase to form a deodorant anhydrous composition, and using the deodorant anhydrous composition to make a
15 stable deodorant anhydrous stick. No precipitation, for example, of the magnesium salt, is formed during the preparation.

A method of treating body odor on skin is further provided. The treatment method comprises applying to the skin the stable deodorant anhydrous stick of the present invention in an amount effective for providing an antiodor effect to the skin.

20 The antiodor effect may last for at least about 8, 16, 24, 48 or 72 hours.

Example 1. Preparation of deodorant anhydrous sticks

Deodorant anhydrous sticks free of an aluminum salt were prepared. Polyethylene, ozokerite, isopropyl palmitate, PPG-14 butyl ether, PEG-8 distearate and dimethicone were mixed at a temperature of 85°C for 15 minutes with an agitation
25 of 500 rpm. Calcium hydroxide was added and dispersed for 5 minutes. Perlite was then added. Lastly, a magnesium salt, magnesium oxide or magnesium hydroxide, was added and dispersed for 10 minutes at an agitation of 600-800 rpm to prevent formation of granules or precipitates of the magnesium salt before being poured to make deodorant anhydrous sticks A-E. Table 1 shows the concentration (wt%) of each
30 ingredient in deodorant anhydrous sticks A-E.

Table 1. Deodorant anhydrous sticks

Cosmetic type	Ingredients	A	B	C	D	E
Active Compound	Magnesium Oxide	3	0	2	10	3

Cosmetic type	Ingredients	A	B	C	D	E
Active Compound	Magnesium Hydroxyide	0	10	0	0	0
Active Compound	Calcium Hydroxide	0.5	0.5	0.5	0.5	0
Wax	Polyethylene	12	12	12	12	12
Wax	Ozokerite	2.75	2.75	2.75	2.75	2.75
Oil	Isopropyl Palmitate	31.7	31.7	31.7	31.7	31.7
Oil	PPG-14 Butyl Ether	6.2	6.2	6.2	6.2	6.2
Filler	Perlite	0.2	0.2	0.2	0.2	0.2
Surfactant	PEG-8 Distearate	6.5	6.5	6.5	6.5	6.5
Silicon	Dimethicone	37.15	30.15	38.15	30.15	37.65

Example 2. Characteristics of deodorant anhydrous sticks

Compared with deodorant glycolic sticks with an aluminum salt as a benchmark, deodorant anhydrous sticks A, B, C and D, not deodorant anhydrous stick E, as prepared in Example 1, showed a good sensorial profile, improved stability, dispersion, optimal hardness, payload, and/or an equivalent or superior antiodor efficacy as compared with a benchmark.

Deodorant anhydrous stick E became soapy and released a lot of the product during application, indicating that calcium hydroxide plays an important role in a deodorant anhydrous stick.

A deodorant stick comprising a high concentration of magnesium oxide or magnesium hydroxide is very hard. The deodorant anhydrous sticks were tested in a payload test to determine if the hardness of a deodorant anhydrous stick had any impact on its performance when applied. In the payload test, a product such as a deodorant anhydrous stick was applied onto a piece of paper, and then the amount of the applied product on the paper was weighed. The quantity of the applied product did not correlate to the hardness of the product. Thus, the hardness of the deodorant anhydrous sticks did not have any impact on the performance of the deodorant anhydrous sticks.

In antiodor tests, deodorant anhydrous stick D showed statistically superior efficacy while deodorant anhydrous sticks A, B and C showed the same antiodor efficacy as the benchmark.

Deodorant anhydrous sticks A, B, C and D were stable and no precipitation was observed for two (2) months at 45°C, which is equivalent to two (2) years of shelf life.

5 The term “about” as used herein when referring to a measurable value such as an amount, a percentage, and the like, is meant to encompass variations of $\pm 20\%$ or $\pm 10\%$, more preferably $\pm 5\%$, even more preferably $\pm 1\%$, and still more preferably $\pm 0.1\%$ from the specified value, as such variations are appropriate.

10 Although the invention is illustrated and described herein with reference to specific embodiments, the invention is not intended to be limited to the details shown. Rather, various modifications may be made in the details within the scope and range of equivalents of the claims without departing from the invention.

SET OF CLAIMS

1. A stable deodorant anhydrous stick, comprising:
 - (a) 0.5-20 wt% of a magnesium salt selected from the group consisting of magnesium oxide, magnesium hydroxide and a combination thereof;
 - 5 (b) 0.4-0.6 wt% of calcium hydroxide;
 - (c) 13-16 wt% of a wax selected from the group consisting of polyethylene, ozokerite, and a combination thereof;
 - (d) 36-40 wt% of an oil selected from the group consisting of isopropyl palmitate, PPG-14 butyl ether, and a combination thereof;
 - 10 (e) 5-8 wt% of a surfactant;
 - (f) a filler; and
 - (g) a silicon;wherein the stick is free of an aluminum salt.
2. The stick of claim 1, comprising 2-3 wt% of the magnesium oxide.
- 15 3. The stick of claim 1, comprising 10 wt% of the magnesium hydroxide.
4. The stick of any one of claims 1-3, wherein the wax is a combination of polyethylene and ozokerite.
5. The stick of claim 4, comprising 11-13 wt% of the polyethylene.
- 20 6. The stick of claim 4, comprising 2-3 wt% of the ozokerite.
7. The stick of any one of claims 1-6, wherein the oil is a combination of isopropyl palmitate and PPG-14 butyl ether.
8. The stick of claim 7, comprising 30-33 wt% of the isopropyl palmitate.
- 25 9. The stick of claim 7, comprising 6-7 wt% of the PPG-14 butyl ether.
10. The stick of any one of claims 1-9, wherein the stick is free of a fragrance.
11. The stick of any one of claims 1-10, wherein the stick is free of a clay.
- 30 12. A method of treating body odor on skin, comprising applying to the skin the stable deodorant stick of any one of claims 1-11 in an amount effective for providing an antiodor effect to the skin.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER INV. A61Q15/00 A61K8/02 A61K8/19 A61K8/37 A61K8/33 A61K8/58 A61K8/81 A61K8/92 A61K8/31 ADD.		
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B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A61Q A61K		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, CHEM ABS Data, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2003/049219 A1 (LEMOINE CYRIL [FR] ET AL) 13 March 2003 (2003-03-13) paragraph [0055]; example 2 -----	1-12
Y	DATABASE GNPD [Online] MINTEL; 30 June 2016 (2016-06-30), anonymous: "Tea Tree Natural Deodorant Stick", XP055534357, retrieved from www.gnpd.com Database accession no. 4107643 abstract -----	1-12
<input style="width: 20px; height: 20px; margin-right: 5px;" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" style="width: 20px; height: 20px; margin-right: 5px;" type="checkbox"/> See patent family annex.		
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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