

## UNITED STATES PATENT OFFICE

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## PERSPIRATION INHIBITING COMPOSITION

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This invention relates to improved perspiration retarding or inhibiting compounds.

It has heretofore been proposed to control or retard the flow of perspiration from certain skin areas by the application of solutions containing an acid salt of a heavy metal, usually aluminum chloride or aluminum sulfate. Such solutions are effective in stopping perspiration but are unsatisfactory and hazardous in that the use thereof frequently produces acute skin irritation or dermatitis and rots clothing fabrics which come in contact with the treated areas. In an attempt to mitigate the corrosive action of these compounds on fabrics, directions for their use usually urge that the solutions be permitted to dry on the skin and that the treated skin areas be thereafter wiped off with a damp cloth before clothing is brought in contact therewith. The solutions dry slowly and these precautions are frequently disregarded. In any case, the recommended procedure does not prevent skin irritation.

Prior to the present invention, the above described corrosive action of effective perspiration inhibiting preparations was considered inherent and unavoidable. The action of such preparations apparently depends upon the presence of both the metallic aluminum or aluminum hydroxide ion and the strong mineral acid ion. Considering aluminum sulfate, for example, the aluminum or aluminum hydroxide ion apparently combines with and coagulates the skin proteins only in the presence of the sulfate radical, and as a result of this action, a residue of sulfuric acid remains which irritates the skin and rots the clothing. The use of metallic salts of weak acids offers no solution since such compounds are ineffective to restrict the flow of perspiration. The problem is further complicated by the fact that if alkaline substances are added, insoluble basic aluminum compounds, such as aluminum hydroxide, are formed, and no perspiration retarding action is obtained. As a consequence, all previously known effective perspiration inhibiting preparations are characterized by the above described undesirable corrosive action.

With the above and other considerations in mind, it is proposed in accordance with the present invention to provide an improved perspiration retarding or inhibiting compound which, while retaining in full the desirable inhibitory action of previously known preparations, avoids their corrosive action and is harmless to the skin and fabrics. Other objects of the invention include the provision of a perspiration treating or

inhibiting compound which is inexpensive to produce, which may be easily applied in liquid, semiliquid or other forms and which has no undesirable odor or other physical or chemical properties which would impair its usefulness as a cosmetic preparation.

The objects of the invention are carried out by providing a compound in which are combined one or more water soluble heavy metal salts of strong acids, usually mineral acids, and a normally neutral water soluble amino compound possessing one or more intact reactive amino ( $\text{NH}_2$ ) groups.

The metallic salt astringent or coagulant ingredient of our composition preferably comprises a water soluble strong acid salt of one or more metals, such as aluminum, zinc, cerium, zirconium, titanium, iron or bismuth, although salts of tin, lead and cadmium are also effective. The acid radical of the astringent salt is preferably chosen from the mineral acid group, such as sulfuric, phosphoric or hydrochloric acid, although salts of strong organic acids, such as sulfonic acids, may also be used. Examples of water soluble heavy metal salts which give excellent results are aluminum sulfate, aluminum chloride and aluminum phosphate.

The normally neutral protective ingredient of our composition is preferably a chemical selected from one of two groups of amino compounds, namely the amides and the amino acids. The suitable chemicals in these groups are those which are neutral, which are materially soluble in water or in the strong acid salt of the heavy metal comprising the astringent ingredient of our composition, and which possess one or more intact amino groups. Examples of amides which are suitable for use as the protective ingredient of our composition are the lower aliphatic and aromatic amides, such as formamide, acetamide, carbamide (urea) and derivatives thereof. Suitable derivatives of carbamide include those obtained by replacing one amino group thereof with an alkyl, acyl, or aryl group, such as ethyl carbamate, and those derived by the replacement of one or more hydrogen atoms of one amino group of carbamide, such as ethyl urea and methyl urea. Another suitable derivative of carbamide is one in which both amino groups are intact and oxygen has been replaced by sulfur.

Examples of amino acids which are suitable for use in our composition as the protective ingredient thereof are aminoacetic acid and aminopropionic acid.

We find it preferable to combine the acid salt

ingredient and the normally neutral ingredient in such proportions that one reactive amino group of the protective ingredient is available for each potential acid ion of the salt. For example, if the astringent and protective ingredients comprise aluminum sulfate and glycine (aminoacetic acid) respectively, the proportions of these ingredients should be such that six molecules of glycine are provided for each molecule of the salt, since upon hydrolysis, a molecule of aluminum sulfate produces three molecules of dibasic sulfuric acid. If urea (carbamide) is used as the protective ingredient with aluminum sulfate, the proportions should be such as to provide six molecules of urea for each molecule of aluminum sulfate, since although each molecule of urea contains two amino groups, only one of them is chemically active in this reaction.

A specific example of our improved composition using aluminum sulfate and urea may be prepared by dissolving 25 grams of aluminum sulfate in approximately 50 cubic centimeters of water and adding and dissolving 15 grams of urea in such solution, the volume of the solution being finally brought up to 100 cubic centimeters by the addition of water.

An example of the composition employing an amino acid as the protective ingredient may be prepared by dissolving 13 grams of aluminum sulfate in about 20 cubic centimeters of water and dissolving 9 grams of glycine (aminoacetic acid) in such solution.

The above and other solutions of our composition may be used in the form described or a suitable wetting agent may be added thereto if desired. Our improved compound may also be incorporated in an emulsion with wax or oil and applied to the skin in this form.

Our improved composition is highly effective in stopping perspiration and is harmless to the skin and fabrics. It is our belief that when the composition is applied to the skin, the ionized metallic salt gives up metallic ions or metallic hydroxide ions which combine with the skin proteins to form coagulant materials and so inhibit the flow of perspiration. The acid ions present make possible this coagulating action, probably either acting as solubilizing agents or reacting with the skin proteins. The reaction of the metallic ions with the skin proteins leaves an excess of sulfuric acid which immediately reacts with the normally neutral protective ingredient, probably forming a neutral addition compound therewith through the reactive amino groups thereof. Although we believe that the foregoing explanation is correct, it should be understood that the invention is in no way dependent upon the accuracy of the theory here expressed.

We claim:

1. A perspiration inhibiting composition comprising a non-toxic water soluble protein coagulating metallic salt of a strong acid and a neutral, water soluble amino compound taken from the group consisting of the aliphatic amides and the aliphatic amino acids and having at least one intact, reactive amino group.

2. A perspiration inhibiting composition com-

prising a solution of aluminum sulfate and a normally neutral amino compound, soluble in said salt solution, taken from the group consisting of the aliphatic amides and the aliphatic amino acids and having at least one intact, reactive amino group.

3. A perspiration inhibiting composition comprising a solution of aluminum sulfate and a normally neutral water soluble aliphatic amide having at least one intact, reactive amino group.

4. A perspiration inhibiting composition comprising a solution of aluminum sulfate and a normally neutral water soluble aliphatic amino acid having at least one intact, reactive amino group.

5. A perspiration inhibiting composition comprising a solution of aluminum sulfate and urea.

6. A perspiration inhibiting composition comprising a non-toxic water soluble protein coagulating metallic salt of a strong acid and a normally neutral water soluble organic compound taken from the group of amino compounds consisting of the aliphatic amides and the aliphatic amino acids and having at least one intact, reactive amino group, the proportion of said organic compound in the composition being sufficient to provide at least one intact, reactive amino group for each potential acid ion of the metallic salt.

7. A perspiration inhibiting composition comprising a water solution containing a solute comprising about 62% by weight of aluminum sulfate and about 38% by weight of urea.

8. A cosmetic astringent preparation containing an astringent material comprising an acid-reacting inorganic salt of a polyvalent metal and a proportion of a soluble aliphatic amide.

9. A cosmetic astringent preparation including aluminum chloride and a soluble aliphatic amide.

10. A cosmetic astringent preparation including aluminum chloride and urea.

11. A cosmetic astringent preparation including as its essential astringent ingredient an acid reacting inorganic salt of a polyvalent metal together with a proportion of a water soluble aliphatic amide.

12. A cosmetic astringent preparation including aluminum sulphate as its essential astringent ingredient together with urea.

13. A cosmetic astringent preparation containing an astringent material comprising an acid reacting inorganic salt of a polyvalent metal and a proportion of urea.

14. A cosmetic astringent preparation containing an astringent material comprising an acid reacting inorganic salt of a polyvalent metal and a proportion of a water soluble aliphatic amino acid.

15. A cosmetic astringent preparation containing aluminum sulphate as its essential astringent ingredient together with a soluble aliphatic amide.

16. A cosmetic astringent preparation containing as its essential astringent ingredient an acid reacting inorganic salt of a polyvalent metal together with a proportion of urea.

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