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BAR SOAP

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This invention relates to an improved composition of bar soaps suitable for toilet and general household use. The specific improvement comprises a discovery of proportions of certain soap ingredients which bestow upon the finished soap the property of dispersing to a high degree the insoluble alkaline earth soaps which form when the toilet soap or the general purpose soap is used in hard water, while avoiding incorporating in the soap ingredients which are irritable to delicate skins.

When most soaps suitable for economical toilet and general household use, that is, substantially unbuilt bar soaps of low glycerine content, are used for washing in hard water, an easily noticeable white curd or scum consisting mostly of insoluble calcium and magnesium soaps forms as the soluble detergent soap dissolves in the water. This objectionable curd tends to rise to the surface of the water and to collect on the side walls of the wash basin, bath tub, or other receptacle, and on the object being washed. This results in the formation of the well known "ring" of such curd combined with dirt around the bath tub or wash basin, this ring being very objectionable, especially so because it is difficultly removable. Any procedure, therefore, that will avoid or minimize the formation of such a ring, or which will make the ring more readily removable, represents a distinct advance in the soap making art. This is accomplished by the present invention.

It is an object of my invention to produce an economical, mild, substantially unbuilt bar soap which will to a large extent disperse the insoluble calcium and magnesium salts of the soap making fatty acids, and thus minimize the formation of flocculent floating scum. It is also an object to minimize the collecting on solid surfaces, in difficultly removable form, of such scum as does form, thus avoiding the formation of a sticky ring around bath tubs, wash basins, etc. This curd dispersion, with soaps of preferred composition, lasts several minutes, or at least long enough for normal washing operations.

Whereas it may be a fact that certain known bar soaps may have possessed a certain amount of this "curd dispersing" property, as it may be called, this has not been generally recognized, probably because the soaps possessing the property have not gained wide recognition as high-grade toilet or general utility soaps. These soaps all contain an undesirably high proportion of coconut oil soaps, or have other drawbacks such as those mentioned in the next paragraph. It is generally recognized that when the proportion of coconut oil to total fat in the fat formula of a bar soap exceeds about twenty to twenty-five per cent, the soap is found to be objectionably irritating when used by persons having dry and sensitive skins. The recognized "mildness' of soaps which have been public favorites for many years is due to a relatively low coconut oil soap content, as well as freedom from harsh alkalis. Heretofore it has not been known how to produce a bar soap of the type under discussion which contains as little as twenty per cent or less of coconut oil in its fat formula and yet which possesses to a high degree the property of dispersing hard water curd. The accomplishment of this is an object of my invention.

Soaps other than high coconut oil soaps may also have possessed unrecognized "curd dispersing" properties in greater or lesser degree. Among these are: certain crutcher saponified soaps high in glycerine content, and therefore relatively uneconomical; some shaving soaps, in which curd dispersing power is of no consequence; and liquid potash soaps, which are restricted to a narrow field of use.

My invention brings the desirable property of curd dispersion into play, for the first time, in the most important and commonest of all types of toilet and general household soaps, that is, low glycerine content (less than one per cent) bar soaps which are free from objectionably high coconut oil soap content.

I have found that by blending potassium soap in substantial proportion with the usual sodium soap, a high degree of curd dispersing power is obtainable. The relative proportion of potash soap required for this purpose is substantially higher than the amounts that have been employed in the manufacture, from a settled kettle soap base, of some bar soaps in the past, this having usually been about five per cent to about fifteen per cent of the total soap content. The preferred proportion of potash soap to sodium soap depends upon several circumstances, chief among which is the ratio of coconut oil soap to total soap in the product. In general, the lower the proportion of coconut oil soap, the higher the proportion of potash soap should be in order to obtain a given curd dispersing power.

The following examples will serve to disclose how my invention may be reduced to practice in preferred manner.

Example 1.—20 parts of coconut oil and 80 parts of tallow are saponified with caustic soda solution in a kettle in well known manner, then the soap is "washed" to remove glycerine,

"pitched," and "settled." To 100 parts of the resulting kettle soap, preferably containing about 29% of water and about 70% of "real soap," there are added, with agitation in a crutcher, 6.9 parts coconut oil fatty acids, 27.8 parts of tallow mixed fatty acids, and just sufficient caustic potash solution, of about 35° to 40° Bé., to saponify these fatty acids. The fatty acids and caustic solution are added quite slowly in separate streams, maintaining a slight excess of caustic in the crutcher until the last of the caustic has been added, after which the last of the fatty acids are added to neutralize all free alkalinity. Perfume, preservative, and/or coloring matter may be added if desired. After thorough crutching the hot soap mass is run into frames to solidify, and is subsequently cut into bars and stamped in finished cake form. The resulting soap product, made from fats consisting about 20% of coconut oil, and having about 35% of its total fatty acids combined as potassium soap, possesses good curd dispersing properties. It is an economical product because the method employed in its manufacture recovers, as a valuable by-product, nearly all of the glycerine of the soap making fats, leaving not more than about 0.3% to about 0.5% in the final product, (which is about the amount commonly found in the best settled soaps). It is a mild product because of its low content of coconut oil soap.

Example 2.—16.7 parts of coconut oil and 83.3 parts of tallow are saponified and made into kettle soap as in Example 1. To 100 parts of this kettle soap there are slowly added, with agitation in a crutcher, 43.1 parts of tallow mixed fatty acids, and just enough caustic potash solution to saponify these fatty acids, employing the precautions described in Example 1. This soap mix is crutched and converted into bars in any desired manner. The resulting soap product, made from fat consisting about 10% of coconut oil, and having about 40% of its total fatty acids combined as potassium soap, possesses good curd dispersing power.

Example 3.—In a manner similar to that described in Examples 1 and 2, a bar soap exhibiting good curd dispersion may be made without any coconut oil (or any of its equivalents), but with 50% or more of its total fatty acids combined as potassium soap.

The curd dispersing powers of soaps may be measured numerically by placing a glass vessel, containing hard water in which some of the soap has been dissolved under standardized conditions, between the light source and the measuring end of a photometer. For example, I dissolve in a pint of water, containing hardness ingredients equivalent to 7 grains of calcium carbonate per U. S. gallon, just enough of the soap to be tested to precipitate the hardness ingredients and to produce a stable suds when agitated. I then dilute this at once with another 2½ pints of the same hard water, and promptly place the resulting mixture in the light beam of a photometer and read and record the amount of current generated by the photoelectric cell of the photometer. After a brief time interval, usually about one to two minutes, when the current attains a substantially constant value, I again record the amount of this current. The change in current is a measure of the hard soap curd leaving the uniform dispersion and coagulating as scum.

In comparative tests of this kind a typical sample of my improved soap, made from fats consisting about twenty per cent of coconut oil and having about thirty-five per cent of its total fatty acids combined as potassium soap, showed less than one microampere increase in current, whereas a sample of exactly similar soap containing no potash showed about eight microamperes increase in current.

In the present invention the kinds of the principal soap making ingredients, namely oils, or fatty acids, and alkalis, and their proportions within the limits that I have determined, are the important factors. The process employed to convert these ingredients into bar soaps is relatively unimportant. In the above Example 1 the process described is that of making framed soap by a combination kettle boiling and crutcher saponification method. Any alternative method of making mild, low glycerine content, bar soaps may be employed with equivalent results. For example, a milled and plodded soap of about thirteen to fifteen per cent moisture content may be produced by well known methods, but only if this soap has the composition characteristic of my invention will it have good curd dispersing properties combined with the other advantageous features of my improved soap.

The soap may be aerated while it is molten or while in a partially solid or pasty condition, to make a floating soap and to lighten the color of the product. Soap builders, such as sodium silicate and sodium phosphate, may be incorporated if desired, although the chief object of this invention is to produce substantially unbuilt soap products.

In place of coconut oil, any of the tropical nut oils of the coconut oil type, having fat characteristics similar to coconut oil, may be employed. Among these are palm kernel oil, babassu oil, and cohune oil. In place of tallow, soap making fats which are approximately equivalent to tallow (and which may be said to be fats of the tallow type) may be substituted, among these being palm oil, hog fat, and hydrogenated vegetable and marine oils.

Although the preferred potash soap content of my product depends to some extent upon the nature of the fats employed in making the product, it may be said that, in general, for a soap fat formula containing no more than about twenty per cent of tropical nut oils of the coconut oil type, the percentage of the total fatty acids combined as potassium soap should be at least 30. The upper limit of the potassium soap content is determined by such practical considerations as firmness of the bar, which of course depends not alone upon the potassium soap content but also upon such variables as the moisture content, coconut soap content, and titer and iodine value of the other fats employed in the formula. The potassium soap content can easily be as high as fifty to fifty-five per cent of the total soap content, provided the fats used are properly chosen according to well known principles of the soap maker's art.

The sum of the percentage of tropical nut oils of the coconut oil type, in the fat formula, plus the percentage of the total soap fatty acids which are combined as potassium soaps in the product, should preferably be at least about fifty (50), in order that the bar will have good curd dispersing properties throughout the entire period of its use in water of any degree and type of hardness. In calculating this sum, of percentage of tropical nut oils plus percentage of fatty acids combined as potassium soaps, some of the fatty

matter may have to be counted twice, as when the product contains potassium soaps of coconut oil. The following examples illustrate the application of the foregoing rule.

	Anhydrous soap formula	Per cent tropical nut oils in fat formula	Per cent of T. F. A. combined as potash soaps	Sum
1	20% potassium soaps of coconut oil 13% potassium soaps of tallow 67% sodium soaps of tallow	19	31+	50+
2	20% potassium soaps of coconut oil 20% potassium soaps of tallow 60% sodium soaps of tallow	19	38+	57+
3	20% sodium soaps of palm kernel oil. 31% potassium soaps of palm oil 49% sodium soaps of hydrogenated soya bean oil.	20+	30	50+
4	51% potassium soaps of tallow 49% sodium soaps of tallow	0	50−	50−

Molecular weights assumed in these examples are:

Coconut oil fatty acids	209
Tallow fatty acids	274
Palm kernel oil fatty acids	221
Palm oil fatty acids	272
Hydrogenated soya bean oil fatty acids	282

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A low glycerine content bar soap, suitable for toilet and general household use, characterized by its property of dispersing the insoluble alkaline earth salts of fatty acids which form when said soap is used in hard water, comprising potassium and sodium salts of soap making fatty acids, no more than about twenty per cent of said fatty acids being fatty acids of tropical nut oils selected from the group consisting of coconut oil, palm kernel oil, babassu oil, and cohune oil, and the sum of the percentage of said tropical nut oils, in the fat formula, plus the percentage of the total soap fatty acids which are combined as potassium soaps in the product being at least fifty.

2. A low glycerine content bar soap, suitable for toilet and general household use, characterized by its property of dispersing the insoluble alkaline earth salts of fatty acids which form when said soap is used in hard water, said soap being made from fats consisting not more than about twenty per cent of tropical nut oils selected from the group consisting of coconut oil, palm kernal oil, babassu oil, and cohune oil, at least about thirty per cent of the soap fatty acids in said product being combined as potassium soaps, and the remaining soap fatty acids being substantially completely combined as sodium soaps.

3. A substantially unbuilt bar soap containing not over about 0.50 per cent glycerine, suitable for toilet and general household use, characterized by its property of dispersing the insoluble alkaline earth salts of fatty acids which form when said soap is used in hard water, the fats employed in making said soap consisting about fifteen per cent of tropical nut oils selected from the group consisting of coconut oil, palm kernel oil, babassu oil, and cohune oil, and at least about thirty-five per cent of the total soap fatty acids in said product being combined as potassium soap.

4. A substantially unbuilt bar soap containing not over about 0.50 per cent glycerine, suitable for toilet and general household use, characterized by its property of dispersing the insoluble alkaline earth salts of fatty acids which form when said soap is used in hard water, the fats employed in making said soap consisting about ten per cent of tropical nut oils selected from the group consisting of coconut oil, palm kernel oil, babassu oil, and cohune oil, and at least about forty per cent of the total soap fatty acids in said product being combined as potassium soap.

5. A low glycerine content bar soap, suitable for toilet and general household use, characterized by its property of dispersing the insoluble alkaline earth salts of fatty acids which form when said soap is used in hard water, said soap being made from fats substantially free from tropical nut oils of the group consisting of coconut oil, palm kernel oil, babassu oil, and cohune oil, and at least about fifty per cent of the soap fatty acids in said product being combined as potassium soaps.

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