

## UNITED STATES PATENT OFFICE

2,114,490

## EMULSION

Benjamin R. Harris, Chicago, Ill.

No Drawing. Application September 27, 1937,  
Serial No. 165,901

11 Claims. (Cl. 167—91)

My invention relates to water-oil emulsions and processes of producing the same. The present invention is a continuation in part of my prior application Serial No. 709,022, filed January 30, 1934, which, in turn, is a division of my prior application Serial No. 431,964, filed February 27, 1930, which has issued as Patent No. 2,109,842.

In the art of making water-in-oil emulsions and oil-in-water emulsions, it is customary to bring the ingredients into intimate contact with each other by shaking, agitating, beating, homogenizing, grinding, working in a colloid mill or using some other means for the purpose of subdividing the disperse phase in intimate contact with the continuous phase, and, generally speaking, in the presence of a suitable emulsifying agent.

Some of the better known emulsions of this kind are, for example, oleomargarine, which is essentially an emulsion of oils and fats and water with finely subdivided clotted casein as the emulsifying agent; vanishing cream, which is stearic acid emulsified with potassium or sodium soap in water; cold creams which are essentially emulsions of oleaginous materials with soap and water; certain types of furniture polishes, which likewise are emulsions of various kinds of oils, among them mineral oil and turpentine and water or other aqueous liquid with a suitable emulsifying agent; bread doughs and cake batters, etc.

The above emulsions are generally made of vegetable, animal and/or mineral oils and fats, depending upon the nature of the emulsion, which are for all practical purposes immiscible with water and/or aqueous liquids. By the addition of substances of a class which I term hydrophillic lipins, however, and which contain free OH groups, such emulsions are stabilized by the emulsifying action of the hydrophillic lipin and greatly improved results are obtained.

One of the principal objects of my invention is to stabilize emulsions of this general character.

I have found that emulsions of the general character described above, as well as other emulsions comprising oleaginous and fatty materials and water or aqueous liquids, may be appreciably improved by the introduction of a proportion of certain types of materials, which I designate as hydrophillic lipins and which are described in greater detail hereinafter. In certain cases, if desired, the oleaginous substance may be entirely replaced by hydrophillic lipins.

One of the principal differences between my hydrophillic lipins and the oleaginous substances used heretofore in water and oil emulsions is that

my substances have a more or less marked affinity for water and aqueous liquids, whereas, the oleaginous substances used heretofore, such as corn oil, cottonseed oil, various marine oils, linseed oil, tung oil, oleo oil, beef stearine, turpentine, liquid paraffin, etc., are distinctly immiscible with water, are not readily wetted by water to any appreciable extent and do not show the affinity for water which characterize, in part, my hydrophillic lipins.

Generally speaking, the hydrophillic properties of my lipins manifest themselves by capacity, in varying degrees, to imbibe water, to be wetted by water and to foam or froth with water. It is common knowledge to those skilled in the art that the fats and oils heretofore used are, generally speaking, notably deficient in this capacity.

In general, my hydrophillic lipins are characterized by the presence of a group of moderately high molecular weight, say, from about six carbons up, and of predominantly oleaginous or hydrocarbon characteristics, which imparts the strictly oleaginous character to a portion of the hydrophillic lipin molecule and another group, or association of groups, with at least one unesterified hydroxy group attached to carbon and with distinctly hydrophillic characteristics; that is, a group which imparts to the molecule as a whole a certain degree of affinity for water and aqueous media not possessed by the oleaginous materials such as linseed oil, lard, petrolatum, soya bean oil, etc., heretofore used in water and oil emulsions.

Among the hydrophillic lipins which are of value are:

1. Mono-oleic acid ester of sucrose
2. Mono-lauric acid ester of dextrose
3. Mono-stearic acid ester of fructose
4. Mono-stearic acid ester of mannitol
5. Coconut oil mixed fatty acid mono-esters of maltose
6. Di-palmitic acid ester of sucrose
7. Mono-ricinoleic acid ester of levulose
8. Mono-lauric acid ester of sorbitol
9. Di-caproic acid ester of maltose
10. Mono-lauric acid ester of mannitol
11. Mono-oleic acid ester of mannitol
12. Mono-oleic acid ester of sorbitol

I may employ various sugars and sugar alcohols as polyhydroxy substances, which may be partially esterified with higher aliphatic or fatty acids to produce the hydrophillic lipins which I employ in accordance with the principles of my invention. These sugars include the monosaccharides, di-

saccharides, trisaccharides and the like among which are specifically sucrose, dextrose, galactose, lactose, maltose, mannose, levulose, xylose, arabinose, rhamnose and raffinose. Among the sugar alcohols are mannitol, sorbitol, dulcitol, arabitol and the like.

The higher molecular weight aliphatic and fatty acids with which the sugars and sugar alcohols are partially esterified include the following: caproic acid, caprylic acid, capric acid, saturated and unsaturated higher aliphatic acids such as the higher fatty acids containing preferably from twelve to eighteen carbon atoms and including stearic acid, oleic acid, ricinoleic acid, palmitic acid, melissic acid, hydroxystearic acid, mixed higher fatty acids derived from animal or vegetable sources as, for example, from lard, coconut oil, sesame oil, corn oil, soya bean oil, sardine and other fish oils, partially or completely hydrogenated animal and vegetable oils such as those mentioned, fatty acids derived from various waxes such as beeswax, spermaceti, and carnauba wax, and carboxylic acids derived, by oxidation and other methods, from petroleum or other hydrocarbons. Other acids which may be employed are naphthenic acid and hydroaromatic acids such as abietic acid and the like.

In cosmetic cream formulae where lanolin is used, it is possible in some cases to entirely replace and in most cases to partially substitute my hydrophillic lipins for said lanolin and the same is true in cosmetic formulae where beeswax is normally employed.

In cosmetic cold cream formulae, which contain a proportion of white vaseline or oils or fats, a part of the fatty ingredient may be substituted with the hydrophillic lipin to give desirable results. Thus, for example, in the following formula:

|                                    |                        |      |
|------------------------------------|------------------------|------|
| Stearic acid.....                  | grams.....             | 1000 |
| Lard.....                          | do.....                | 200  |
| Ammonia water (sp. gr. 0.880)..... |                        |      |
| .....                              | cubic centimeters..... | 100  |
| Distilled water.....               | do.....                | 7700 |
| Scent.....                         |                        |      |

The lard may be advantageously replaced by 200 grams of mono-oleic acid ester of sucrose. When this change is made, the saponification of the stearic acid with the ammonia is carried out first, after which the lipin is introduced; in other respects, the usual procedure for making a face cream of this type may be followed.

Another example of my invention may be carried out in the manufacture of vanishing cream as follows:

|                                         |       |
|-----------------------------------------|-------|
|                                         | Grams |
| Rosewater.....                          | 1500  |
| Glycerine.....                          | 300   |
| Stearic acid.....                       | 120   |
| Potassium hydroxide.....                | 12    |
| Monostearic acid ester of fructose..... | 60    |

The ingredients, exclusive of the lipins, are warmed to saponify the stearic acid and agitated together in the usual order and manner by means of a suitable stirring apparatus. Finally, while still warm, the hydrophillic lipin is added to the mixture with stirring. A suitable amount of coloring and scent material may be added; other ingredients also may be added, such as starch, zinc oxide, and other medicaments.

It will seem that one outstanding characteristic of the constitutional structure of my hydrophillic lipins is that the fatty character of the otherwise oleaginous molecule is partly offset and

attenuated by the presence of hydrophillic hydroxy groups attached to carbon.

I have found that the degree of the attenuation of the oleaginous characteristics is by no means the same in different hydrophillic lipins, but varies, first, with the number and character of the free hydroxyl groups present, and, second, with the mass and character of the oleaginous group or groups. Thus, for example, monostearyl glucose is more hydrophillic and a better emulsifying agent than distearyl glucose, in view of the fact that the former has four free hydroxy groups, whereas the latter has only three free hydroxy groups.

It is by no means to be understood that my hydrophillic lipins are limited to the particular substances specifically named in this specification by way of example. Other organic water-soluble polyhydroxy substances may be used, in which one or more than one hydroxyl is converted into an ester group with a high molecular weight fatty acid or derivative thereof having at least six carbon atoms, and preferably twelve to eighteen carbon atoms, there being at least one and preferably several free or unesterified hydroxyl groups attached to the polyhydroxy nucleus.

Besides the manufacture of cosmetic creams, my hydrophillic lipins may also be used for the manufacture of furniture polishes, mineral oil, turpentine and water emulsions and other oleaginous emulsions containing animal and vegetable fats and oils such as corn oil, cottonseed oil, marine oils, tung oil, oleo oil, beef stearine, lard, soy bean oil, linseed oil, and mineral oils such as liquid paraffin, kerosene, petrolatum, and oleaginous substances such as turpentine, etc.

It will, of course, be appreciated that the proportions of the hydrophillic lipins employed in the emulsions are variable, this depending upon the exact nature of the emulsion, the potency of the particular hydrophillic lipin selected, and the specific results desired. In general, the proportions may range from a fraction of 1% to at least several percent. For example, from about 1/4% to about 5%, based on the weight of the emulsion as a whole, is usually satisfactory.

Wherever the term "higher" or "higher molecular weight" is employed herein, it will be understood to mean at least six carbon atoms unless otherwise specifically stated.

What I claim as new and desire to protect by Letters Patent of the United States is:

1. An emulsion comprising oleaginous material, aqueous material and a hydrophillic lipin of a class consisting of higher fatty acid esters of sugars and sugar alcohols, said lipins containing at least one unesterified sugar or sugar alcohol hydroxy group.

2. An emulsion comprising oleaginous material, aqueous material, and a proportion of a higher molecular weight aliphatic acid ester of the class of sugar alcohols consisting of mannitol and sorbitol, said ester containing at least one free sugar alcohol hydroxy group.

3. An emulsion comprising oleaginous material, aqueous material, and a proportion of a higher molecular weight fatty acid ester of the class of sugar alcohols consisting of mannitol and sorbitol, said ester containing at least one free sugar alcohol hydroxy group.

4. An emulsion comprising oleaginous material, aqueous material, and a proportion of a high molecular weight fatty acid ester of a sugar, said ester having at least one free sugar hydroxy group.

5. A cosmetic emulsion containing oleaginous material, aqueous material and a hydrophillic lipin of a class consisting of higher fatty acid esters of sugars and sugar alcohols, said lipins  
5 containing at least one unesterified sugar or sugar alcohol hydroxy group.

6. A cosmetic emulsion containing oleaginous material, aqueous material, and a proportion of a higher molecular weight fatty acid ester of a  
10 sugar, said ester having at least one free sugar hydroxy group.

7. A cosmetic emulsion containing oleaginous material, aqueous material, and a proportion of a higher molecular weight aliphatic acid ester of  
15 a sugar alcohol of the class consisting of mannitol and sorbitol, said ester containing at least one free sugar alcohol hydroxy group.

8. A cosmetic emulsion containing oleaginous material, aqueous material, and a proportion of  
20 a higher molecular weight fatty acid ester of a sugar alcohol of the class consisting of mannitol

and sorbitol, said ester containing at least one free sugar alcohol hydroxy group.

9. An emulsion comprising oleaginous material, aqueous material, alkaline material, and a hydrophillic lipin of a class consisting of higher  
5 molecular aliphatic acid esters of the class consisting of sugars and sugar alcohols, said lipins containing at least one unesterified sugar or sugar alcohol hydroxy group.

10. A cosmetic emulsion containing oleaginous material, aqueous material, soap, and a hydrophillic lipin of a class consisting of higher fatty acid esters of sugars and sugar alcohols, said  
10 lipins containing at least one unesterified sugar or sugar alcohol hydroxy group.

11. A cosmetic emulsion containing oleaginous material, aqueous material, soap, and a proportion of a higher molecular weight aliphatic acid ester of the class of sugar alcohols consisting of mannitol and sorbitol, said ester containing at  
15 least one free sugar alcohol hydroxy group.

BENJAMIN R. HARRIS.