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SOAPMAKING

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The present invention relates to a process for making a detergent in the form of bars and cakes and, more particularly, to a novel method of making bars and cakes of an improved soap.

In making low-priced soaps, builders and fillers having some deterative or water-softening properties are frequently added to decrease the cost of the soap. In the manufacture of powdered and granulated soaps, any desired proportion of such materials can be mechanically mixed with soap grains and beads. However, where bars and cakes of soap are desired, there are limitations upon the amounts of the builders and fillers which can be added and still produce soap in this form. Thus, it has always been assumed by the art that the incorporation of large amounts of these materials in soap batches and soap compositions would make it impossible to obtain the soap in the form of bars and cakes. For example, the prior art believed that the practical upper limit upon the proportion of borax which could be embodied in a bar or cake of soap was of the order of about 15 to about 20%.

It has now been discovered that, by the novel process of the present invention, a far larger proportion of certain builders and fillers can be incorporated in bar and cake soap.

It is an object of the present invention to provide a method for producing a soap in the form of bars and cakes having a relatively large proportion of an inexpensive builder.

It is another object of this invention to provide a process of manufacturing soap in bar or cake form whereby the product is inexpensive, has good water-softening properties, and is not harmful to the human skin.

It is also an object of the invention to provide a process for making a blander and more neutral soap than the ordinary soaps of commerce.

A further object of the present invention is to provide a process for incorporating large amounts of borax in bars and cakes of soap, whereby an inexpensive hand soap well adapted for grinding can be produced.

The invention also provides a process for producing soap in bar or cake form suitable for toilet and/or household uses and containing a large proportion of borax.

Other objects and advantages of this invention will be apparent from the following description.

According to the present invention, bars of soap containing large amounts of an inexpensive builder can be produced by incorporating a suitable material in soap compositions during their manufacture. Borax has been found to be particularly

suitable for this purpose, as it combines the properties of a cheap ingredient, a good water-softener, and an agent without appreciable harmful effect upon the skin. Unlike most builders, which raise the pH of soap above the usual 10.0 to 10.5 of unfilled soaps, borax reduces the pH of the soap and, in the quantities contemplated in the present invention, a product having a pH of only about 9.0 to about 9.5 can be produced. Thus, due to the buffer action of borax, its presence in large quantities in a toilet soap actually makes the soap more neutral, and hence more bland, which is a desirable characteristic.

A surprising feature of the invention is the fact that about 25 to about 60% of borax (on an anhydrous soap plus borax basis) can be employed in manufacturing soap, and the soap can still be formed into cakes and bars. When using more than about 60% of borax upon this basis, even though a bar may be formed, such soap would be too hard and brittle for convenient use. It is preferred to use proportions of about 45 to about 55 parts of borax to about 45 to about 55 parts of anhydrous soap in the soap bars and cakes of the present invention, particularly where the appearance of the soap is not important. Thus, cakes of toilet soap having about 45 to about 55% of borax upon the aforesaid basis are well adapted for use in dispensers where the soap is concealed from view and grinding means are provided for enabling the consumer to grind a small amount of the soap for immediate use.

In manufacturing the novel soap cake of the present invention, it is preferred to make up a kettle soap composition in the usual manner, flake, and dry. The flaked soap is then mixed with the desired proportion of borax, and a small amount of water is preferably added. The mixture is then milled and plodded, and it is preferred that the mixture be plodded in accordance with the process disclosed by Schwantes in his United States Patent No. 2,146,770. When the moisture content is carefully controlled, a small amount of heat is produced, and, under proper conditions of temperature and moisture, the mixture is easily worked. It has been found that a satisfactory temperature is one between the point of plasticity of the mass, say about 120° F. or slightly lower, and the point where the soap begins to blister, i. e., about 140° F., or even somewhat higher when using the process of the Schwantes patent. Upon cooling, the soap hardens, and at least part of the borax apparently crystallizes. A relatively hard and brittle product, admirably adapted for grinding, is formed.

Borax, $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$, contains about 47.24% of water of crystallization and is sometimes damp with excess water; such excess is taken into account before adding further quantities of water to the composition. At times, borax is received so badly lumped that it is desirable to grind the borax before attempting to use it.

If permitted to stand in a dry atmosphere, borax tends to lose some of its water of crystallization, so that it is always desirable to run a moisture analysis upon the borax to determine the proportion of sodium tetraborate present therein. It will be understood from the foregoing that, where part of the water of crystallization has been lost, less borax and more water are added to the soap.

In order that those skilled in the art may have a better understanding of this invention, the following illustrative examples are given.

Example I

About 220 pounds of white soap chips, made in the usual manner from a base of about 25% coconut oil and about 75% tallow and containing about 13.5% water, are milled and plodded at about 125° F. with about 15 pounds of water and with about 220 pounds of borax (sodium tetraborate decahydrate) analyzing about 52.76% sodium tetraborate. A hard, cream-colored soap which can be stamped is obtained. This soap gives the following analysis:

	Per cent
Anhydrous soap	About 41.8
Sodium tetraborate	About 25.5
Water	About 32.7
	100.0

which is about 53.7% borax (the decahydrate) on a borax-anhydrous soap basis. Small amounts of various materials for giving the product greater opacity, such as titanium dioxide, zinc oxide and other pigments, can be incorporated in the soap, and perfumes and preservatives can also be added as desired.

Where the borax has lost some of its water of crystallization, so that it gives an analysis of about 54.5% of sodium tetraborate, the proportions used in order to obtain a soap with approximately the same analysis are 220 pounds of white soap chips to about 212.75 pounds of borax (54.5%) and about 22.25 pounds of water. If still more water of crystallization is lost, so that the analysis of the borax runs as high as about 56% sodium tetraborate, only about 207 pounds of this borax and about 28 pounds of water are added to the 220 pounds of white soap chips to produce approximately the same soap.

It has been found that the greatest proportion of water must be present as water of crystallization in the borax, if a satisfactory soap is to be produced. Thus, according to the present invention, it is undesirable to employ borax which analyzes higher than about 56% sodium tetraborate. The addition of sufficient water to compensate for the loss of water of crystallization makes the soap very difficult to work.

Example II

A kettle soap is made having a base of about 50% palm oil, about 25% olive oil and about 25% coconut oil, and the same is flaked and dried to a moisture content of about 12.0%. About 220 pounds of the chips thus prepared are then mixed with about 12 pounds of water and with about 180 pounds of borax analyzing about 52.76% sodium

tetraborate. This mixture is milled and plodded, the plodding operation being carried out according to the process of Schwantes' United States Patent No. 2,146,770. Upon mixing, the temperature of the mass goes to about 90° F., and the friction of the milling operation raises it to about 120° F. This is ordinarily warm enough for easy working, so that addition of heat from an external source is normally unnecessary. A hard, green soap adaptable for pressing is produced. The soap analyzes as follows:

	Per cent
Anhydrous soap	About 47.0
Sodium tetraborate	About 23.0
Water	About 30.0
	100.0

The borax percentage on the borax-anhydrous soap basis is thus about 48.1%. Just as in Example I, the proportion of water added is largely dependent upon the moisture analysis of the borax. Similarly also, pigments, perfumes and preservatives can be added as desired.

Other materials may be substituted for part of the borax in our improved soap bars. Thus, where it is intended that the soap be adaptable for use with hard water, materials such as phosphates, e. g., tetrasodium pyrophosphate, sodium hexametaphosphate, and the like, or other builders can replace part of the borax in the composition according to this invention. Water is added to the composition to make up for the difference in water content between the borax and the phosphate added. Other materials commonly incorporated in cakes and bars of soap, such as abrasives, colors, perfumes, deodorants, germicides, superfatting agents, etc., can similarly be employed in the soaps of the present invention.

Example III

About 220 pounds of white soap chips are mixed and plodded with about 132 pounds of borax (analyzing about 52.76% sodium tetraborate), about 44 pounds of sodium pyrophosphate and about 59 pounds of water. The soap obtained is comparable with that obtained in Example I but has increased water-softening characteristics.

In another modification of the present process, borax can be incorporated in the soap composition in a crutching operation. According to this modification, a kettle soap is crutched with borax in such proportion as to give the desired composition in the final dried product. After crutching, the soap is dried to a chip, milled and plodded. In general, this modification, as compared with that described supra, has the disadvantages of increased equipment costs and of insufficient heat to permit easy working, and it is ordinarily desirable to add heat during the crutching in order to maintain fluidity of the mass. Such heat can be added by any convenient means, such as passing steam through a jacket surrounding the crutcher, and the mix may be heated to a temperature of about 160° F. to about 180° F.

Example IV

About 1,020 pounds of white kettle soap, made from a base of about 20% coconut oil and about 80% tallow and having a moisture content of about 30%, are crutched with about 580 pounds of borax (analyzing about 52.76% sodium tetraborate) in a crutcher heated to about 170° F.

The soap is then dried to remove part of the moisture and to form chips and is milled and plodded. The drying and subsequent operations are carefully controlled to leave the desired amount of moisture in the composition. A soap having the following analysis is produced:

	Per cent
Anhydrous soap-----	About 49.4
Sodium tetraborate-----	About 21.2
Water -----	About 29.4
	100.0

This gives about 44.8% borax on the borax-anhydrous soap basis.

If desired, the soap from the crutcher can be framed and cut, but drying, milling and plodding is preferred. The frame soap gives a softer bar not as well suited for grinding in a dispenser. In this connection, it may be noted that some low titre soap cannot be milled, but borax can be incorporated by the present process with any soap which can form an unfilled chip.

Although the present invention has been described with respect to particular illustrative examples and compositions, it will be understood by those skilled in the art that equivalent substances and proportions can be employed and that variations and modifications may be introduced without departing from the principles of the present invention. Such variations and modifications are believed to be within the scope of the present specification and within the purview of the appended claims.

We claim:

1. The process of making bars and cakes of soap which comprises mixing soap with borax in such proportion that borax is present in an amount at least about 25% of total borax and anhydrous soap in the mixture, milling the mixture, and forming bars and cakes therefrom.

2. The process of making bars and cakes of soap which comprise mixing soap with borax in such proportion that borax is present in an amount about 25 to about 60% of total borax and anhydrous soap in the mixture, thereafter milling and plodding the mixture, and forming bars and cakes therefrom.

3. The process of making bars and cakes of soap which comprises mixing soap with borax in such proportion that borax is present in an amount about 25 to about 60% of total borax and anhydrous soap in the mixture, milling said mixture, plodding at a temperature between the point of plasticity of the mixture and the blistering point, and forming bars and cakes therefrom.

4. The process of making bars and cakes of soap which comprises mixing soap with borax in such proportion that borax is present in an amount about 25 to about 60% of total borax and anhydrous soap in the mixture, milling said mixture, plodding at a temperature of about 120 to about 140° F., and forming bars and cakes therefrom.

5. The process of making bars and cakes of soap which comprises mixing unfilled soap with borax in such proportion that borax is present

in an amount about 45 to about 55% of total borax and anhydrous soap in the mixture, milling the mixture, and forming bars and cakes therefrom.

6. The process of making bars and cakes of soap which comprises mixing a chipped soap with about 25 to about 60% of borax on a borax-anhydrous soap basis, said borax having a sodium tetraborate content of not more than about 56%, and with sufficient water to make the mixture easily workable, thereafter milling and plodding said mixture, and forming bars and cakes therefrom.

7. The process of making bars and cakes of soap which comprises mixing a chipped soap with about 25 to about 60% of borax on a borax-anhydrous soap basis, said borax having a sodium tetraborate content of not more than about 56%, and with sufficient water to make the mixture easily workable, milling said mixture, plodding at a temperature of about 120 to about 140° F., and forming bars and cakes therefrom.

8. The process of making bars and cakes of soap which comprises flaking and drying kettle soap to a moisture content of about 12 to about 13.5%, mixing about 45 to about 55 parts of said flaked soap (on an anhydrous soap basis) with about 45 to about 55 parts of borax having a sodium tetraborate content of not more than about 56% and with sufficient water to make the mixture easily workable, thereafter milling and plodding said mixture, and forming bars and cakes therefrom.

9. The process of making bars and cakes of soap which comprises flaking and drying kettle soap to a moisture content of about 12 to about 13.5%, mixing about 45 to about 55 parts of said flaked soap (on an anhydrous soap basis) with about 45 to about 55 parts of borax having a sodium tetraborate content of not more than about 56% and with sufficient water to make the mixture easily workable, milling, plodding said mixture at a temperature of about 120 to about 140° F. to form a borax soap, dividing said plodded soap into bars and cakes, and cooling said soap.

10. The process of making bars and cakes of soap which comprises crutching kettle soap with about 25 to about 60% of borax on a borax-anhydrous soap basis, drying the crutched composition, forming chips therefrom, thereafter milling, plodding, and forming bars and cakes therefrom.

11. The process of making bars and cakes of soap which comprises crutching a kettle soap having a moisture content of the order of about 30% with an amount of borax sufficient to give a proportion of about 45 to about 55% of borax in the mixture on a borax-anhydrous soap basis, maintaining the temperature of the mixture during crutching at about 160 to about 180° F., removing part of the water from the crutched mixture to leave a predetermined amount of moisture therein, thereafter milling and plodding the mixture, and forming bars and cakes therefrom.

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