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3,448,189

ORGANO-ALUMINUM ANTIPERSPIRANT COMPOSITIONS AND ANTIPERSPIRANT METHOD

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No Drawing. Continuation-in-part of application Ser. No. 122,645, July 10, 1961. This application Jan. 12, 1966, Ser. No. 520,095

Int. Cl. A61k 7/00

U.S. Cl. 424—47

17 Claims

ABSTRACT OF THE DISCLOSURE

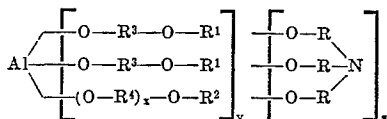
Organo-aluminum compositions containing compounds with no ionic bonds are effective deodorants and antiperspirants. They comprise at least one aluminum nitrilo compound and one aluminum alkoxy alkoxide compound. A representative composition is a mixture of aluminum nitrilotriethoxide and aluminum bis (beta-ethoxyethoxide) isopropoxide. Aerosols of these compositions are especially advantageous.

This application is a continuation-in-part of our co-pending patent application Ser. No. 122,645 entitled "Organo-aluminum Antiperspirant Compositions and Methods of Application" filed July 10, 1961 now abandoned.

This invention is deodorant antiperspirant cosmetic compositions comprising aluminum compounds having unique properties.

Many aluminum compounds have been described in the prior art as being useful in controlling the flow of perspiration. Among these are aluminum compounds such as aluminum chloride, aluminum sulfate, aluminum oxychloride, aluminum oxysulfate, aluminum chlorhydrates, and alkoxy aluminum chlorides. All the above compounds are more or less irritating to the skin and corrosive to clothing. Attempts have been made to reduce skin irritation and fabric damage by adding agents which act as corrosion inhibitors or buffers. Illustrative of such agents is urea, which is presumed to release ammonia and neutralize any acids formed by hydrolysis of the aluminum compound. While these expedients have resulted in some improvement they have not solved the problem completely.

We have found that certain organo aluminum compounds containing no ionic bonds are effective deodorants and antiperspirants and minimize irritation to the skin and corrosion of fabrics. They may be used without added buffering agents or corrosion inhibitors. Effective astringent, deodorant, and antiperspirant compositions according to our invention comprise at least one aluminum compound having the general formula

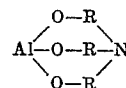


in which the groups are independently selected alkyl radicals wherein each R has 2 to 12 carbon atoms, R¹ and R² each has 1 to 18 carbon atoms, each R³ has 2 to 6 carbon atoms, R⁴ has 2 to 4 carbon atoms, x has an integral value from 0 to 20 and y and z are integers of from 0 to 1 the sum of which is 1. The alkyl radicals may be straight or branched. Presently preferred are the compounds which have at least about 4.5% by weight of aluminum metal in the molecule.

The compounds can be considered as falling into two groups; Group I where z=1 and Group II where y=1

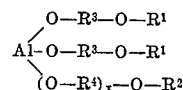
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and x has its assigned values. When z is one and y is zero in the above general formula the Group I compounds are represented by the formula



and may be considered as aluminum nitrilo compounds. Representative examples are aluminum nitrilotriethoxide, aluminum nitrilotriisopropoxide, aluminum nitrilotributoxide, aluminum nitrilotrihexoxide, aluminum nitrilotri-octoxide, aluminum nitrilotridecoxide, aluminum nitrilotridodecoid, etc. These compounds are generally solids, and are amorphous and slow-drying when evaporated from alcoholic solutions. They may be prepared by reacting an alkanolamine such as triethanolamine with an aluminum alkoxide such as aluminum triethoxide, aluminum triisopropoxide or other alkoxides of aluminum in equimolar quantities and removing the formed alkyl alcohol. Representative alkanolamines are triethanolamine, triisopropanolamine, tributanolamine, trihexanolamine and the like.

When z is zero and y is one in the general formula, the compounds of this invention are represented by the formula



and may be considered as aluminum alkoxy alkoxides. Representative examples are aluminum bis(beta-hexoxyhexoxide) isopropoxide, aluminum bis(beta-methoxyethoxide) isopropoxide, aluminum bis(beta-octadecoxyethoxide) isopropoxide, aluminum bis(beta-butoxyethoxide) methoxide, aluminum bis(beta-hexoxyhexoxide) octadecoxide, aluminum bis(beta-ethoxyethoxide) isopropoxide, aluminum bis(beta-hexoxyethoxide) isopropoxide, aluminum bis(beta-butoxyethoxide) isopropoxide, aluminum bis(beta-hexoxyethoxide) (beta-butoxyethoxide), aluminum bis(beta-hexoxyethoxide) (beta-butoxyethoxide), aluminum bis(beta-hexoxyethoxide) mono(ethoxyethoxide) butoxide and the like. These compounds may be prepared by reacting an aluminum alkoxide such as aluminum triethoxide, aluminum triisopropoxide, or other alkoxides of aluminum with an alkoxy alkanol such as butoxyethanol, hexoxyhexanol and the like in calculated quantities and removing the displaced alkyl alcohol.

Compounds wherein x is zero and R² is in the upper range of carbon atoms may be prepared by reacting a higher alcohol such as dodecyl or octadecyl alcohol with the aluminum alkoxide compound in which the R² attached to the aluminum through the oxygen is a lower alkyl group, whereby the higher alcohol will replace the lower alcohol. Thus heating of octadecyl alcohol with aluminum bis(beta-hexoxyhexoxide) isopropoxide at about 120° C. or higher under dry nitrogen followed by distillative removal of isopropyl alcohol gives aluminum bis(beta-hexoxyhexoxide) octadecoxide.

Compounds wherein x is an integer may be prepared by first oxyalkylating the desired alcohol with up to about 20 moles of the alkylene oxide. By reacting the oxyalkylated alcohol with an aluminum compound where R² is a lower alkyl group (and x is zero), the oxyalkylated alcohol will replace the lower alcohol. As an example, ethylene oxide is reacted with butyl alcohol by bubbling the oxide into the butyl alcohol until the desired weight of ethylene oxide has added on. The oxyethylated butyl alcohol is then reacted with a compound such as aluminum bis(beta-hexoxyethoxide) isopropoxide followed by distillative removal of isopropyl alcohol to

give aluminum bis(beta-hexoxyethoxide)mono(polyethoxy)butoxide.

As is well known, alcoholates are derivatives of alcohols in which the hydroxyl hydrogen atom of the alcohol is replaced by a metal. From this standpoint the compounds of Group I may be considered to be aluminum alcoholates of alkanolamines. The compounds of Group II may similarly be considered to be aluminum alcoholates of the alkanols and alkoxy alkanols used in preparing the compounds. The compound shown in Example 1 may be called aluminum alcoholate of triethanolamine and that shown in Example 3 may be called aluminum alcoholate of ethoxyethanol and of isopropyl alcohol.

The compounds of both Group I and Group II hydrolyze in the presence of water or moisture on the skin to produce nascent aluminum hydroxide which is the active deodorant and antiperspirant agent.

The methods of preparing the compounds of this invention are illustrated by the following examples.

EXAMPLE 1

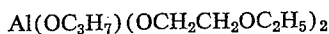
204 grams (1 mole) of liquid aluminum isopropoxide are weighed into a stainless steel beaker and covered with dry nitrogen. 149 grams (1 mole) of triethanolamine are added all at once. An exothermic process ensues after which the beaker is heated on a hot plate under a hood. Isopropyl alcohol distills from the reaction mixture as the temperature is increased to about 160° C. The residue becomes increasingly viscous until it solidifies. The product which contains considerable isopropyl alcohol is crushed and further dried in vacuo at 75° C. The product, aluminum nitrilotriethoxide, is obtained as a white powder. Its formula may be represented as $\text{Al}(\text{OCH}_2\text{CH}_2)_3\text{N}$.

EXAMPLE 2

204 grams (1 mole) of liquid aluminum isopropoxide are weighed into a stainless steel beaker and covered with dry nitrogen. 191 grams (1 mol) of triisopropanolamine are added to the warm alcoholate. After the initial exothermic reaction, the mixture is heated under a hood. As the isopropyl alcohol distills from the mixture, the temperature slowly rises and after most of the alcohol has been removed, the reaction mixture may begin to solidify. By raising the temperature to about 190° C. the product melts and the residual isopropyl alcohol is driven off. The melt solidifies on cooling to room temperature and may be ground to an almost white powder. Yield of about 215 grams of aluminum nitrilotriisopropoxide is essentially quantitative. Melting point is about 182° C. Its formula $\text{Al}(\text{OCH}(\text{CH}_3)\text{CH}_2)_3\text{N}$.

EXAMPLE 3

In a liter flask fitted with a dropping funnel and distillation condenser are placed 204 grams (1 mole) of liquid aluminum isopropoxide and covered with dry nitrogen. Through the dropping funnel are added 180 grams (2 moles) of ethyl Cellosolve (beta-ethoxyethanol) and the temperature of the mixture is raised until isopropyl alcohol begins to distill from the flask. The removal of the liberated isopropyl alcohol by distillation requires about one hour. The temperature is raised to about 160° C. and the residual isopropyl alcohol is removed in vacuo. The product, aluminum bis(beta-ethoxyethoxide) isopropoxide, is a clear colorless liquid and obtained in essentially quantitative yield of about 264 grams. Its boiling point is about 230° C. at a pressure of 5 mm. mercury and its formula may be represented as



EXAMPLE 4

204 grams (1 mole) of liquid aluminum isopropoxide are weighed into a stainless steel beaker and covered with dry nitrogen. The alcoholate is warmed to

100° C. and then 236 grams (2 moles) of butyl Cellosolve (beta-butoxyethanol) are added in small portions during a thirty minute period as the temperature is maintained at about 100° C. Isopropyl alcohol is distilled from the flask as the alcoholysis proceeds. After the butyl Cellosolve has been added, the reaction mixture is heated at 160° C. for fifteen minutes to remove the residual isopropyl alcohol. The residual aluminum bis(beta-butoxyethoxide)isopropoxide remains as a clear colorless liquid. The yield of about 320 grams is practically quantitative. Boiling point is about 250° C. at a pressure of 5 mm. mercury. Formula:

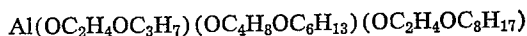


EXAMPLE 5

One mole of liquid aluminum isopropoxide and 292 grams (two moles) of hexyl Cellosolve (beta-hexoxyethanol) were reacted using a process similar to that of Example 4. The product, aluminum bis(beta-hexoxyethoxide)isopropoxide, was obtained in practically quantitative amount as a clear colorless liquid. Refractive index is 1.44. Formula: $\text{Al}(\text{OC}_3\text{H}_7)_2(\text{OCH}_2\text{CH}_2\text{OC}_6\text{H}_{13})_2$.

EXAMPLE 6

One mole of aluminum isopropoxide is reacted with a mixture consisting of one mol of beta-propoxyethanol and one mol of beta-hexoxybutanol under dry nitrogen at a temperature of about 100° C. in a process similar to Example 4. Isopropyl alcohol is distilled off leaving aluminum mono(beta-propoxyethoxide)mono(beta-hexoxybutoxide)isopropoxide. This reaction product is heated with 174 grams (one mol) of beta-octoxyethanol at about 100° C. under dry nitrogen to displace isopropyl alcohol which is removed by distillation. Residual isopropyl alcohol is removed by heating at 170° C. and above for a short time. The reaction product, aluminum (beta-propoxyethoxide)(beta-hexoxybutoxide)(beta-octoxyethoxide), is recovered in practically quantitative amount. Formula:



EXAMPLE 7

In a 3-neck round bottom flask equipped with a mechanical stirrer, reflux condenser, thermometer and ethylene oxide feed inlet, there were placed 74 grams (1 mol) of butyl alcohol and 1 gram of KOH. The flask was purged with nitrogen to remove air and heated to 120° C. with stirring and until the KOH was dissolved. Then ethylene oxide was introduced into the mixture as fast as it would react until a total of 20 moles of ethylene oxide are introduced and reacted. The product was cooled under nitrogen and the catalyst neutralized with sulfuric acid and the product filtered. Ethoxylated butyl alcohol having the formula $\text{H}(\text{OC}_2\text{H}_4)_{20}\text{OC}_4\text{H}_9$ is recovered. Propylene oxide or butylene oxide may be substituted for the ethylene oxide and by varying the amount of the alkylene oxide supplied to the reaction vessel, one mole only of the alkylene oxide may be added, or 6 moles, or 15 moles, etc. Other alcohols of course may be used in place of the butyl alcohol.

1 gram mole of the aluminum alkoxy product of Example 5 is reacted with 1 gram mole of the above ethoxylated butyl alcohol under dry nitrogen at a temperature of about 100° C. The temperature is maintained for about thirty minutes and isopropyl alcohol is distilled off. When the distillation of the alcohol ceases, the temperature is raised to about 190° C. to remove any residual isopropyl alcohol. The reaction product, aluminum bis(beta-hexoxyethoxide)mono(polyethoxy)butoxide has the formula $\text{Al}(\text{OC}_2\text{H}_4\text{OC}_6\text{H}_{13})_2(\text{OC}_2\text{H}_4)_{20}\text{OC}_4\text{H}_9$.

Effective deodorant and antiperspirant preparations which are bland, non-irritating and non-corrosive comprise compounds of the invention in a concentration from about 5 % to about 40% by weight in a pharmaceutical

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carrier. By "pharmaceutical carrier" is meant all the usual vehicles employed in pharmacy and cosmetics and includes alcoholic solutions, aerosols, ointments, creams, powders, lotions, powder sticks and the like, which may contain the usual perfumes, bactericidal and fungicidal ingredients, etc. Illustrative examples follow.

EXAMPLE 8

(A)	Percent wt. or vol.	
Stearic acid -----	15	10
Glyceryl monostearate -----	2.5	
Propylparaben -----	0.1	
Methylparaben -----	0.2	
Aluminum nitrilotriethoxide -----	10.0	15

(B)	Percent wt. or vol.	
Propylene glycol -----	6.0	
Potassium hydroxide -----	1.5	
Water -----	64.5	20

(C)	Percent wt. or vol.	
Perfume -----	0.2	

Procedure: Heat A to 60° C. and mix well to fully suspend the aluminum compound. Heat B to 60° C. and slowly add A with constant mixing. Cool to 35° with mixing and then add C. Mill the product to obtain a smooth antiperspirant cream.

EXAMPLE 9

(A)	Percent wt. or vol.	
Stearic acid -----	3.0	
Mineral oil -----	14.0	
Isopropyl palmitate -----	2.0	35
Polyethylene glycol 400 monostearate -----	10.0	
Lanolin -----	4.4	
Beeswax -----	8.0	
Propylparaben -----	0.1	

(B)	Percent wt. or vol.	
Glycerine -----	5.0	
Triethanolamine -----	1.5	
Methylparaben -----	0.2	
Water -----	41.6	40

(C)	Percent wt. or vol.	
Aluminum nitrilotrisopropoxide -----	10.0	

(D)	Percent wt. or vol.	
Perfume -----	0.2	50

Procedure: Heat A to 70° C. Heat B to 70° C. and add, with mixing, to A. Mix until temperature drops to 35° C., then add C and D. Mill to form a smooth antiperspirant cream.

EXAMPLE 10

(A)	Percent wt. or vol.	
Mineral oil -----	2.0	
Cetyl alcohol -----	0.5	60
Lanolin -----	1.0	
Stearic acid -----	1.25	
Glyceryl monostearate, self-emulsifying -----	4.0	
Propylparaben -----	0.1	

(B)	Percent wt. or vol.	
Triethanolamine -----	0.65	
Water -----	80.0	

(C)	Percent wt. or vol.	
Aluminum nitrilotrisopropoxide -----	10.0	

(D)	Percent wt. or vol.	
Perfume -----	0.5	75

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Procedure: Heat A to 65° C. Heat B to 65° C. and add to A with constant stirring. Continue stirring until cool (30° C.). Mix in C and D. Homogenize to form an antiperspirant lotion.

EXAMPLE 11

(A)	Percent wt. or vol.	
Stearic acid -----	2.0	
Mineral oil -----	15.0	
Isopropyl myristate -----	2.0	
Polyethylene glycol 400 monostearate -----	10.0	
Lanolin -----	5.0	
Beeswax -----	7.9	
Propylparaben -----	0.1	

(B)	Percent wt. or vol.	
Propylene glycol -----	5.0	
Triethanolamine -----	1.0	
Methylparaben -----	0.2	
Water -----	41.6	

(C)	Percent wt. or vol.	
Aluminum bis(beta-ethoxyethoxide)isopropoxide --	10.0	

(D)	Percent wt. or vol.	
Perfume -----	0.2	

Procedure: Heat A to 65° C. Heat B to 65° C. and add to A with constant mixing. Continue mixing until cool (35° C.), then add C and D. Mill to form a smooth cream.

EXAMPLE 12

(A)	Percent wt. or vol.	
Stearic acid -----	15.0	
Cetyl alcohol -----	3.0	
Petrolatum -----	5.0	
Methylparaben -----	0.2	
Propylparaben -----	0.1	
Glyceryl monostearate, self-emulsifying -----	2.0	
Polyoxyethylene stearate -----	6.0	
Aluminum bis(beta-butoxyethoxide)isopropoxide --	10.0	

(B)	Percent wt. or vol.	
Sorbitol 70% -----	10.0	
Water -----	48.5	45

(C)	Percent wt. or vol.	
Perfume -----	0.2	

Procedure: Heat A to 60° C. Heat B to 60° C. and add slowly, with mixing, to A. Mix until cool. Add C at 35° C. Mill to smooth cream.

EXAMPLE 13

(A)	Percent wt. or vol.	
Stearyl alcohol -----	0.5	
Isopropyl myristate -----	2.0	
Lanolin -----	1.0	
Stearic acid -----	1.25	
Glyceryl monostearate, self-emulsifying -----	4.0	
Propylparaben -----	0.1	

(B)	Percent wt. or vol.	
Triethanolamine -----	0.65	
Methylparaben -----	0.2	
Water -----	80.0	65

(C)	Percent wt. or vol.	
Aluminum bis(beta-ethoxyethoxide)isopropoxide --	10.0	

(D)	Percent wt. or vol.	
Perfume -----	0.3	70

Procedure: Heat A to 65° C. Heat B to 65° C. and add, with constant mixing, to A. Continue mixing until cool. Mix in C and D at 35° C. Homogenize to form lotion.

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Deodorant and antiperspirant compositions in aerosol form are a special class which has recently gained attention. One problem of this type of composition however, is rusting of the metal container and the clogging of the aerosol valve caused by the tendency of the prior art aluminum compounds to crystallize in the valve as the solvent evaporates, which also fosters corrosion. We have advantageously found that aerosols prepared from mixtures of aluminum compounds described herein and packaged in the usual metal aerosol containers are free from such disadvantages. These aerosols carry the aluminum compounds on through the nozzle of the metal aerosol spray container without depositing them out and clogging the nozzle and consequently are much more satisfactory both from the manufacturer's point of view and the consumer's point of view.

The proportion of aluminum compound present in the aerosol formulation may vary but in general should be from about 5 to about 40%, preferably from about 5 to about 20%, by weight in the final formulation. Especially advantageous, non-irritating and fast drying aerosols which are very stable in metal aerosol containers can be prepared using 20 to 80% of a compound from one group with a corresponding 80 to 20% of a compound from the other group. Especially good aerosol compositions which are fast drying on the skin and do not clog the aerosol valve contain 40 to 60% of a compound from one group, for example aluminum nitrilotriethoxide, with a corresponding 60 to 40% of a compound from the other group, for example aluminum bis(beta-ethoxyethoxide)isopropoxide. Mixtures in the above proportions give highly stable aerosol solutions which have an acceptable drying time on the skin, are not irritating or corrosive and do not tend to clog or corrode the valve of a metal aerosol container. This property of non-clogging is of economic value since the prior art preparations of which we are aware tend to clog the valves of metal containers. It is to be understood that in addition to the propellents shown in the following examples all the solvents and propellents known to the art such as carbon dioxide, nitrogen, helium, fluorinated hydrocarbons, chlorinated hydrocarbons, mixed halogenated hydrocarbons and mixtures thereof, including the Genetrons and Freons, may be utilized. A text on the general subject of aerosols which contains a more complete listing of useable materials is Pressurized Packaging (Aerosols) by Herzka and Pickthall (1958), Academic Press, Inc., New York.

EXAMPLE 14

Antiperspirant aerosol

(A)	Percent wt. or vol.
Aluminum nitrilotriisopropoxide	4.20
Aluminum bis(beta-butoxyethoxide)isopropoxide	1.05
Isopropyl palmitate	1.80
Perfume	0.15
Isopropyl alcohol	45.55

(B)

Dichlorodifluoromethane	17.25
Dichlorotetrafluoroethane	30.0

Procedure: Dissolve all ingredients of A in the isopropyl alcohol. Place in a suitable aerosol container and pressurize with the mixture of propellents (B).

EXAMPLE 15

Antiperspirant aerosol

(A)	Percent wt. or vol.
Aluminum nitrilotriethoxide	4.00
Aluminum bis(beta-ethoxyethoxide)isopropoxide	4.00
Acetylated lanolin	1.20
Hexachlorophene	0.10
Perfume	0.10
Absolute alcohol	30.60

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(B)

Dichlorodifluoromethane	20.00
Trichloromonofluoromethane	40.00

Procedure: Dissolve all ingredients of A in the absolute alcohol. Place in a suitable aerosol container and cool in a Dry Ice-acetone bath. When cold, fill with a mixture of propellents (B), insert valve and seal.

EXAMPLE 16

Antiperspirant aerosol

(A)	Percent wt. or vol.
Aluminum nitrilotriethoxide	3.15
Aluminum bis(beta-butoxyethoxide)isopropoxide	12.60
Isopropyl myristate	1.80
Perfume	0.20
Isopropyl alcohol	35.00

(B)

Dichlorodifluoromethane	15.75
Dichlorotetrafluoroethane	31.50

Procedure: Dissolve all ingredients of A in the isopropyl alcohol. Place in a suitable aerosol container, cool, and when cold, fill with the mixture of propellents (B). Insert valve and seal.

EXAMPLE 17

Antiperspirant aerosol

(A)	Percent wt. or vol.
Aluminum nitrilotriethoxide	7.0
Aluminum bis(beta-ethoxyethoxide)isopropoxide	8.0
Hexachlorophene	0.25
Isopropyl myristate	4.75
Anhydrous ethyl alcohol	29.625
Perfume	0.375

(B)

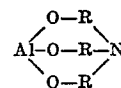
Trichloromonofluoromethane	20.0
Dichlorodifluoromethane	30.0

Procedure: Dissolve all ingredients of A in the anhydrous alcohol. Place in a suitable aerosol container, cool, and when cold fill with B. Insert valve and seal.

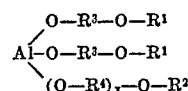
All the above aerosol compositions were used by human subjects and found to be highly effective and safe in controlling the flow of perspiration.

We claim:

1. A deodorant antiperspirant composition comprising a pharmaceutical carrier and from about 5 to about 40% by weight of a mixture of aluminum compounds comprising a compound of the first formula



and a compound of the second formula



wherein the groups are independently selected alkyl radicals in which each R has 2 to 12 carbon atoms, R¹ and R² each has 1 to 18 carbon atoms, each R³ has 2 to 6 carbon atoms, R⁴ has 2 to 4 carbon atoms, and x has an integral value of from 0 to 20.

2. The antiperspirant composition of claim 1 wherein each aluminum compound contains at least about 4.5% aluminum metal in the molecule.

3. The antiperspirant composition of claim 2 in aerosol form and containing a propellant.

4. The antiperspirant aerosol composition of claim 3 wherein 20 to 80% by weight of the mixture comprises a compound of the first formula and a corresponding 80

to 20% by weight of the mixture comprises a compound of the second formula.

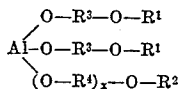
5. The antiperspirant aerosol composition of claim 4 wherein the compound of the first formula comprises 40 to 60% of the mixture and the compound of the second formula comprises a corresponding 60 to 40% of the mixture.

6. The antiperspirant aerosol composition of claim 5 wherein the compound of the first formula is aluminum nitrilotriethoxide and the compound of the second formula is aluminum bis (beta-ethoxyethoxide) isopropoxide.

7. The antiperspirant aerosol composition of claim 6 wherein the mixture comprises about 47% of aluminum nitrilotriethoxide and about 53% of aluminum bis (beta-ethoxyethoxide) isopropoxide.

8. The antiperspirant aerosol composition of claim 5 wherein the compound of the first formula is aluminum nitrilotriisopropoxide and the compound of the second formula is aluminum bis (beta-ethoxyethoxide) isopropoxide.

9. A deodorant antiperspirant composition comprising a pharmaceutical carrier and from about 5 to about 40% by weight of at least one aluminum compound having the formula

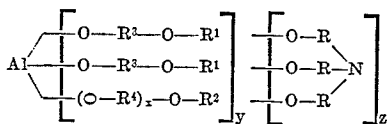


in which the groups are independently selected alkyl radicals wherein each R^1 and R^2 has 1 to 18 carbon atoms, each R^3 has 2 to 6 carbon atoms, R^4 has 2 to 4 carbon atoms and x has an integral value from 0 to 20.

10. The antiperspirant composition of claim 9 in aerosol form and containing a propellant.

11. The antiperspirant aerosol composition of claim 10 containing aluminum bis (beta-ethoxyethoxide) isopropoxide.

12. A method of controlling the flow of perspiration which comprises applying to the skin area to be affected a deodorant and antiperspirant composition comprising a pharmaceutical carrier and from about 5 to about 40% by weight of at least one aluminum compound having the formula



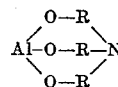
in which the groups are independently selected alkyl radicals wherein each R has 2 to 12 carbon atoms, R^1 and R^2 each has 1 to 18 carbon atoms, each R^3 has 2 to 6 carbon atoms, R^4 has 2 to 4 carbon atoms, x has an integral value of from 0 to 20 and y and z are integers of from 0 to 1 and the sum of which is 1.

13. The method of claim 12 in which z is one and y is zero and the composition is applied as an aerosol.

14. The method of claim 13 in which the aluminum compound is aluminum nitrilotriethoxide.

15. The method of claim 13 in which the aluminum compound is aluminum nitrilotriisopropoxide.

16. A deodorant antiperspirant aerosol composition comprising a propellant and from about 5 to about 40% by weight of at least one aluminum compound having the formula



where R is an alkyl radical of 2 to 6 carbon atoms.

17. A deodorant antiperspirant aerosol composition comprising:

	Percent wt. or vol.
Aluminum nitrilotriethoxide	7.0
Aluminum bis(beta-ethoxyethoxide) isopropoxide	8.0
Hexachlorophene	0.25
Isopropyl myristate	4.75
Anhydrous ethyl alcohol	29.625
Perfume	0.375
Propellant	50.00

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ALBERT T. MEYERS, *Primary Examiner*.

U.S. Cl. X.R.

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