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MIXED LAURIC-MYRISTIC ESTERS AND METHOD OF MAKING SAME

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This invention relates to vegetable oils and the like and, more particularly, to the utilization of what has heretofore been considered as waste material and the production therefrom of highly valuable substances.

It is customary in the treatment of vegetable oils, for example, such as coconut oil for edible purposes, to refine the crude material in order to purify it and render it palatable. In the course of the refining operation, the oil is treated with an alkali solution in order to remove free fatty acids present in the oils. By this treatment, the alkali forms a soap with the free fatty acids and this in turn forms an emulsion carrying with it a certain proportion of the oil itself. This emulsion is generally removed from the oil being purified and difficulty has been encountered in finding a sufficiently valuable use therefor to render it worth while saving. Up to the present, it was common to mix this emulsion with the raw materials for soap making, but this use hardly paid for the cost of the extraction of the fatty acids from the oil.

It is among the objects of the present invention to provide a means for utilizing this waste product and to give the same a high value.

In practicing this invention, I may take the emulsion of oil and soap and saponify the same as by means of a mineral acid and Twitchell's reagent in order to break down the soap and the oil into free fatty acids. The fatty acids are then subjected to a distillation operation whereby there is recovered a fraction boiling at a low temperature and a fraction boiling at a high temperature. The higher boiling fraction is then treated with glycerine in order to esterify the same and to provide a synthetic fat mixture having a relatively high softening point. This type of product has considerable usefulness in that it is edible, and has a softening point which is relatively sharp and approximates body temperature. Partly by reason of this softening point, the fat has a pleasant taste and may be used successfully for edible purposes.

While the synthetic fat so produced originates, for example, from coconut oil, the characteristics thereof are different. Not only is it characterized by a different softening point, but the saponification number is different and the iodine number is also different. While the natural oil becomes quite hard at low temperatures, has an indefinite melting point and will, in fact, melt in warm weather, the synthetic fats made in accordance with the present invention are superior in these respects to the natural oils.

The natural coconut oil contains in combined form fatty acids such as caproic, caprylic and capric, having from 6 to 10 carbon atoms in addition to the higher fatty acids such as lauric and myristic, having 12 and 14 carbon atoms and minor amounts of palmitic, oleic and linoleic having from 16 to 18 carbon atoms. In the natural oil, the combinations with glycerine may be such that the lower fatty acids are combined in mixed esters with the higher fatty acids and this contributes to the low and indefinite softening point of the oil.

The present invention by the distillation process has eliminated to a large extent the acids having from 6 to 10 carbon atoms, so that a smaller number of esters are formed from higher fatty acids and having higher softening points and thus more desirable properties. It is not possible by a freezing method, such as is often used on coconut oil and the like whereby the harder portion of the oil is separated, to obtain characteristics in the natural products such as are found in the present invention because of the complexity of the esters in the natural product.

For example, I take the soap obtained in alkali refining of coconut oil acidulated with sulphuric acid, and split in the usual fashion with Twitchell reagent. I separate the fatty acids and fractionate by distillation into two fractions having the following characteristics:

Constants	Low boiling	High boiling fractions
Color lovibond, 5¼ in. column	5.0Y/1.0R	6.0Y/1.1R
Free fatty acids as percent oleic acid	151.4	126.0
Acid number	302.0	251.0
Saponification number	303.0	251.9
Iodine number	1.5	14.1
Titer °C	23.8	28.7

I then take 671 lbs. of the higher boiling fraction and esterify with 97 lbs. glycerine (95%) heating in the presence of CO_2 gas to a temperature of 300° C. (or 572° F.) during 5–8 hours.

The crude ester thus obtained is refined and treated in the usual manner employed for coconut oil. I obtain an edible product of the following characteristics:

Melting point (open tube method)	89.2° F.
Saponification number	233.0
Iodine number	13.1
Free fatty acids as percent oleic acid	0.032
Odor	None
Flavor	None

By hydrogenating this product I obtain another product having the following characteristics:

Melting point (open tube method)	108.0° F.
Saponification number	233.2
Iodine number	0.5
Free fatty acids as percent oleic acid	0.05
Odor	None
Flavor	None

Although I have described my invention setting forth but a single embodiment thereof, showing the treatment of a waste by-product from coconut oil refining, it is, of course, apparent that my invention is not limited thereto. Other oils or fats may be used as starting materials as, for example, palm kernel oil and the like. The invention is not confined to a waste portion of the oil but the entire oil may be treated to give the fatty acids which are distilled and treated as provided in the present invention. In fact, most fatty acids from any such source may be used in accordance with the present invention. Instead of a single oil, mixtures of oils or of oils and fatty acids may be used.

While I prefer to distill so as to remove in a separate fraction those fatty acids which have 10 carbon atoms or less, I may, of course, distill in order to obtain a different line of separation of the acids. I may esterify the lower boiling fraction and thus obtain a new synthetic oil or fat of low sotfening point. Instead of glycerine as the esterifying agent, I may use other polyhydric alcohols or mixtures thereof with glycerine. If desired, my products may be hydrogenated as usual in the art.

These and other variations may be made in my invention within the scope thereof and the invention is to be broadly construed and to be limited only by the character of the claims appended hereto.

What I claim is:

1. As an article of manufacture, the neutral mixed unhydrogenated glyceride esters of fatty acids having principally from 12 to 18 carbon atoms, having a softening point about 89° F. and free fatty acids less than 0.1%, and having an iodine number of about 13 and a saponification number of about 233.

2. As an article of manufacture, the neutral mixed unhydrogenated glyceride esters of fatty acids consisting essentially of lauric and myristic, having a softening point about 89° F. and free fatty acids less than 0.1%, and having an iodine number of about 13 and a saponification number of about 233.

3. As an article of manufacture, the neutral hydrogenated mixed glyceride esters of fatty acids having principally from 12 to 18 carbon atoms, having a softening point about 108° F. and free fatty acids less than 0.1%, and having a negligible iodine number and a saponification number of about 233.

4. A method of forming mixed esters of a plurality of fatty acids which consists essentially in providing a natural liquid mixture of the glyceride esters of fatty acids of from 6 to 18 carbon atoms in which glycerine molecules are combined with two or more fatty acids including the high and low carbon atom fatty acids in the above range, hydrolyzing the mixture to free substantially all the fatty acids present, removing from the mixture substantially all of the fatty acids having from 6 to 10 carbon atoms, and re-esterifying the remainder of the fatty acids with glycerine, whereby the resultant esters have higher and sharper softening points than the starting material, and the higher fatty acids are in the same ratio as in the starting material.

5. A method of forming mixed esters of a plurality of fatty acids which consists essentially in providing a natural liquid mixture of the glyceride esters of fatty acids as follows: caproic, caprylic, capric, lauric and myristic, in which glycerine molecules are combined with two or more fatty acids including the high and low carbon atom fatty acids in the above range, hydrolyzing the mixture to free substantially all the fatty acids present, removing from the mixture substantially all of the caproic, capric and caprylic acids, and re-esterifying the remainder of the fatty acids with glycerine, whereby the resultant esters have higher and sharper softening points than the starting material, and the higher fatty acids are in the same ratio as in the starting material.

6. As an article of manufacture, the neutral mixed glyceride esters of fatty acids consisting essentially of lauric and myristic acids with minor amounts of palmitic, oleic and linoleic acids, having a sharp softening point approximating body temperature, having an iodine number of about 13 and a saponification number of about 233, being harder than coconut oil and showing less tendency to become rancid.

7. A method of forming mixed esters of a plurality of fatty acids which consists essentially in treating an oil taken from the class consisting of coconut and palm kernel oils with caustic alkali to form a soap emulsion containing some of said oil, separating said emulsion from said oil, hydrolyzing said emulsion to free substantially all the fatty acids present therein which are principally those having 6, 8, 10, 12 and 14 carbon atoms, removing from said fatty acids substantially all of those having 6, 8 and 10 carbon atoms, and esterifying the remaining acids having principally 12 and 14 carbon atoms and minor amounts of those having 16 and 18 carbon atoms with glycerine, whereby the resultant mixed esters contain the said higher fatty acids in the same ratio as in the starting material, said product having a higher and sharper softening point than the starting material approximating body temperatures.

8. A method of forming mixed esters of a plurality of fatty acids which consists essentially in treating an oil taken from the class consisting of coconut and palm kernel oils with caustic alkali to form a soap emulsion containing some of said oil, separating said emulsion from said oil, hydrolyzing said emulsion to free substantially all the fatty acids present therein which are principally those having 6, 8, 10, 12 and 14 carbon atoms, removing from said fatty acids substantially all of those having 6, 8 and 10 carbon atoms, and esterifying the remaining acids having principally 12 and 14 carbon atoms and minor amounts of those having 16 and 18 carbon atoms with glycerine, hydrogenating the product to a point where the iodine number is negligible, whereby the resultant mixed esters contain the said higher fatty acids in the same ratio as in the starting material, said product having a higher and sharper softening point than the starting material approximating body temperatures.

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