

UNITED STATES PATENT OFFICE

2,264,737

WETTING, DETERGENT, AND EMULSIFYING AGENTS

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No Drawing. Application July 11, 1934,
Serial No. 734,697

11 Claims. (Cl. 260—459)

This invention relates to soap-like products and more particularly refers to the manufacture of soaps, detergents, wetting, emulsifying and stabilizing agents and the like, and to improvements in treatment liquids for use in the textile, leather, and other industries wherein soap or soap-like products have heretofore been used or are capable of use.

Water-soluble sulfuric esters produced by the action of sulfuric acid on fatty materials, including both fatty acids and esters of fatty acids, containing double linkages and/or hydroxyl groups, are widely employed as wetting, cleansing and dispersing agents in the textile and related industries. Thus a sulfuric acid ester of hydroxy stearic acid may be produced by treating oleic acid with sulfuric acid; and a sulfuric acid ester of a dihydroxy stearic acid may be obtained by the treatment of ricinoleic acid with sulfuric acid. These agents were not satisfactory, since the sulfated fatty materials heretofore available contained carboxyl groups, either free or combined, and in consequence were capable of forming insoluble alkaline earth salts. For instance, the difficultly soluble lime salts formed when these esters were added to hard water produced deleterious effects in the textile industry by precipitating from the solution and adhering to the textile materials. Such insoluble salts cannot be completely removed from the textile materials and impart a harsh, unpleasant feel thereto. Furthermore, fatty acids are quite susceptible to rancidity upon aging and fibers treated therewith are liable to acquire and retain a disagreeable odor.

It is an object of this invention to produce new soap-like materials having exceptionally satisfactory wetting, cleansing, stabilizing, dispersing and foaming properties. A further object is to produce detergents which may be substituted for or used in admixture with prior art detergents. A still further object is to obtain detergents, wetting and emulsifying agents which may be used in hard or acid water without the formation of deleterious constituents. A still further object is to produce superior dispersing agents. A still further object is to produce compounds heretofore unknown which are particularly adapted for use in the numerous processes wherein soap or soap-like products have been used in the past. Additional objects will become apparent from a consideration of the following description.

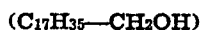
In accordance with the preferred embodiment of the present invention, the aforementioned defects as well as numerous other defects are in large measure avoided if, instead of fatty acids or the esters of these acids, the corresponding alcohols (which may be obtained therefrom by replacement of the carboxyl group whether free

or combined with the CH_2OH group) are treated with sulfuric acid or with other sulfating or sulfonating agents. Commercial fats are in general essentially mixed glycerides of the various higher fatty acids, and the higher alcohols obtainable therefrom are mixtures of alcohols of the general formula $\text{C}_n\text{H}_{2n-2}\text{—CH}_2\text{OH}$. These mixtures consist predominantly of normal primary alcohols having ten or more carbon atoms per molecule, corresponding in number of carbon atoms to the fatty acids, free or combined, contained in the natural fats and fatty oils and the other commercially available fatty materials from which they are derived. I have found that products soluble in water and valuable for use as wetting, cleansing, stabilizing, dispersing and foaming agents can be obtained by treating such alcohols with sulfuric acid or with other sulfating or sulfonating agents. These alcohols may for convenience be referred to collectively as normal primary alcohols having more than eight carbon atoms to the molecule.

Thus this invention contemplates the conversion of the free or combined fatty acids of fatty materials, i. e. animal and vegetable fats and oils, and manufactured derivatives such as oleic acid or ethyl oleate, into the corresponding alcohols, and the treatment of these alcohols with a sulfating or sulfonating agent such as sulfuric acid. Usually it is also advisable to neutralize the reaction product with an inorganic or an organic base, for example sodium hydroxide, ammonia, pyridine or triethanolamine to form a water-soluble soap-like salt.

The precise nature of the method selected to convert the fatty material to the alcohol may be varied. For instance, a well known method is that of Bouveault and Blanc, in accordance with which an alkyl ester of a fatty acid, e. g. an ethyl oleate, is reduced by sodium or other alkali metal and a lower aliphatic alcohol such as butyl alcohol, or the improved method described in my application for Letters Patent Serial No. 472,764 may be used. Numerous processes are known for preparing the alkyl esters from fats and fatty acids and are contemplated herein.

The Bouveault and Blanc process is of general application for the preparation of both unsaturated and saturated alcohols. For instance, by this process oleyl alcohol ($\text{C}_{17}\text{H}_{33}\text{—CH}_2\text{OH}$) may be prepared from esters of oleic acid ($\text{C}_{17}\text{H}_{33}\text{COOH}$). An octodecyl alcohol



may be formed from esters of stearic acid

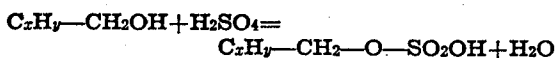


Mixed saturated and unsaturated alcohols result when the unfractionated esters of the fatty acids

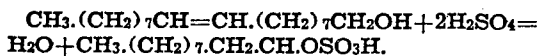
of most natural fats, for example, tallow, are reduced according to the Bouveault and Blanc process.

A very satisfactory method for preparing predominantly saturated alcohols is catalytic hydrogenation of esters under high pressure, as described in the application for U. S. Letters Patent of Wilhelm Normann, Serial No. 510,326, filed January 21, 1931, and assigned to the assignee of the present application. This method may be applied directly to the conversion of the natural glycerides, such as coconut or palm kernel oil, to primary alcohols for use in accordance with the present invention.

Fatty alcohols obtained from the sources described may next be treated with a sulfating agent having water-binding properties. Ordinarily concentrated sulfuric acid may be used, or stronger reagents such as anhydrous sulfuric acid, chlorosulfonic acid, or fuming sulfuric acid. The principal reaction occurring is the formation of sulfuric esters, frequently called alkyl sulfuric acids, for instance, as follows:



In the case of an unsaturated alcohol, some addition of sulfuric acid at the double bond may also occur, so that complete reaction of sulfuric acid with oleyl alcohol might be according to the equation:

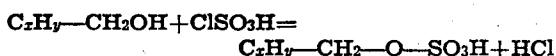


(CH₂)₇CH₂.OSO₃H
sulfuric ester of 1,9-octadecandiol

Unless a higher temperature is required to melt the alcohol I prefer to effect sulfation in the cold within the range of ordinary room temperature or lower, down to about 0° C. However, higher and lower temperatures can be used, and my invention is not restricted to a particular range of temperature of sulfation.

Under almost any practical conditions of sulfation, there may be formed at least traces of sulfonic acids, the proportion of which may be increased by choice of sulfating medium and other conditions of reaction, for instance, by high reaction temperatures and by the use of highly concentrated energetically acting reagents such as fuming sulfuric acid. While these are not my preferred reaction conditions, it should be understood that the sulfation products made in accordance with the present invention are not purely esters, but may contain also appreciable amounts of sulfonic acids or sulfonates. For convenience, the products resulting from the treatment with sulfuric acid or other agents such as those hereinbefore mentioned will be referred to generically as "sulfuric reaction products."

One method of sulfating which is of fairly general application to different alcohol mixtures is to treat the alcohol just above its melting point with 100-110% of the theoretical quantity of chlorosulfonic acid required according to the equation:



The acid reaction products obtained as described above are preferably carefully neutralized, for instance, with sodium hydroxide. Neutralization should ordinarily be carried out at relatively low temperatures, preferably in a vessel fitted with a means for cooling. The resulting

alcohol salts such as sodium lauryl sulfate may be separated from inorganic components such as sodium sulfate and sodium chloride by known methods, for instance, by dissolving in ethyl alcohol, decanting or filtering, and evaporating off the solvent. With or without this purification, the products obtained are in general readily soluble in water, possess marked wetting, cleansing, stabilizing, dispersing and foaming properties, and may be employed for manifold purposes wherein soap or soap-like substances were heretofore used. For use in soft, hard or acid water they are pronouncedly superior to soap or the soap-like substances of the prior art.

The sulfated products of oleyl alcohol are particularly resistant to hardness and are highly suitable for use in the textile and related industries. Probably due to the unsaturated nature of the alcohol from which these esters are derived they possess properties which make them well adapted for use alone or in admixture with saturated alcohols or derivatives of saturated alcohols.

A high resistance to the action of hard water is shown by the sulfated products of lauryl alcohol, which is the principal constituent of the mixed alcohols obtained by reduction of coconut, palm kernel and similar oils, or by reduction of the alkyl esters or the free fatty acids of these oils. Sulfated alcohols of this class have remarkable cleansing, collecting and foaming properties, and are valuable as soap substitutes, especially for use in hard water.

The sulfuric reaction products derived from lauryl alcohol, especially the esters and salts thereof, are also found to be particularly effective in the textile industry. Thus when starting from the fatty alcohols made from free fatty acids of the coconut oil or palm seed oil according to known processes, for instance, by esterifying the fatty acids of the same with lower aliphatic alcohols and reducing the mixture of esters by means of sodium in the presence of an alcohol, it is advantageous to remove by distillation portions of the reduction products and thereby increase the proportion of lauryl alcohol in the mixture to be sulfonated. Such a mixture may contain higher and/or lower homologues of lauryl alcohol depending upon the object in view. It should be understood, however, that the presence of the sulfuric derivatives of lower and/or higher alcohols, such as of decyl, myristyl and stearyl alcohols with the lauryl alcohol derivatives does not materially decrease the efficiency of the final product.

Numerous higher alcohols may be produced and converted into wetting and cleansing agents, substantially according to the procedures described above, for instance the following:

Alcohols obtained by catalytic hydrogenation of the free fatty acids of coconut oil and comprising mainly lauryl alcohol, myristyl alcohol, cetyl alcohol and stearyl alcohol or the single alcohols separated from each other by fractional distillation, or crystallization.

Alcohols obtained by catalytic hydrogenation of palm kernel oil or of the free fatty acids of palm kernel oil comprising similar constituents although in somewhat different proportions as the alcohols obtained from coconut oil.

Alcohols obtained by saponification of spermaceti, sperm oil, beeswax and distillation according to Axelrad and Hochstadter (U. S. A. Patent 1,290,870).

Linoleic alcohol obtained by reduction of linoleic acid by means of sodium and ethyl alcohol.

Alcohols obtained by catalytic reduction of tallow or the free fatty acids of tallow.

Alcohols obtained by reducing olive oil by means of metallic sodium and butyl alcohol.

Alcohols obtained by reducing the ethyl esters of tallow fatty acids by means of metallic sodium and butyl alcohol.

Alcohols obtained by catalytic hydrogenation of the ethyl ester of commercial stearic acid.

Ricinoleic alcohol obtained by reduction of ricinoleic acid by means of sodium and ethyl alcohol.

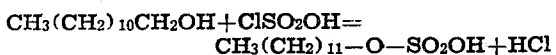
Additional sources of alcohols according to the above or related processes are montan wax, carnauba wax, lard oil, sperm train oil, docolin train oil, ocotilla wax and various other oils and waxes of fish, animal or vegetable origin.

The following examples are given to illustrate the manner in which the process may be carried out:

Example 1

100 kgs. of a mixture of fatty alcohols mainly consisting of lauryl alcohol, and obtained from coconut oil by esterification of the fatty acids with ethyl alcohol, reduction of the ethyl ester, distillation of the product of the reduction and collection of the first 50-60% of the distillate, are heated to melting temperature about 30° C. and treated at this temperature with 50 kgs. of chlorosulfonic acid.

The foregoing reaction may be represented by the following formula:



100 kgs. of pure lauryl alcohol would require for best results a higher proportion of chlorosulfonic acid, about 60 kgs.

Example 2

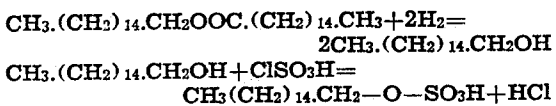
100 kgs. of the same mixture of fatty alcohols is sulfonated with 70 kgs. of fuming sulfuric acid at the temperature of 150° C.

The products of the reaction are directly neutralized by means of soda lye and separated by known methods from inorganic components such as sodium sulfate or sodium chloride.

Example 3

100 kgs. of a mixture of fatty alcohols obtained by the catalytic reduction of spermaceti with hydrogen, using a copper catalyst, a temperature between 300-350° C. and a pressure of 150-200 atmospheres until the acid number has wholly disappeared, are sulfonated at a temperature of 35° C. with 60 kgs. of chlorosulfonic acid. The product is poured in 200 kgs. of ice water and is then neutralized by means of a potassium hydroxide solution. There results a white paste readily soluble in water.

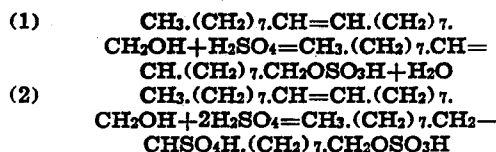
The reactions occurring can be illustrated by the following equations:



Example 4

100 kgs. of oleic alcohol are sulfated at 25° C. with 80 kgs. of concentrated sulfuric acid. The mixture is poured into 150 kgs. of ice water and is neutralized by means of piperidine.

The sulfation reactions may be illustrated by the following equations:

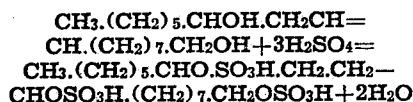


Example 5

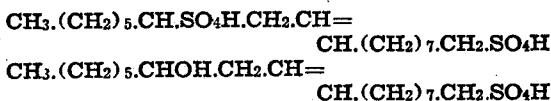
100 kgs. of a mixture of unsaturated and saturated fatty alcohols were obtained by reduction of coconut oil by means of an alkali metal and butyl alcohol, adding water, separating the resulting watery alkali hydroxide solution and removing the butyl alcohol by distillation. The resulting alcohols were treated with 80 kgs. of chlorosulfonic acid at 35° C. The product was worked up as described in Example 3 and neutralized with sodium hydroxide solution to form a white, readily water-soluble paste.

Example 6

100 kgs. of ricinoleic alcohol were obtained by reduction of ricinoleic acid by means of sodium and amyl alcohol, adding water, separating the watery alkali hydroxide solution and removing the amyl alcohol by distillation. The residue was treated with 150 kgs. of concentrated sulfuric acid at a temperature between 10 and 20° C. The product is worked up as described in Example 3 and neutralized by means of equal parts of sodium hydroxide solution and potassium hydroxide solution. An oily product readily soluble in water was obtained. The main reaction is probably represented by the following equation:



Besides this reaction there may be also a reaction of only two or only one of the free groups (two hydroxyl groups and one double linkage) capable of reaction with sulfating means. These reactions yield for example the following products:



Example 7

100 kgs. of stearic alcohol are treated at 40-50° C. with 50 kgs. of chlorosulfonic acid. The product is worked up as described in Example 3. A white paste is obtained. The reaction can be illustrated by the following formulae:



Example 8

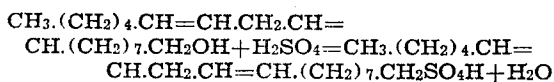
100 kgs. of a mixture of the alcohols obtained by saponification of spermaceti oil by means of caustic lime and distillation of the saponification product according to U. S. A. Patent 1,290,870, said alcohols having an iodine number of about 50 and consisting mainly of cetyl alcohol and oleic alcohol, are mixed with 100 kgs. of concentrated sulfuric acid at 40° C. The mass is then poured into 200 kgs. of ice water. The mixture is neutralized by adding sodium hydroxide solution of 28° Bé. The resulting solution containing 15-20% calculated on free fatty alcohol,

is introduced in a spraying drier of the Krause system and dried at a temperature between 75–80° C. the temperature of the hot air entering at the bottom of drier being about 170° C. Before or after the drying operation such quantities of Glauber's salt may be added to the solution or to the dried product respectively, that the final product contains for example 35% calculated on free fatty alcohol.

Example 9

100 kgs. of linoleic alcohol obtained by reduction of linoleic acid by means of an alkali metal and ethyl alcohol in a manner known per se, are dissolved in 50 kgs. of water free ethyl ether and treated with 200 kgs. of concentrated sulfuric acid at a temperature between 0–5° C. for several hours. The product is mixed with 300 kgs. chopped ice and 50 kgs. ethyl ether, washed with saturated Glauber's salt solution and neutralized by means of triethanolamine.

The reaction is probably represented by the following equation:



Besides the esterification of the CH₂OH group addition of sulfuric or sulfonic acid to one or both of the double linkages may also occur.

The more volatile portion of the mixture of alcohols obtained from coconut oil as described in Example 1 may be removed therefrom by distillation. The residue consists essentially of lauryl alcohol with smaller portions of myristyl and higher alcohols and possibly traces of decyl and/or lower alcohols. Upon sulfonation of this mixture as described in Example 1 or 2 and neutralization of the resulting derivatives with salts of sodium, potassium, ammonium, calcium, lithium and/or magnesium, etc. detergents having very satisfactory characteristics are obtained. The sodium and other salts of these derivatives have been found to be of particular value when substituted for or used in admixture with soap or soap-like products. For example, in scouring textiles of all types including wool, silk, cotton, regenerated cellulose or mixtures thereof; in the production of dyes and pigments and in the application of said dyes and pigments to textile materials, to rubber and rubber-like substances, to plastics such as natural and synthetic resins, etc.; in the concentration of latex without coagulation of the concentrated latex; in forming aqueous emulsions of mineral oils and derivatives thereof including asphalt, rubber or rubber-like substances. In carrying out the foregoing processes as well as the innumerable other processes suggested thereby or related thereto it is frequently desirable to incorporate free alcohols in the treatment. These alcohols may advisably correspond to the ester or esters utilized or to homologues thereof, preferably but not necessarily containing from eight to eighteen carbon atoms. The proportion of such alcohols may vary from traces to many times the amount of esters present, and in some cases the described alcohols or mixtures thereof may practically be substituted for the esters, particularly when incorporating pigments or other solid materials into substances such as rubber, natural and synthetic resins, etc.

The following fatty materials have been found particularly suitable for conversion to alcohols and thence to sulfuric acid derivatives: tallow, 75

lard, whale oil, coconut oil, palm kernel oil, palm oil, olive oil, castor oil, linseed oil, tall oil, technical stearic acid, technical oleic acid and ricinoleic acid, palmitic acid, tallow fatty acids, Japan wax, spermaceti, sperm oil, herring oil, beeswax, montan wax, methyl, ethyl, propyl and butyl esters of technical fatty acid mixtures such as stearic acids, oleic acids, tallow fatty acids, linseed oil fatty acids and whale oil fatty acids.

Alcohols coming within the scope of this invention are, as previously mentioned, advantageously sulfated with concentrated or fuming sulfuric acid or chlorosulfonic acid and at reduced temperatures within the range of 0–30° C. or at temperatures wherein the alcohols are present in the liquid phase. This treatment may be carried out in the presence of organic solvents or diluents and likewise in the presence of water-binding agents such as acid anhydrides or anhydrous acids, for instance acetic anhydride, phthalic anhydride and sulfur trioxide.

Prior to or simultaneously with the aforementioned sulfation treatment the alcohols or mixtures thereof may be treated with other reagents of an acidic nature. Such reagents may be of organic or inorganic origin, for example, boric, phosphoric, acetic, sulfurous, hydrochloric, hydrobromic, nitrous, nitric, propionic, butyric, benzoic, phthalic, sulfanilic, naphthionic and/or related acids or derivatives thereof which have an acid character. The amounts of such acids or derivatives thereof including their anhydrides which are used may vary widely depending upon the alcohols treated, the strength of the reagents and the objects in view. Treatment with the aforementioned substances is preferably carried out prior to treatment with the sulfating medium but may also be carried out simultaneously with such sulfation treatment, or even subsequent thereto if the sulfation treatment is of a relatively mild nature.

Where the alcohol is of an unsaturated nature the aforementioned treatment is of particular value. As illustrative of this principal, oleyl alcohol or mixtures thereof with saturated and/or unsaturated alcohols, particularly with alcohols previously described herein, may first be treated with acetic acid or its anhydride. The resulting acetylated product may then be treated with chlorosulfonic acid. The products of this combined treatment are probably mixtures of oleyl alcohol derivatives containing one or more sulfate groups which in some molecules are partially replaced by acetate groups, and also by a small proportion of sulfonate groups. The particular type of product will in great measure depend upon the intensity of the sulfation treatment. Regardless of the heterogeneous reactions which take place the product is of pronounced value because of its detergent, wetting out and emulsifying properties. It is excellent adapted for the uses previously described, either alone or in admixture with other detergent, wetting out and emulsifying agents, including those described herein.

It may here be mentioned that the described alcohols esterified with inorganic or organic acids or substances of acidic nature but untreated with sulfating agents in many cases possess detergent, wetting out, stabilizing and emulsifying properties of their own and may be used as such without subjection to sulfation treatment or may be used in admixture with such products after sulfation treatment and/or in

admixture with alcohols which have been esterified solely with sulfating agents.

The esterified products comprised within the scope of the present invention are advisably neutralized with inorganic or organic salt-forming compounds, and preferably those salts or bases which form water-soluble derivatives therewith. Compounds which are representative of this category are soda ash, caustic soda, ammonium hydroxide, lithium chloride, magnesium chloride, pyridine, piperidine, diethanolamine, triethanolamine, mono-methylamine, dimethylamine, cyclohexylamine, mono- and dialkyl-cyclohexylamine, etc.

The aforementioned products, particularly the esterified higher normal primary alcohol and preferably the water-soluble salts of sulfate esters of normal primary alcohols containing from twelve to eighteen carbon atoms are of distinct utility in the detergent, emulsifying, wetting out and frothing field. They are well adapted for use in the various processes wherein soap or soap-like substances have been used in the past. These new compounds may be used alone and/or in admixture with other compounds described herein and/or in admixture with soap or soap-like substances and including the various assistants which have heretofore been used to enhance the properties of soap or soap-like substances. In other words, wherever it was known to use soap or soap-like substances in the prior art it is to be understood that part or all of said substances might be replaced by the previously described compounds. Examples of a few uses suggested thereby are: in the leather industry as in the dyeing, tanning, treating and other processing of leather; in the textile industry, as in the washing of cotton, wool, silk, regenerated cellulose and other natural and synthetic materials as well as combinations thereof, in the weighting of wool or other substances having an affinity therefor, in the production of pigments and dyes and in their application to textile or other material; in the manufacture or treatment of soaps, cosmetics, tooth pastes and powders, salves, creams, boring oils, coating materials, stencils, inks, dust-binding agents, insecticides, medicinal and other emulsions, polishes, waxes, foodstuffs, lubricating media, insulating media, paints, varnishes, lacquers, plastic compositions, latex, synthetic and natural rubber products and perfumes.

As a general rule it may be stated that for detergent, emulsifying, wetting out and frothing purposes water-soluble salts of sulfate esters of normal primary alcohols having from twelve to eighteen carbon atoms are preferred. Derivatives of lower or higher molecular weight alcohols may also be used although they are ordinarily not so efficacious. The presence of corresponding free alcohols or their homologues is frequently advantageous for this purpose. Where an intimate mixture of non-analogous solids is desired the higher fatty alcohols may advisably be used alone or in conjunction with the aforementioned esters or their previously described derivatives.

The present invention is in part disclosed in my prior applications Serial Nos. 350,135, filed March 26, 1929, now Patent No. 1,968,793; 382,078, filed July 29, 1929, now abandoned after transferring its subject matter and claims to the Application Serial No. 448,806; 433,815, filed March 6, 1930, now Patent No. 1,968,794; 448,806, filed April 30, 1930, now Pat-

ent No. 1,968,795; and 650,203, filed January 4, 1933, now Patent No. 1,968,797, of which the present application is a continuation in part.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. Compounds having the following general formula:



wherein R is an open chain hydrocarbon radical containing at least eight carbon atoms, X is an acid group other than $-\text{COOH}$, Y is a sulfate group, and n is an integer.

2. The compounds described in claim 1 characterized in that the group defined by X is of inorganic origin.

3. The compounds described in claim 1 characterized in that the group defined by X is of organic origin.

4. The compounds described in claim 1 characterized in that the group defined by X is a member selected from the class consisting of borate, phosphate, acetate, sulfonate, chloride, bromide, nitrite, nitrate, propionate, butyrate, benzoate, phthalate, phenylamino-sulfonate, and naphthionate, groups.

5. Wetting, detergent and emulsifying agents characterized in that the carboxyl group of fatty acid esters having more than 8 carbon atoms in the acid radical is changed to a methylene sulfonate group, and further characterized in that additional groups of an acidic nature are substituted thereon.

6. Wetting, detergent, and emulsifying agents characterized in that the carboxyl group of fatty acid esters having more than 8 carbon atoms in the acid radical is changed to a methylene sulfate group, and further characterized in that additional groups of an acidic nature are substituted thereon.

7. Wetting, detergent and emulsifying agents characterized in that the carboxyl group of fatty acid esters having more than 8 carbon atoms in the acid radical is changed to a $-\text{CH}_2\text{SO}_3\text{H}$ group, and further characterized in that additional groups of an acidic nature are substituted thereon.

8. In the production of compounds suitable as wetting, detergent and emulsifying agents, the steps which comprise catalytically hydrogenating a fatty material to form a higher molecular alcohol corresponding to a fatty acid radical of said fatty material, introducing into the molecule with the higher molecular alkyl radical of said alcohol a polybasic acid radical whereby a compound is formed having oil solubilizing characteristics imparted by the higher molecular alkyl radical and water solubility by the acid radical.

9. In the production of compounds suitable as wetting, detergent and emulsifying agents, the steps which comprise subjecting a fatty material to catalytic hydrogenation at an elevated temperature and pressure, thereby forming a higher molecular alcohol, and introducing into the molecule with the higher molecular alkyl radical a sulfonate radical whereby a compound is formed having oil solubilizing characteristics imparted thereto by the higher molecular alkyl group and water solubility by the sulfonate radical.

10. A wetting, detergent and emulsifying agent composed of a mixture of compounds having oil solubilizing characteristics imparted thereto by higher molecular alkyl radicals and water solubility by sulfonate groups, said higher molecular alkyl radicals being obtained through catalytic hydrogenation of a fatty material.

11. A composition of matter having wetting, cleaning and emulsifying properties consisting of

sulfonated compounds free of carboxyl radicals, which compounds have higher molecular alkyl radicals imparting oil solubilizing properties and neutralized sulfonate groups which impart water solubility; said higher molecular alkyl radicals being those of higher molecular alcohols obtained by the elevated temperature and pressure catalytic hydrogenation of a fatty material.

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