

UNITED STATES PATENT OFFICE

2,131,235

DEODORIZING MATERIAL

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No Drawing. Application October 30, 1933,
Serial No. 695,840

13 Claims. (Cl. 167—90)

This invention relates to the production of a deodorizing material for the perspiratory and menstrual secretions.

It may be used as a deodorant on sanitary napkins or for direct application to the body in the form of a powder or otherwise as a deodorant for perspiration.

In general, previous efforts to deodorize menstrual secretions on sanitary napkins have attempted by means of perfume or other odoriferous materials to cover and disguise the natural odor of the menstrual secretions with stronger and less suggestive odors. These attempts to overcome the unpleasant odor of the menstrual secretions are, however, not satisfactory because the strong perfume or odor which such napkins carry is very obviously a disguise to persons who may come near the persons wearing such napkins.

One of the objects of our invention was to discover the true cause of unpleasant body odors, such as perspiration, both male and female, menstrual and other uterine secretions, and to provide a deodorizing material for such secretions which in itself is substantially non-odorous, or very slightly perfumed if so desired, and which is capable of chemically combining with the odor giving parts of the secretions to form chemical compounds in themselves substantially non-odorous, so that the natural odors of these secretions are neutralized and no other objectionable odors introduced.

The menstrual secretions consist generally of two types of organic bodies, the first of which are compounds connected with blood and their derivatives, such as hemoglobin, fibrin, blood albumen and serum, imidazol compounds and their derivatives, and the second of which are compounds connected with secretions of the ovary, uterus and urinary tract and decompositions thereof, consisting of albuminous bodies and derivatives closely related to ptomaine and purin compounds. The chief odor of these secretions is produced by substituted amino compounds, such as methylamine, dimethylamine and trimethylamine, and in order to neutralize this odor, it is necessary to provide in the deodorizing material, compounds which enter into chemical combinations with the odor producing part of the secretions to neutralize the same and thereby effect complete deodorization. At the same time, it is desirable, particularly when the deodorizer is applied to sanitary napkins or directly to the body, to use materials which are strongly anti-

septic and at the same time non-corrosive and non-irritating to the skin or mucous membranes.

As the odor giving portion of the secretions are essentially of the character of organic bases, it is desirable to use an acid of an equally active character to effect the neutralization. No inorganic acids are known which can be suitably used, as the compounds formed generally hydrolyze and form free acid ions. It is obvious that such inorganic acids as sulphuric, hydrochloric, phosphoric, etc., cannot be used because the compounds resulting from the reaction between the organic secretions and such acids not only slowly hydrolyze, but the acids in themselves are of a strongly corrosive character. It can be understood that weak acids such as boric, substituted vanadic, etc., and most of the aliphatic acids such as acetic, lactic, etc., are unsuitable because the compounds formed with the secretions are unstable, and therefore decompose to free the base and its odor. The aromatic acids such as benzoic and salicylic acids, as well as phenylacetic, cinnamic and hydrocinnamic acids, will combine in alcoholic solutions with the strong amino odor-giving portions of the menstrual secretions to form stable, non-odorous compounds which do not hydrolyze. But these acids in themselves are not water soluble and are corrosive and irritating to the delicate membranes. If used alone, the reaction between the acids and the amino compounds of the menstrual secretions would not readily take place. It is thus impossible to use sanitary napkins containing these neutralizing acids as such in direct contact with any portion of the human body.

These aromatic acids such as benzoic, salicylic, phenylacetic, etc., however, from the reaction standpoint are most suitable for the purpose, for the reason that they combine very solidly with substituted amines of the body secretions and leave no odor. As stated, one disadvantage of these acids is that they are as such practically insoluble in water. Therefore, for the purpose of making them soluble we react them with a so-called aldehyde or a keto amino base which combination is water soluble. Furthermore, the combination of these aromatic acids with the aldehyde or keto amino bases eliminates the irritative qualities of the free acids.

In the preferred embodiment of our invention we therefore combine these neutralizing aromatic acids with other materials which besides rendering the reaction compounds water-soluble also stabilize and control the reactions to such an extent that the entire compound will be non-cor-

rosive and non-irritating to the membranes. When sanitary napkins are used containing the reaction compounds, only so much of the acid ingredients are liberated as may be necessary in the presence of the menstrual secretions to react with the amino compounds and deodorize the same.

In our preferred composition, we use a combination of salicylic acid and benzoic acid and react this with a material of the aldehyde or keto amino group which has the property of making these acids soluble in water so that they may react with the odoriferous constituents of the menstrual and perspiratory secretions. We may use, for example, hexamethylene tetramine or triacetoneamine.

It is known that compounds formed by condensation between amines and aldehydes as for instance hexamethylene tetramine, triacetoneamine, and the so-called "Schiffs bases" like benzyliden-aniline, form with certain acids, especially those of the aromatic series, like benzoic, cinnamic, salicylic and other similar acids, loosely attached salts, which possess most characteristics of salts, but titrate as the free acids themselves. These compounds are really chemical additions, easily hydrolyzed, but at the same time possessing the physical characteristics of organic salts, as for instance their ready solubility in water, their faculty of forming double salts with other organic or inorganic salts and of forming complex purely additive compounds with other bodies that would not react with the single constituents themselves.

We make use of these peculiar physical properties to produce compounds, which by forming additive bodies of salt-like character are made capable of combining with amines, amino-acids, organic acids, aldehydes, etc., to remove the bad odors due to the uterine fluids at the time of menstruation, and to perspiration.

The main objections to the use of salicylic and benzoic acids have been firstly, their insolubility in water, and, secondly, their corrosive effect, especially of the salicylic acid. The addition of one of the compounds mentioned above especially of hexamethylene tetramine overcomes these handicaps. The new addition compounds formed between the acids and hexamethylene tetramine are easily soluble in water and are non-corrosive. These results are due to the fact that the salicylic acid adds itself to the hexamethylene tetramine not only as an acid but also as a phenol, losing thereby the acid character of the hydroxyl group. The acid character of benzoic acid is mitigated through the slight hydrolysis of the hexamethylene tetramine.

If these new compounds, hexamethylene tetramine salicylate and hexamethylene tetramine benzoate come in contact with amines or amino-acids as they exist in the female uterine secretions, they at once form salts, setting free the hexamethylene tetramine. The hexamethylene tetramine also will react with the amino-acids, as is proved by the existence of such compounds as hexamethylene tetramine glycine after use.

The behavior of these deodorizing compounds is different in the presence of an organic acid like caproic acid such as exists in the perspiration of male persons. Our formula provides for an excess of hexamethylene tetramine which means that enough hexamethylene tetramine is left over to combine with the caproic acid. While hexamethylene tetramine caproate by itself is unstable and gives off the odor of caproic acid it forms a stable double salt with the hexamethyl-

ene tetramine benzoate and hexamethylene tetramine salicylate. This double salt is odorless and only hydrolyzes in the presence of a great excess of water.

We will mention here that hexamethylene tetramine in the presence of acids is sometimes slightly dissociated as the emanating odor of formaldehyde proves. In order to avoid any disturbing effects of the formaldehyde, we add a small proportion of a phenolester like para-hydroxy benzoic methyl ester, as a protection. The small portion of formaldehyde formed will combine with the phenol ester in the presence of the acids and so prevent any ill effects which otherwise would result from the existence of formaldehyde in the free state.

The compounds of benzoic and salicylic acid with hexamethylene tetramine have very little free acidity but are unstable and leave the acids free to combine with the compounds of the menstrual secretions or perspiratory secretions to deodorize the same. While these compounds are non-irritating and strongly antiseptic they are, however, very unstable and may be readily dissociated. The methylparaoxybenzoate or other compounds of paraoxybenzoic acid also act to stabilize the material and prevent the acid and the hexamethylene tetramine from separating prior to the reaction with the perspiratory or menstrual secretions. Piperonal which combines directly with hexamethylene tetramine and prevents it from breaking up may also be used with the methyl-para-hydroxybenzoate.

To this compound, we may or may not, as desired, add a material to give a mild but pleasant aroma, such as mild perfume, terpenol acetate or the like. In any event, the amount of the perfume ingredient is not sufficient in itself to overcome the natural odors of the body secretions.

It will be obvious to persons skilled in the art that certain modifications can be made or alternatives substituted in the compositions proposed herein.

We prefer specifically to use 100 parts of salicylic acid, 85 parts of benzoic acid, 243 parts of hexamethylene tetramine, and 5 parts each of methylpara-hydroxybenzoate and piperonal. These materials are first dissolved in 300 parts of alcohol to which have been added 50 parts of water, the materials being heated on a water bath for about two hours or until a small sample, is perfectly soluble or produces no cloudiness in water. When the sample is soluble, the alcohol and water are evaporated at as low a temperature as possible to crystallize the materials, which are found to be equally soluble in alcohol and water.

Instead of using benzoic and salicylic acids, we may use other aromatic acids which behave substantially in the same way, such as cinnamic, phenylacetic or hydrocinnamic acids. We have found, for example, that a compound consisting of 100 parts of hexamethylene tetramine, 70 parts of cinnamic acid, 10 parts of phenylacetic acid and 5 parts each of methylpara-hydroxybenzoate and piperonal, mixed substantially as indicated above will produce a deodorizing material which is satisfactory for all of the purposes we have mentioned. Instead of aromatic acids sulfonated aliphatic acids there likewise may be used as well.

The material may be applied to sanitary napkins as a dry powder in which one-tenth to three-tenths of a gram per napkin has been found sufficient to deodorize menstrual secretions. In the form of a water or alcohol solution, the com-

position may be applied directly to the body for deodorizing perspiration. It may also be sprayed from an alcohol solution on the napkins, if desired.

5 The composition is free of inorganic acids and as produced is a powerful antiseptic and deodorant. At the same time it is non-corrosive, non-toxic and non-irritating to the skin.

10 While we have described certain specific examples of our preferred compounds, and compositions, it will be understood that equivalent materials may be used and substituted in place of those specifically mentioned herein without departing from the spirit of our invention and
15 the scope of the appended claims.

We claim:

1. In a deodorizing composition for menstrual and other secretions of the human body an active aromatic acid of phenolic character, hexamethylene-tetramine and a non-corrosive phenolic stabilizing material capable of preventing premature dissociation of said addition product, said hexamethylene-tetramine being combined at least in part with said acid in the form of a
25 loose addition product.

2. A composition of matter for deodorizing purposes comprising at least two aromatic acids one of which is a phenolic aromatic acid combined with hexamethylene-tetramine, and methylpara-hydroxybenzoate and piperonal.

3. A composition of matter for deodorizing purposes, containing an aromatic acid and an aldehyde base material chemically combined with said acid to render said compound water-soluble and non-corrosive together with a non-corrosive phenolic material capable of stabilizing said compound.

4. A composition of matter for the purpose described containing salicylic acid, benzoic acid, hexamethylene-tetramine, methylpara-hydroxybenzoate and piperonal, said acids being combined with at least part of said hexamethylene-tetramine in the form of a loose addition product.

5. A composition of matter for the purpose described containing approximately 100 parts salicylic acid, 85 parts benzoic acid, 243 parts hexamethylene-tetramine, 5 parts methylpara-hydroxybenzoate and 5 parts piperonal, said acids being combined with part of said hexamethylene-tetramine in the form of a loose addition product.

6. A composition of matter for the purpose described containing cinnamic acid, phenylacetic acid, hexamethylene tetramine, methylpara-hydroxybenzoate and piperonal, said acids being combined with at least part of said hexamethyl-

ene-tetramine in the form of a loose addition product.

7. A composition of matter containing approximately 70 parts cinnamic acid, 10 parts phenylacetic acid, 100 parts hexamethylene tetramine, 5 parts methylpara-hydroxybenzoate and 5 parts piperonal, said acids being combined with part of said hexamethylene-tetramine in the form of a loose addition product.

8. A deodorizing compound for secretions of the human body comprising a material of the group consisting of the aldehyde and ketone amino groups combined with an active aromatic acid to render the same non-corrosive and non-irritating and capable of going into chemical combination with the odor-giving ingredients of the secretions to effectively neutralize the odors.

9. A deodorizing compound for secretions of the human body comprising a material of the group consisting of the aldehyde and ketone amino group combined with an aromatic acid and a stabilizer capable of combining with any formaldehyde liberated from said material to render the same non-corrosive and non-irritating and capable of going into chemical combination with the odor-giving ingredients of the secretions to effectively neutralize the odors.

10. A composition of matter for deodorizing body secretions comprising a reaction product of an aromatic acid and an aldehyde-amine condensation product together with a non-corrosive phenolic stabilizing agent adapted to prevent premature dissociation of said reaction product and also to combine with any formaldehyde liberated from said condensation product.

11. A composition of matter for deodorizing body secretions comprising a reaction product of a phenylic acid of sufficiently active character to react with the odor imparting compounds of the body secretions with which the composition is to be employed, and an aldehyde-amine condensation product.

12. A composition of matter for deodorizing body secretions comprising a reaction product of a phenylic acid, the carboxylic group of which is not separated from the aromatic ring by more than a low number of carbon atoms and an aldehyde-amine condensation product together with a phenol ester stabilizing agent.

13. A composition of matter for deodorizing body secretions comprising a reaction product of a phenylic acid having not more than about 9 carbon atoms in the molecule and an aldehyde-amine condensation product together with a phenol ester stabilizing agent and piperonal.

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CERTIFICATE OF CORRECTION.

Patent No. 2,131,235.

September 27, 1938.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 52, for the word "losing" read loosing; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of November, A. D. 1938.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.