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DENTAL CREAM

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This invention relates to certain improvements in cosmetics and particularly to a new variety of toilet emulsions or creams differing from those now in common use by having as one of the basic ingredients a new and highly effective material that eliminates many of the undesirable characteristics of present day cosmetics and gives them several new advantages.

In making shaving creams, cleansing creams, vanishing creams, cold creams, dental creams, and many other similar preparations for toilet use, it has been customary to use soap; that is, alkali metal salts of fatty acids, as a base material or at least as an essential ingredient. Perfumes, fillers, glycerin, additional fatty acids, abrasives, preservatives, starch, waxes, mineral, animal, or vegetable oils, germicides, water and/or other ingredients are usually compounded with the soap to make the final cream. In all of the products made in this way there are certain disadvantages. Although the soap used is ordinarily "super fatted," that is, made to contain an excess of fatty acid so as to reduce to a minimum its alkalinity; nevertheless, it gives to the compositions an alkalinity that it is desirable to avoid. Also, soap forms insoluble curds with calcium and magnesium, both of which are commonly present in water, and the effectiveness of the soap detergent is thereby reduced.

Furthermore, acidic astringents, such as aluminum chloride, zinc sulfate, alum, and the like, cannot be included in the compositions; germicidal materials such as cresol, phenol, and resorcinols are rendered ineffective or less effective by the alkalinity of the soap; and the taste of the soap must be masked.

Of course, numerous attempts have been made to eliminate soap and its undesirable characteristics from toilet creams, but the results heretofore have not been encouraging.

According to the present invention, however, a new type of product is provided having as a basic or at least an essential ingredient, one or more of a new class of substances that are inexpensive and yet have the characteristics of mild taste and odor, excellent detergent and emulsifying properties, neutrality of reaction, and compatibility toward metallic salts.

The new ingredient has the distinct advantage of not being alkaline, not forming precipitates with hard or even sea water, and rinsing readily from the skin. In addition, the new ingredient is effective in its foaming and detergent properties at lower concentrations than soap, is compatible with numerous germicides, such as phenol, cresol, and the various resorcinols, and does not interfere with their germicidal action. Also, the new products may include acidic astringents such as aluminum chloride, zinc sulfate, alum, and organic materials not stable in the presence of

alkali such as isoeugenol, vanillin, and methyl anthranilate.

In addition to all of these advantages, the new products may be formed inexpensively, and the efficiency of the new products incorporating the new ingredient makes a lesser amount of these products able to perform the same service as would a larger amount of the corresponding soap-base product.

The essential feature of the new products is that they embody as the basic ingredient a new type of detergent material formed by the interaction of fatty oil, glycerin, and sulfuric acid, preferably just neutralized with caustic soda or other alkaline reagent. The detergent material that it has been found possible and advantageous to use for this purpose, together with certain processes for making it, are described in detail in United States patent applications 28,711 and 28,712 both by this inventor and both filed on June 27, 1935 which have issued as Patents Nos. 2,130,361 and 2,130,362. The present application is a continuation in part of those applications.

The detergent material can be prepared by mixing the fatty oil, glycerin, and sulfuric acid in any desired order, and thereafter subjecting the mixture to a temperature sufficient to cause them to react. The temperature necessary is usually quite low. Alternatively, the product may be formed by reacting the fatty oil and glycerin with the aid of heat and a catalyst, such, for example, as caustic soda, soap or an alcoholate, and thereafter treating the resulting product with sulfuric acid. Ordinarily, it will be found desirable to neutralize the resultant material before use.

In most cases fuming sulfuric acid and anhydrous glycerin will be used. The raw materials may be reacted either by batches or in a continuous manner by a suitable arrangement of apparatus, such as is shown in this applicant's Patent No. 2,130,361. One molecular proportion of fatty oil, two molecular proportions of glycerin, and a considerable excess over three molecular proportions of sulfuric acid have produced very fine products well suited for ordinary detergent use. In all cases the excess of sulfuric acid is either neutralized or removed before the material is used, and in most cases it has been found desirable also to neutralize; that is, form a salt of the reaction product itself.

To illustrate the general process of preparing materials of the type above described, a specific process may be cited which consists in reacting a quantity of fatty oil and glycerin, then treating the resulting product with sulfuric acid, and finally neutralizing. Thus, to 216 pounds of coconut oil, 64 pounds of anhydrous glycerin (99.5%) and 1.2 pounds of caustic soda have been added, and the mixture heated to 175 to 205° C.

for approximately an hour. The resulting product was found to be miscible with 95% ethyl alcohol. The use of caustic soda which acts as a catalyst may be eliminated if the temperature of the fatty oil and glycerin mixture is raised to 280–290° C. and held there until the product is homogeneous and soluble in 95% ethyl alcohol.

To 281 pounds of the product of this first reaction, 526 pounds of fuming sulfuric acid (102.8%) were added, and the mixture stirred at a temperature of around 40° C. until the resultant product was miscible with water. The product was then neutralized to a pH of about 6.0 to 7.0 with caustic soda, (it took around 815 pounds of a 50° Baumé solution) and thereafter dried by spraying as set forth in the United States patent to Dallas R. Lamont No. 1,652,900. Any other soap drying method could be used in place of this last step, however.

Sulfuric acid of the proportion and strength mentioned has been found sufficient to bring the reaction to completion by reacting with the glycerin-fatty oil compound and absorbing the water of reaction. It has been found that, in general, enough sulfuric acid should be provided to fulfill the molecular weight requirements, namely, three molecular weights for every two molecular weights of glycerin and one molecular weight of fatty oil, and that, in addition, there should be an excess of sulfuric acid sufficient to absorb one molecular weight of water for each molecular weight of sulfuric acid that is to enter the reaction. Since this water needs to be absorbed readily, it is preferable that the amount and concentration of the excess of sulfuric acid be such that, after absorbing the water, the concentration of the excess sulfuric acid will still be at least 95%. From this information the amount and concentration of the sulfuric acid, which it is desirable to use in any particular situation, may be readily calculated.

The dry neutralized material formed by using the quantities of raw materials specified above contains around 60% of sodium sulfate and 40% of the organic material, and will form a dry, granular, non-hygroscopic powder at room temperature.

As a specific example of a process of making the new detergents without preliminarily reacting the glycerin and fatty oil, there may be cited an occasion upon which 64 pounds of substantially anhydrous glycerin (99.5%) were mixed with 526 pounds of fuming sulfuric acid (102.8%) at around 30° C., and the mixture stirred with 216 pounds of coconut oil at a temperature of about 50° C. or slightly less. The reaction completed itself within approximately 40 minutes, and the product was thereafter neutralized at a temperature of about 40° C. with a 30% aqueous solution of caustic soda, to a pH of between 6.0 to 7.0.

The resultant solution contained about 46% total solids, of which around 40% was the organic reaction product and around 60% sodium sulphate. This combination of organic reaction product and sodium sulphate was found very satisfactory for many uses as a domestic detergent in place of soap. However, the percentage of sodium sulphate may be varied by a change in the proportion of sulfuric acid used, or may be removed entirely, either in the process of manufacture or from the finished product, if desired. To eliminate this sodium sulfate it has been found that, in general, it is easier to modify the original process by which the material is produced than to attempt to remove the sodium sulfate, once it has been formed in the composition.

As an example of a process by which the new materials may be formed and freed of inorganic salts, the fatty oil, glycerin, and sulfuric acid may be reacted as in the first example above. Then, instead of neutralizing with caustic soda, about 400 pounds of hydrated lime may be added to the mixture as a 10% slurry. Calcium sulfate will be formed from the excess sulfuric acid and lime, and will precipitate. The calcium salt of the detergent product being soluble, the mixture may be filtered to remove the calcium sulfate. Preferably, an amount of water equal to the amount of the solution is used to wash the calcium sulfate free of the calcium salt of the detergent product. The solution, containing the calcium salt, may then be evaporated, and the calcium salt itself may be used in cake or bar products. Alternatively, the calcium salt solution may be treated with a solution of a suitable calcium precipitant, as for instance, sodium carbonate or sodium phosphate or sodium oxalate, in an amount slightly in excess of that required to replace all of the calcium in the detergent with sodium and precipitate the calcium as the carbonate, phosphate or oxalate. After this precipitate is filtered off, the remaining solution is ready for concentration as desired.

In order to stabilize the new product, the solution may, if it is found necessary, be adjusted to a pH of 6.0 to 7.0. Thereafter, it may be concentrated by boiling until it has the correct solids content for whatever use it is required. The solution can be evaporated to form a solid product from a concentration of around 25% or over by spraying or by the use of drying rolls. The anhydrous product, free from inorganic salts, is soft and flexible when warm, but becomes quite hard and brittle at room temperature, and can be prepared as a powder.

In some instances, as has been indicated, it may be desirable to use the calcium salt of the new material directly without converting it into the sodium salt, and in other cases it may be to advantage to form the corresponding ammonium, triethanolamine, magnesium, potassium or other salts. These may be formed in the same manner as the sodium salts; that is, by substituting the corresponding ammonium, triethanolamine, magnesium, potassium or other salt for the sodium carbonate, phosphate or oxalate mentioned above. Alternatively, ammonia or triethanolamine may be added, together with carbon dioxide to precipitate the calcium, instead of adding their carbonates or oxalates.

The calcium salt may be dried over a heated roll. In this case, a low temperature of drying is desirable, since the product has a tendency to char. The use of a vacuum with the roll is desirable, or the product may be mixed to a slurry with a filler, such as calcium sulfate, chalk, bentonite, pumice or clay, and dried by means of the roll.

The salt-free product may, if desired, be formed from the final product made according to either of the first two examples by extracting the product with alcohol to remove the salt-free material and leave the inorganic salt. Instead, if desired, the product may be extracted before neutralization, but after sufficient dilution to prevent reaction, with butyl alcohol. The butyl alcohol solution is thereafter neutralized with caustics, or the like, to the proper pH of around 6.0 to 7.0. Other solvents can be used in place of the alcohol and butyl alcohol mentioned.

While coconut oil has been named in the above examples, it is to be understood that the use of other fatty oils will also result in satisfac-

tory products, varying proportions being used to compensate for their different molecular weights. Among the oils which have been satisfactorily used are tallow, soy bean oil, and palm oil. In fact, it has been found that oils ordinarily considered to be inferior for the purpose of making soap may be used according to this invention to produce products of a very good grade, and the use of even such materials as fish oils and garbage grease is within the scope of this invention. Also, glycol or other polyhydric alcohols may be substituted for glycerin, and other sulfonating or even phosphating compositions may be substituted for sulfuric acid. Fatty acid monoglycerides may also be formed by reaction with glycerin of fatty acids, naphthenic acids, abietic acid, or the carboxylic acids produced by the air oxidation of paraffin hydrocarbons, and thereafter, reacted with sulfuric acid substantially as indicated above.

Although the process of forming the new product has been described in the examples as though it were a batch process, it is contemplated that by suitable arrangement of equipment the reacting compounds can be caused to flow continuously through a system of apparatus, thus permitting raw materials to be reacted in a continuous process to produce the new products.

The detergent materials are salts of fatty acid glyceride sulfates, probably fatty acid monoglyceride monosulfates. Among the properties which serve to identify these materials and which greatly enhance the usefulness of the products containing them are the following:

(1) Most of their metal salts are soluble, including those of calcium, magnesium, and even silver and mercury.

(2) The material is substantially neutral.

(3) The surface tension of solutions thereof is extremely low.

(4) The foaming, emulsifying, and detergent properties are excellent.

According to the present invention, it has been found that these new materials may advantageously form the basic material or essential ingredient with which to compound other materials, such as perfumes, glycerin, fillers, stearic acid, water, preservatives, abrasives, flavoring materials, coloring materials, or whatever is found desirable to make a cream or salve or paste of the desired characteristics. The new material used in the creams or emulsions is very mild in both odor and taste, so that little flavoring or perfume need be used to mask the original flavor or odor. This is particularly important as regards taste in dental creams in which the addition of flavor should be for the purpose of producing a feeling of cleanliness and not for masking other flavors.

Besides the above mentioned, more or less common cosmetic ingredients, there may be incorporated numerous other materials that heretofore were excluded because they are not compatible with soap. Examples are germicides such as phenolic bodies, mildly acidic astringents such as aluminum chloride, alum and zinc sulfate, and organic flavoring compounds not stable toward alkali such as isoeugenol, vanillin, and methyl anthranilate.

Any of the organic materials described may be used in the new products either with or without the inorganic sulfate material, but it has been found particularly advantageous in most cases to use the organic materials without any appreciable quantity of the inorganic sulfate therein. Hence, in the following examples such material will be

used, although it is to be understood that the sulfate containing material is adaptable to this purpose and can be used if desired.

Particularly desirable products may be made by using the product of one molecular proportion of fatty oil, two molecular proportions of glycerin, and an excess over three molecular proportions of sulfuric acid, but the proportions may be varied somewhat and the resulting products still be satisfactory.

As examples of some compositions that may be prepared in accordance with this invention, the following may be cited, although obviously many more formulas of the type contemplated may be easily devised by application of the general principles involved:

Example 1

A shaving cream that is completely lacking in alkalinity may be prepared from a salt of the reaction product of one molecular proportion of fatty oil, two molecular proportions of glycerin, and an excess over three molecular proportions of sulfuric acid, the material being substantially free from sodium sulfate.

With this detergent material the shaving cream may be compounded by the following:

	Parts by weight
Detergent material.....	44.90
Water.....	36.22
Glycerin (98%).....	15.73
Stearic acid.....	2.37
Perfume.....	.78

The shaving cream so prepared is adapted to be applied with a brush, but the brushless type may be prepared by proper proportioning of the above ingredients. A noteworthy economy is effected by the use of products such as this in hard water districts, due to the complete solubility of the calcium and magnesium salts of the emulsifying material involved at the concentration and temperature employed in lathering, and the fact that the new products produce a lather readily and easily, even in sea water or very hard water.

Example 2

A dental cream formed from the detergent material mentioned in the above example has the distinct advantage of a mild taste. Alkalinity of the product is also avoided while at the same time an excellent detergent action is a characteristic. In addition, a wide variety of polishing materials, many of which are incompatible with soap, as for instance, dicalcium phosphate and magnesium hydroxide, may be used; and what little taste the composition possesses is easily masked by a mild flavoring agent.

A formula that has been found satisfactory is as follows:

	Parts by weight
Detergent material.....	1.2
Water.....	14.4
Glycerin.....	28.2
Calcium carbonate.....	45.7
Starch.....	7.0
Sodium benzoate.....	2.2
Flavoring material.....	1.3

Example 3

Face creams are generally prepared as water emulsions of stearic acid, using as an emulsifying agent, soap, such as that made from potash and stearic acid, borax and beeswax, or ethanalamine and stearic acid. All of these emulsifying

agents are alkaline, and the finished cream is also alkaline as a suitable indicator will show. The irritating effect of this alkalinity on the skin is even more pronounced than with soaps, for the compositions are deliberately massaged into the skin.

By compounding a cream of the following formula from the same emulsifying material as was used in the first example, these disadvantages are overcome, and a cream free from alkalinity is produced:

	Parts by weight
Emulsifying material.....	1.27
Water.....	63.24
Glycerin.....	9.17
Stearic acid.....	19.11
Mineral oil.....	1.92
Perfume.....	.29

Many substances, such as astringents, fillers, antiseptics or germicides, coloring agents, topical medicaments or deodorants, not mentioned in the specific examples, may be incorporated in any of the new products, providing only that they are compatible with the other ingredients. Since the new emulsifying material is compatible with almost anything except strong acids or strong

bases, this is no great limitation, and a wide variety of products may be prepared within the scope of the principles of this invention as defined in the appended claims.

I claim:

1. A dental cream comprising:

	Parts by weight
Detergent.....	about 1.2
Water.....	about 14.4
Glycerine.....	about 28.2
Calcium carbonate.....	about 45.7
Starch.....	about 7.0
Sodium benzoate.....	about 2.2
Flavoring material.....	about 1.3

the detergent being the sodium salt of the sulphuric acid ester of a fatty acid monoglyceride.

2. A dental cream that contains, as an essential ingredient, a salt of the sulphuric acid ester of a fatty acid monoglyceride and that also contains a polishing agent and a flavoring material.

3. A dental cream comprising a salt of the sulphuric acid ester of a fatty acid monoglyceride together with glycerine, calcium carbonate, and flavoring material.

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