



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>A61K 7/32</b></p>	<p><b>A2</b></p>	<p>(11) International Publication Number: <b>WO 98/24404</b></p> <p>(43) International Publication Date: 11 June 1998 (11.06.98)</p>
<p>(21) International Application Number: PCT/EP97/06675</p> <p>(22) International Filing Date: 21 November 1997 (21.11.97)</p> <p>(30) Priority Data: 9625070.9 2 December 1996 (02.12.96) GB</p> <p>(71) Applicant (for AU BB CA GB GH IE IL KE LC LK LS MN MW NZ SD SG SL SZ TT UG ZW only): UNILEVER PLC [GB/GB]; Unilever House, Blackfriars, London EC4P 4BQ (GB).</p> <p>(71) Applicant (for all designated States except AU BB CA GB GH IE IL KE LC LK LS MN MW NZ SD SG SL SZ TT UG ZW): UNILEVER N.V. [NL/NL]; Weena 455, NL--3013 AL Rotterdam (NL).</p> <p>(72) Inventors: HALL, Lynne; 2 Strother Close, The Balk, Pocklington, Yorkshire YO4 2GR (GB). HOUGH, Gordon, Charles; 12 Grove Avenue, Vicars Cross, Chester, Cheshire CH3 5HL (GB).</p> <p>(74) Agent: ROTS, Maria, Johanna, Francisca; Unilever plc, Patent Division, Colworth House, Sharnbrook, Bedford MK44 1LQ (GB).</p>		<p>(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, 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, 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).</p> <p><b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i></p>
<p>(54) Title: ANTIPERSPIRANT COMPOSITION IN STICK FORM</p>		
<p>(57) Abstract</p> <p>An emulsion antiperspirant composition suitable for topical application to the human skin in a stick form, comprising an antiperspirant active material, water, a hydrophobic phase, and an emulsifier, characterised in that it additionally comprises at least 10 % by weight of the composition of ethanol.</p>		

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## ANTIPERSPIRANT COMPOSITION IN STICK FORM

This invention relates to cosmetic compositions in stick form. In particular, it relates to compositions for application to the human skin which are in stick form, are emulsions, and contain an antiperspirant active. Such stick compositions may typically be used in conjunction with a stick holder.

Antiperspirant compositions for use on the human skin are well known. Antiperspirant actives tend to be predominantly (although not exclusively) metal salts, for example aluminium or zirconium salts such as aluminium chloride, aluminium chlorohydrate, activated aluminium chlorohydrate and zirconium hydroxychloride, to name but a few, which are intended to reduce or prevent perspiration at the skin surface, in particular on the underarm.

An important feature of topical antiperspirant compositions from a user's perspective is that they are sensorially pleasing when applied to the human skin. In particular, it has been found that a significant proportion of users appreciate a so-called "cooling" feeling when the antiperspirant composition is applied. However, such a "cooling" sensation tends to be found primarily only in deodorant compositions, which do not comprise an antiperspirant active material.

We have found that it is possible to provide a stable emulsion cosmetic composition in stick form, which can typically be an antiperspirant stick composition, which comprises a relatively high level of ethanol. In combination with water in the composition, the ethanol

provides a remarkably good cooling effect when the composition is applied. The stability of the composition is aided by being in emulsion form, since the simple addition of ethanol to an ordinary suspension antiperspirant stick composition can cause it to soften undesirably.

In US-A-4,673,570 (Carter Wallace), there are described uniform, clear gel antiperspirant compositions, which are free of waxes and conventional gelling agent. These typically comprise in combination a volatile silicone fluid, silicone emulsifier, a destabilizing auxiliary emulsifier, water, a non-volatile emollient, a coupling agent, an activated antiperspirant component and ancillary agents. Exemplified compositions contain ethanol, but at an upper limit of 4% by weight of the composition.

Thus, according to the first aspect of the invention, there is provided an emulsion antiperspirant composition suitable for topical application to the human skin in a stick form, comprising an antiperspirant active material, water, a hydrophobic phase, an emulsifier and ethanol, characterised in that it comprises at least 10% by weight of the composition of ethanol.

Preferably, the composition comprises between 10 and 25% ethanol. Preferably the composition comprises from 12% to 18% ethanol. If the composition contains less than about 10% ethanol, insufficient cooling benefit is obtained, whereas if the composition contains more than about 25% ethanol, there is a tendency for the composition to be too soft.

With regard to the emulsifier, preferably this is present in the composition at a level of from 0.1 to 10%, more preferably from 0.1 to 5% and most preferably from 0.2 to 1%, though the exact amount may vary according to the other components in the composition. The emulsifier may be any suitable emulsifier, although it is preferred that it is a water-in-oil emulsifier, and has an HLB value of less than 8, preferably in the region 5-6. The emulsifiers included in the composition may comprise a surfactant, such as sorbitan fatty esters, polyoxyethylene sorbitol derivatives, polyoxyethylene lanolin derivatives, polyoxyethylene fatty esters, polyoxyethylene propylene glycol stearate, polyoxyethylene stearates, polyoxyethylene sorbitan fatty esters, and the like. Specific suitable emulsifiers include lauryl dimethicone copolyol. Particularly preferred emulsifiers include cetyl dimethicone copolyol and PEG 7 hydrogenated castor oil (e.g. Arlacel 989, ex Imperial Chemical Industries) and mixtures thereof.

The composition according to the invention also comprises a hydrophobic phase, which typically comprises a structurant, which may be present at a level of 2 to 30% by weight, more preferably 10 to 25% by weight of the composition. In this context a "structurant" is a material which is effective at physically and/or chemically altering the composition to provide a stick which is stable at ambient conditions. Suitable structurants include long chain (e.g. C<sub>16</sub> to C<sub>28</sub>) fatty acids, gellants such as fatty acid soaps and dibenzylidene alditol acetals, synthetic and natural waxes, and other known structurants.

Suitable waxes include high melting point waxes, for example those having a melting point in the region of 75-

130°C, and include for example silicone waxes, beeswax, carnauba, baysberry, canelilla, montan, ozokerite, ceresin, and hydrogenated castor oil (castor wax). Suitable synthetic waxes include Fischer-Tropsch waxes and  
5 microcrystalline waxes. Examples of suitable waxes may be found in CA-A-2,152,754 (The Mennen Company). Combinations of waxes or structurants may also be used to provide a stick with the required hardness. A particularly preferred combination is stearyl alcohol with hydrogenated castor oil.  
10 A most preferred combination is paraffin wax with hydrogenated castor oil.

The composition according to the invention may also comprise as part of the hydrophobic phase other materials  
15 which are typically found in such hydrophobic phases, such as one or more oils.

The antiperspirant active in the composition may be any known antiperspirant active provided it is emulsifiable in  
20 the system, but may particularly comprise a metal salt, based on aluminium and/or zirconium. The antiperspirant active material will typically be present in the composition at a level of 10% by weight or more, in order to provide antiperspirant benefit. Typically, the composition will  
25 contain no more than 25% by weight of the antiperspirant active. For further guidance regarding antiperspirant metal salts, a non-limiting list of antiperspirant metal salts is provided by the FDA in "Antiperspirant drug products for over the counter human use, a tentative final monograph",  
30 Federal Register 47:36592 (1982).

The composition also comprises water, which may be typically be present in the composition at a level of from 5 to 60%, preferably from 10 to 35% by weight, more preferably from 15 to 25% by weight.

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The cosmetic composition so formed is an emulsion product with sufficient rigidity to form a stick of sensorially satisfactory hardness, which can readily be applied from a suitable container, such as a stick barrel.

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In a preferred aspect of the invention, the composition additionally comprises a masking oil, which can typically be present at a level of 3-40% by weight of the composition. Suitable masking oils include for example polydecene, polybutene, PPG-14 butylether, non-volatile silicones, isopropyl myristate, isopropyl palmitate, C<sub>12</sub>-C<sub>15</sub> alkyl benzoates, and mineral oils.

15

The antiperspirant composition according to the invention may comprise other ingredients, depending on the properties required in the finished product.

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Examples of other ingredients which can optionally be present in a composition according to the invention include:

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- cosmetically acceptable vehicles other than ethanol such as straight and branch chain lower alcohols, for example isopropanol, or isobutanol;

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- other volatile and non-volatile silicones, such as dimethyl cyclosiloxanes, such as Dow Corning fluids DC 344 and DC 345, or polydimethylsiloxane, having a viscosity in excess of 5 mm<sup>2</sup>s<sup>-1</sup>, for example from 50 to 100 mm<sup>2</sup>s<sup>-1</sup>, such as Dow Corning 200 Fluids (standard viscosities 50-1000 mm<sup>2</sup>s<sup>-1</sup>);

- deodorants, including deodorising levels of other metal salts, deoperfumes, and deodorant compounds which can also act as antimicrobial agents, such as unsaturated fatty acids, or other antimicrobial agents, e.g. Irgasan DP300, ex  
5 Ciba Geigy;

- hydrophobic oils, such as liquid paraffin oils;

- skin feel improvers, such as talc and finely divided polyethylene, an example of which is Acumist B18;

- humectants, such as polyols, for example glycerol;

10 - emollients;

- sunscreens;

- perfumes;

- preservatives and antioxidants;

- skin benefit agents, such as allantoin;

15 - colours;

- further skin cooling agents, such as menthol and menthol derivatives;

- other cosmetic adjuncts conventionally employed in stick, antiperspirant products.

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The invention will now be further described by way of example.

#### Example 1

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The following composition represents a suitable composition according to the invention.

	<u>Material</u>	% W/W
	Cetyl dimethicone copolyol (1)	0.4
	Stearyl alcohol (2)	16.0
	Hydrogenated castor oil (3)	4.0
5	Volatile cyclomethicone (4)	4.6
	Polydecene (5)	20.0
	Ethanol	12.0
	Alkyl dimethicone wax (6)	2.0
	50% aqueous aluminium chlorohydrate	40.0
10	Perfume oil	1.0

(1) Abil EM 90, ex TH Goldschmidt

(2) Lorol C18 DEO, ex Henkel

(3) Castor Wax MP80, ex Caschem

15 (4) DC345, ex. Dow Corning

(5) Silkflo 364NF, ex. Albemarle

(6) SF1642, ex. General Electric

20 Example 2

	<u>Material</u>	% W/W
	Cetyl dimethicone copolyol (1)	0.5
	Stearyl alcohol (2)	14.0
25	Hydrogenated castor oil (3)	6.0
	Volatile cyclomethicone (4)	7.0
	Polydecene (5)	17.0
	Ethanol	15.0
	50% aqueous aluminium chlorohydrate	40.0
30	Perfume oil	0.5

Compositions according to the invention can typically be prepared by melting together all components of the

composition except the aqueous active and the perfume oil,  
typically at a temperature of 75°C and under reflux to retain  
volatile components. The composition is then subjected to  
high shear, and the aqueous antiperspirant active is slowly  
5 added. The composition is sheared at a suitable speed and  
for adequate time to provide a stable emulsion. The  
composition is then cooled and the perfume oil added, and  
then cooled further to an appropriate pouring temperature,  
and poured into stick barrels

10

### Example 3

The object of this example is to measure the cooling  
obtained for compositions according to the invention to  
15 those containing lower or no levels of ethanol/water.

## Composition:

Cetyl dimethicone copolyol (1)	0.2	0.2	0.5	-	-
Ethanol	15.0	10.0	-	15.0	10.0
Hydrogenated Castor oil (3)	5.0	5.0	5.0	5.0	5.0
Stearyl alcohol (2)	20.0	20.0	20.0	15.0	15.0
Volatile Silicone (4)	0.8	5.8	15.5	5.0	10.0
Polydecene (5)	20.0	25.0	25.0	30.0	30.0
Talc	4.0	4.0	4.0	4.0	4.0
40% Al/Zr antiperspirant active in water (7)	35.0	30.0	30.0	-	-
Al chlorohydrate powder (8)	-	-	-	25.0	25.0
PEG-8-distearate (9)	-	-	-	1.0	1.0
Experiment Code	1	2	3	4	5

5 (7) - Rezal 67 solution (60% water), ex. Reheis

(8) - Microdry ACH, ex Reheis

(9) - Estol EO4DS3724, ex. Unichema

## Method:

Three products were applied during each experiment to the inside of the forearm of one panellist, each to an area approximately 5 cm x 5 cm. The weight of product applied was not measured but each application was approximately the same. Thermal imaging (Agema equipment), was conducted of the whole of the inside forearm at once. The products were applied 10 seconds after imaging was started. Images were taken every 30 seconds for 5 minutes. The experiment was repeated so that all prototypes and products were imaged.

## Results:

Time Seconds	Skin temperature/°C						
	1	2	3	4	5	A	B
Base line 0	33.6	33.6	33.6	34.5	35.0	34.3	34.8
30	31.4	32.0	32.5	33.3	34.6	32.5	34.4
60	31.3	32.8	33.2	33.9	34.7	32.7	34.4
90	31.6	33.1	33.2	33.8	34.7	33.0	34.6
120	31.8	33.0	33.2	34.1	34.8	33.3	34.4
150	31.9	32.9	33.3	34.6	34.7	33.6	34.5
180	32.1	32.9	33.4	34.4	34.8	33.7	34.5
210	32.6	33.2	33.4	34.2	34.6	34.1	34.7
240	32.7	33.2	33.4	34.2	34.9	34.3	34.7
270	32.7	33.0	33.5	34.2	34.8	34.2	34.7
300	32.7	33.0	33.5	34.2	34.8	34.2	34.7

A - Commercially available water-containing deodorant stick containing 50% ethanol.

B - Commercially available anhydrous antiperspirant stick containing no ethanol.

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The results show that a superior degree of cooling when the composition contains a relatively high amount of ethanol and water as in samples 1 and 2 (ie. equal or superior to a commercially available deodorant product), but that inferior cooling was obtained when the composition contained ethanol but no water (see samples 4 and 5). In addition, the emulsion system can be seen to prolong the cooling effect. Sample 3, which had no ethanol, showed a cooling effect comparable with the commercially available anhydrous antiperspirant stick containing no ethanol. These effects were broadly confirmed on tests conducted on sensory panels where the panels were asked to evaluate their perceptions of cooling on application and after a set period (2 minutes).

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Example 4

This example further demonstrates the cooling effect of emulsion sticks, compared to homogenous antiperspirant sticks containing ethanol.

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Cetyl dimethicone copolyol (1)	0.5	0.5	0.5
Ethanol	15.0	15.0	15.0
Stearyl alcohol (2)	20.0	20.0	16.0
Volatile silicone (4)	8.5	7.8	5.0
Polydecene (5)	20.0	20.0	20.0
50% solution Al active (10)	35.0	35.0	35.0
Fragrance	1.0	1.0	-
Menthol	-	0.7	-
C <sub>18</sub> -C <sub>36</sub> acid glycol ester (11)	-	-	4.0
Alkyl dimethicone wax (6)	-	-	1.0
Water	-	-	3.5
Composition	6	7	8

(10) - Chlorhydrol, ex. Reheis

(11) - Syncrowax ERLC, ex Croda

These compositions were tested under a similar thermal imaging test to that described in Example 3, again with two compositions C and D, which are anhydrous antiperspirant suspension sticks containing aluminium chlorohydrate and 15% and 20% ethanol respectively, and a commercially available deodorant stick containing ethanol-(E).

Results:

Time Seconds	Skin Temperature (°C)					
	6	7	9	C	D	E
0	33.7	33.9	34.1	33.9	34.1	34.0
30	32.0	32.3	32.5	32.9	33.1	32.4
60	32.3	32.5	32.4	33.1	33.4	32.9
90	32.5	32.6	32.6	33.2	33.5	33.2
120	32.7	32.7	32.9	33.3	33.6	33.5
150	32.9	32.8	33.2	33.3	33.7	33.7
180	33.0	32.9	33.4	33.4	33.7	33.8
210	33.1	33.0	33.7	33.4	33.8	33.9

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The results show that a superior cooling benefit is obtained by the emulsion stick.

#### Example 5

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The following samples according to the invention were subjected to a sensory panel. The sticks were assessed for cooling, immediately after application and 2 minutes later.

The comparative example was a typical alcoholic deodorant stick product. The scoring used by the panellists ranges from 100 to 0. Zero being maximum coolness.

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Ingredients	10 %w/w	11 %w/w	12 %w/w	13 %w/w	14 %w/w
Cetyl dimethicone copolyol (1)	0.5	0.5	0.5	0.5	0.5
Refined paraffin wax (12)	14.0	15.5	15.5	16.0	14.0
Hydrogenated castor oil (3)	6.0	6.0	4.0	4.0	6.0
Volatile cyclomethicone (4)	14.0	14.0	7.5	7.0	24.0
Polydecene (5)	10.0	10.0	17.0	10.0	-
Ethanol	15.0	15.0	15.0	22.0	15.0
50% aq. aluminium chlorohydrate (10)	40.0	-	40.0	40.0	40.0
40% aq. Zr/Al chlorohydrate (7)	-	40.0	-	-	-
Perfume Oil	0.5	0.5	0.5	0.5	0.5

(12) - Paraffin was SP173, ex strahl & Pitsch.

### Results

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	Alcoholic	10	11
Cool - Immediate	54.6	55.4	52.8
Cool - 2 minutes	38.8	39.1	35.5

	Alcoholic	12	13
Cool - Immediate	54.6	64.4	66.3
Cool - 2 minutes	38.8	40.6	44.9

	Alcoholic	10	14
Cool - Immediate	54.6	55.4	44.7
Cool - 2 minutes	38.8	39.1	37.0

5           The results show that the antiperspirant according to the invention (samples 10-14) are comparable to the alcoholic deodorant sticks currently on the market.

## CLAIMS:

1. An emulsion antiperspirant composition suitable for topical application to the human skin in a stick form, comprising an antiperspirant active material, water, a hydrophobic phase, an emulsifier and ethanol, characterised  
5 in that it comprises at least 10% by weight of the composition of ethanol.
  
2. An antiperspirant composition according to claim 1,  
10 wherein the composition comprises between 10 and 25% ethanol.
  
3. An antiperspirant composition according to claim 2,  
15 wherein the composition comprises from 12% to 18% by weight ethanol.
  
4. An antiperspirant composition according to any one of the preceding claims, wherein the emulsifier is present at a level of from 0.1 to 5% by weight of the composition.  
20
  
5. An antiperspirant composition according to claim 4, wherein the emulsifier is present at a level of from 0.2 to 1% by weight of the composition.

6. An antiperspirant composition according to any one of the preceding claims, wherein the emulsifier has an HLB value of less than 8.
- 5 7. An antiperspirant composition according to any one of the preceding claims, wherein the emulsifier is cetyl dimethicone copolyol or PEG 7 hydrogenated castor oil.
8. An antiperspirant composition according to any one of  
10 the preceding claims, wherein the composition comprises 10 to 35% by weight of water.
9. An antiperspirant composition according to any one of the preceding claims, wherein the composition additionally  
15 comprises a masking oil at a level of from 3 to 40% by weight of the composition.
10. Use of an antiperspirant composition according to any previous claim to cool the skin.