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DEPILATORY SOAP

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7 Claims. (Cl. 167—89)

The invention relates to soaps that are adapted for removing hair from the cuticle and more particularly it relates to a soap which will lather freely when applied to the skin and after remaining thereon for a few minutes, the hair and reaction products can be washed off with water without any injurious effects.

The invention contemplates the combination of depilatory material with a soap base or vehicle in such proportions that the mixture is efficient both as a depilatory and as a soap and is lacking in sufficient moisture content to permit hydrolysis prior to use. The invention also contemplates the use when desired of neutralizers and buffers as additional ingredients within limits providing a product which will suds or lather freely upon the addition of water, without irritation to the skin, which produces the desired depilatating effect, and which is lacking in sufficient moisture content to permit hydrolysis of the mixture prior to use. The basic principle of our invention is the dehydration of materials incorporated in the soap, such dehydration lowering the moisture content of the mixture sufficiently that hydrolysis will not occur until water is added at the time of use for forming a suds or lather. Avoidance of hydrolysis is successfully accomplished by dehydration of the soap base and of the depilatory materials as well as dehydration of other constituents, such, for example, as neutralizers and buffers. The purpose of dehydration is to prevent hydrolysis of the ingredients and subsequent formation of insoluble alkaline earth soap, sodium sulphide and hydrosulphide and hydrogen sulphide gas.

Any soap containing depilatory materials regardless of whether it is powder, cake, paste or liquid soap has sufficient moisture present to permit hydrolysis. The following formulæ are typical of the reactions resulting from hydrolysis of the soap, such reactions being avoided by dehydration of the materials within limits hereinafter designated

$$2BaS+2H_2O=Ba(OH)_2+Ba(HS)_2$$

$$4C_{17}H_{35}COONa+Ba(OH)_2+Ba(HS)_2=2Ba(OOC.C_{17}H_{35})_2+2NaHS+2NaOH$$

$$NaHS+H_2O=2NaOH+H_2S$$

In the above it is to be understood that Ba is the symbol for barium, given as an example of alkaline earth metals, for which strontium (Sr) and calcium (Ca) are equivalents. Such alkaline earth metals in the form of sulphides are known as depilatory materials. The material

$$C_{17}H_{35}COONa$$

is sodium stearate, which is representative of an alkali metal salt of a fatty acid, or a soluble soap. Other materials are commonly known soluble soaps.

Complete dehydration of the soap vehicle and of the depilatory and of other incorporated materials is the desirable procedure from an ideal standpoint and in practice we endeavor to accomplish this in so far as it is commercially feasible.

The invention has among its further objects the actual production of stable depilatory soaps in either cake, paste, powder or liquid form and a process for manufacturing the same so that the soaps may be conveniently stored; are subject to little or no hydrolysis while in storage, are capable of being easily handled and manipulated for application to the skin for the removal of hair, and permit the hair and reaction materials to be easily removed without injury to the epidermis and without the emanation of disagreeable odors.

Heretofore depilatories have not been commercially produced with a soap base because the mixture is chemically unstable, and becomes in time practically inactive due to the formation of reaction products which have little or no depilatory action.

It will be observed that only the intermediate reaction products possess the chemical property of removing hair, and that the end products are inert. It is believed that the active depilatory compound is the one containing the radical HS. When depilatories are combined with a soap base which has not been previously dehydrated, even when the mixture is in cake or powder form, the above decomposition products are gradually formed, and the mixture becomes inactive.

The invention, therefore, broadly contemplates a soap product having a depilatory action and an improved process for manufacturing the same whereby any depilatory material which normally decomposes in the presence of water and soap to release alkali-hydroxides and sulphide gases, may be incorporated with the soap base to produce a depilatory product in which the decomposition due to hydrolysis does not occur.

The dehydration of a selected soap vehicle and of the selected depilatory materials to the point where hydrolysis is inhibited, avoids the occurrence of the above designated and similar chemical reactions, and causes the depilatory material to retain its efficiency until the product is applied to the skin in the usual manner to form a moist suds or lather.

As an instance of manufacture we dehydrate powdered commercial soap until its moisture content is reduced to 1% or less. A non-aqueous liquid, preferably ethyl alcohol, higher alcohols, or polyhydric alcohols or any combination of these is added to the soap powder in an amount such that upon the addition of one of the above designated powdered dehydrated depilatories the product would be in the form of a slightly moist soap powder. The depilatory material thus added is first dehydrated until its moisture content by weight is not greater than one percent (1%). Said sudsing and depilatory results are obtained by adding sufficient dehydrated depilatory material that the dehydrated soap vehicle and depilatory materials are in the proportions by weight of two to one. In the event the finished product is to be in cake, paste or liquid form the same proportions of dehydrated soap and depilatory materials may be used as for the powdered product and to this is added non-aqueous liquids of the kind described in the amounts necessary to produce the particular physical state desired. It has been found by experiment that complete dehydration of the materials is not necessary if grain alcohol is added in an amount substantially equal to the moisture content of the other constituents. If amyl alcohol is used as the non-aqueous fluid, hydrolysis is inhibited if the ratio of the amyl alcohol to the moisture content is as great as 15% thereof. In all cases it is contemplated that the soap vehicle be present in sufficient proportions to provide a completed product which lathers or suds freely when applied to the skin. The above described proportions of soap vehicle is typical only and may be varied by several percent and the desired results achieved. If desired, dehydrated emollient materials beneficial to the skin may be added to either the cake, powder, paste or liquid product without affecting the stability. Starches, proteins, gums, colloids and lanolin are among the materials that have been found satisfactory for this purpose.

It is contemplated that a soap comprising only a dehydrated soap vehicle, dehydrated depilatory materials and non-aqueous liquids, will be stored in containers or wrappers that exclude the air and moisture, in which event there will be no possibility of incipient hydrolysis prior to use.

A dealkalizing agent or agents operating either separately or in combination to neutralize or offset the irritating action of free alkali hydroxides may be added. A variety of materials are contemplated as suitable for this purpose, such materials hereinafter being generally designated as dealkalizers. Among such dealkalizers are materials hereinafter more specifically designated as neutralizers, absorbers, amphoteric colloids and buffers.

The neutralizers which are found suitable to offset or neutralize the irritating effect upon the skin of the described alkali-hydroxide decomposition products include the weak inorganic acids such as boric acid; the weak organic monobasic or multibasic acids such as malic, malonic, fumaric, glycollic and succinic acids; the metallic and non-metallic oxides, which form double salts with alkali-hydroxides such for example as zinc oxide, zinc peroxide, boric oxide and aluminum oxide; and powdered amorphous metals soluble in alkalies, such as zinc powder and aluminum powder.

Colloidal clay, starches, gums and some of the amphoteric colloids are found satisfactory as absorbers. Among the amphoteric colloids found satisfactory as dealkalizers are included such proteins as gelatins, albumins, caseins and glutenins. Illustrative of the buffer materials are the weak acid salts of the alkali metals such for example as Rochelle salts, alkali silicates and alkali lactates. These ingredients are satisfactory as buffers where the alkali radicals of the buffers correspond with the alkali radicals of the soap. The dealkalizers are added to counteract the free alkali liberated by hydrolysis when moisture is added at the time of application. The material selected as a dealkalizer in any case is determined either by the consideration that the materials themselves are harmless or non-irritating to the skin, or have an emollient effect.

As an instance of manufacture wherein dealkalizers are used we add a neutralizer consisting of boric acid in approximately two (2%) percent by weight to the dehydrated soap vehicle and a depilatory comprising barium sulphide. As an example of an absorber we add gelatin or albumin in proportions by weight of approximately ten (10%) percent. As an absorber Rochelle salts in the amount of three (3%) percent by weight may be added.

The dehydration of the materials before incorporation results in a product which is incapable of hydrolysis by reason of its low moisture content and by enclosing the product in a moisture proof package it can be stored indefinitely without any deterioration. The ingredients may include from fifteen to forty percent of the suggested depilatory agents, preferably one of the alkaline earth sulphides, and dealkalizers to the extent of five to fifteen percent. One of the amphoteric colloids is suggested as generally suitable for a dealkalizer. Any one of the chemical reagents capable of functioning as a deordorant such as zinc oxide may be incorporated to the extent of two and one-half percent to ten percent. The combinations and proportions of ingredients herein specifically set forth are illustrative only and are obviously one of many such combinations and proportions coming within the scope of the invention, which upon substantial dehydration are suitable for use in producing a satisfactory and stable depilatory soap.

Thus it will be seen that the invention provides a novel depilatory and also a novel process for manufacturing depilatory soap from materials unfit by established practice for the purpose and by the teachings of the invention a new product having sudsing and detergent action as well as depilatory properties may be cheaply and economically manufactured and preserved in stable form for an indefinite period of time.

It will thus be understood that barium sulphide is an example of the depilatory sulphur-base compounds of the alkaline earths which are subject to hydrolysis in the presence of water to form other and different sulphides which have depilitating power. The soluble soaps also hydrolyze in water. Accordingly when a soluble soap and a depilitating sulphide are present together without a hydrolyzing quantity of water, as in dehydrated form, they form a stable depilatory composition. In the presence of sufficient water the substances hydrolyse, deteriorate, or interact, with numerous changes including formation of an active depilitating sulphur-base compound or sulphide of the base derived from the soap, and the formation of a scum or insoluble metal soap.

In accordance with the foregoing description and explanation of the invention, it will be un-

derstood that the essential ingredients are soluble soap and an alkaline earth sulphide; that the soap may be one of various soaps so long as it is reactive in the composition to form insoluble soaps; and that the alkaline earth sulphide may be one of many, varying both in the alkali earth metal, and in the relation of it to sulphur. Since the reaction to form insoluble soap is the essential reaction in the use of the compound, that reaction may be used as a basis for the amounts which are to be united to avoid excesses of one ingredient or the other. Any skilled chemist may write the reaction for the materials particularly selected and from the equation determine the reacting quantities to be employed. For example, where the essential reaction involves sodium palmitate and strontium sulphide it is written:

$$4C_{15}H_{31}COONa+2SrS+2H_2O= 2(C_{15}H_{31}COO)_2Sr+2NaHS+2NaOH$$

In the foregoing the reacting weights of soap and sulphide are respectively and approximately 278 and 260, or substantially equal parts. However, it will be understood that ordinary soaps are mixtures of different fatty acids and that for exact reactive proportions the analyses of products must be available.

It is not necessary however, to limit the invention to exact proportions. Excess soap does no harm, and is advantageous where a more permanent lather is desired upon application. Excess metal-sulphur element, say strontium sulphide, contributes its independent depilatory action.

For general purposes, then irrespective of the kind of material employed, the composition may be made from 20 to 75 parts of dehydrated soap, and from 15 to 40 parts of depilatory alkaline earth sulphide. Thus the soap tends to predominate and maintain a lather.

Having thus described our invention in a few typical forms, it is obvious that it is not so limited but that various modifications and changes may be made in the same without departing from the spirit thereof and we desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What we claim as new and desire to secure by Letters Patent is:

1. A depilatory composition comprising in physical admixture a substantially dehydrated alkaline earth metal depilatory sulphur-base compound, and a substantially dehydrated soluble soap capable of forming with said depilatory compound an insoluble soap, said materials being present together in the absence of any substantial amount of water which would if present cause hydrolysis of, or deterioration of, or interaction between said materials.

2. A depilatory composition comprising in physical admixture a substantially dehydrated alkaline earth metal depilatory sulphur-base compound, and a substantially soluble soap capable of forming with said depilatory compound an insoluble soap, said materials being present together in dry powder form.

3. A depilatory composition comprising in physical admixture a substantially dehydrated alkaline earth metal depilatory sulphur-base compound, and a substantially soluble soap capable of forming with said delipatory compound an insoluble soap, said materials being present together in liquid of non-hydrolyzing character in the absence of any substantial amount of water which would if present cause hydrolysis of, or deterioration of, or interaction between said materials.

4. A depilatory composition comprising in physical admixture a substantially dehydrated alkaline earth metal depilatory sulphur-base compound, and a substantially soluble soap capable of forming with said depilatory compound an insoluble soap, said materials being present together in an alcohol liquid medium in the absence of any substantial amount of water which would if present cause hydrolysis of, or deterioration of, or interaction between said materials.

5. A stable inactive depilatory composition comprising a mixture of barium sulphide and a soluble soap capable of forming an insoluble barium soap, said materials being present together in the substantial absence of hydrolyzing quantities of water.

6. A stable inactive depilatory composition comprising a dry mixture of depilatory alkaline earth sulphide and a soap reactive therewith in the presence of water to form an insoluble soap and a depilatory sulphide of the soap base.

7. A stable inactive depilatory composition comprising a dry mixture of depilatory alkaline earth sulphide, a soap reactive therewith in the presence of water to form an insoluble soap and a depilatory sulphide of the soap base, and an agent for absorbing the free alkali resulting from the action of water on said composition.

EMERY ROTH.
LEO SPIRA.

Certificate of Correction

Patent No. 1,982,268. November 27, 1934.

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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 1, line 47, (fourth line of tabulation) for "2NaOH" read *NaOH;* 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 25th day of December, A. D. 1934.

[SEAL] LESLIE FRAZER,
Acting Commissioner of Patents.

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7. A stable inactive depilatory composition comprising a dry mixture of depilatory alkaline earth sulphide, a soap reactive therewith in the presence of water to form an insoluble soap and a depilatory sulphide of the soap base, and an agent for absorbing the free alkali resulting from the action of water on said composition.

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