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3,576,749 SOAP TOILET BARS HAVING IMPROVED SMEAR CHARACTERISTICS

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ABSTRACT OF THE DISCLOSURE

Milled soap bars containing free fatty acid, high levels of sodium chloride and high moisture levels, said bars being processed at temperatures of from 110° F. to about 140° F.; processes for mixing soap bar formulations without mechanically overworking the soap.

This application is a continuation-in-part of our co-pending application Ser. No. 706,770, filed Feb. 20, 1968, now abandoned.

FIELD OF THE INVENTION

This invention relates to a milled soap toilet bar which is free of synthetic detergents, which has superior sudsing and emollient characteristics, and which has acceptable smear characteristics. The bars of this invention contain relatively large amounts of free fatty acid, sodium chloride and water. These ingredients, in combination with the soap, give the bars acceptable performance and smear characteristics when the bars are processed at the specified high temperatures.

This invention also relates to a process for mixing, e.g., milling these soap bar formulations at temperatures from about 110° F. to about 140° F. to mix the ingredients without mechanically overworking the soap.

PRIOR ART

Soap bars containing large amounts of water and sodium chloride have been disclosed in U.S. Pat. 2,686,761. However, the bars of U.S. Pat. 2,686,761 do not contain free fatty acid which is an essential ingredient of the bars of the present invention and the amount of water contained in the bars of U.S. Pat. 2,686,761 is higher than the amount of moisture in the bars of the present invention.

U.S. Pats. 3,247,121 and 3,223,645 disclose synthetic detergent bars containing soap, free fatty acid, water, and sodium chloride. Unlike the bars of the present invention the bars of these patents contain synthetic detergents which drastically affect the plasticity and sudsing characteristics of the product, and give a totally different type of smear. The synthetic type of bar has a very soft, slimy, messy type of smear which is acceptable to users of this type of bar but which is unacceptable in soap bars including soap bars which contain free fatty acid.

SUMMARY OF THE INVENTION

The milled toilet bars of this invention are free of synthetic organic detergent and consist essentially of from about 70% to about 88% of soap selected from the group consisting of sodium soap and mixtures of sodium soap and potassium soap containing no more than about 25% potassium soap, said soap comprising from about 20% to about 80% of fatty acids containing from about 8 to about 14 carbon atoms of which at least about 25% contain 12 carbon atoms and from about 20% to about 80% fatty acids containing from about 16 to about 20 carbon atoms;

from about 1% to about 3% sodium chloride; from about 2% to about 15% free fatty acid containing from about 8 to about 20 carbon atoms; and from about 5% to about 18% water, said bar being formed by mechanically working the ingredients at a temperature of from about 110° F. to about 140° F.

This invention also relates to the process of mixing soap bar ingredients consisting essentially of from about 70% to about 88% of soap selected from the group consisting of sodium soap and mixtures of sodium soap and potassium soap containing no more than about 25% potassium soap, said soap comprising from about 20% to about 80% of fatty acids containing from about 8 to about 14 carbon atoms of which at least about 25% contain 12 carbon atoms and from about 20% to about 80% fatty acids containing from about 16 to about 20 carbon atoms; from about 1% to about 3% sodium chloride; from about 2% to about 15% free fatty acid containing from about 8 to about 20 carbon atoms; and from about 5% to about 18% water without overworking the soap comprising a step of mechanically working the ingredients at a temperature of from about 110° F. to about 140° F.

Each of the ingredients in the bar is essential to the good performance of the bar. The soap provides detergency and sudsing effects; the free fatty acid provides a suds boosting effect, a skin emollient effect, and a plasticizing effect; and the salt improves the processing of the bar. The salt permits the use of the high processing temperatures which can be used to improve the character of the smear and the "recovery" characteristics of the smear.

The sodium and potassium soaps which are used in formulating these bars are the soaps of higher fatty acids. The soap will normally be no more than about 25% by weight potassium soap since the presence of potassium soap will tend to make the bars softer. Although a range of specific chain lengths is given, it will be understood that the use of mixtures of these acids derived from natural sources is usual in soap preparation. When the term "coconut oil" is used herein in connection with free fatty acid and soap it refers to fatty acid mixtures having an approximate carbon chain length distribution of: 8% C₈, 7% C₁₀, 48% C₁₂, 17% C₁₄, 9% C₁₆, 2% C₁₈, 7% oleic, and 2% linoleic (the first six fatty acids listed being saturated). Other sources having similar carbon chain length distribution such as palm kernel oil and babassu kernel oil are included within the term "coconut oil." The term "tallow" is used herein in connection with free fatty acid mixtures having an approximate carbon chain length distribution of 2.5% C₁₄, 29% C₁₆, 23% C₁₈, 2% palmitoleic, 41.5% oleic, and 3% linoleic (the first three fatty acids listed are saturated). Other mixtures with similar distribution, such as the fatty acids derived from various animal tallow and lard, are also useful. Coconut oil fatty acids ordinarily have a sufficiently low content of unsaturated fatty acids to have satisfactory keeping qualities without further treatment. As is customary, however, the fatty acids are hydrogenated to decrease the amount of unsaturation (especially polyunsaturation) of the fatty acid mixture listed above. Synthetic fatty acids having from about 8 to about 20 carbon atoms can also be used.

At least 15% of the soap used in these bars and preferably more, should be of the shorter chain fatty acids of from about 8 to 14 carbon atoms, preferably coconut oil soap, in order to provide good lathering properties. At least 25% of these shorter chain fatty acids should contain 12 carbon atoms for the same reason, it is desirable, however, that a substantial portion of the soap has fatty acid chain lengths of from 14 to 20 carbons, preferably tallow soap, in order to impart creaminess and mildness

to the lather. The soap will ordinarily be prepared from hydrogenated fatty acids with an iodine value (I.V.) of from about 1 to about 45. The tallow fatty acids will ordinarily have an I.V. of from about 40 to about 55 and the coconut fatty acids will ordinarily have an I.V. of from about 0 to about 8. Preferred mixtures include mixtures of soaps derived from a mixture of 80% tallow and 20% coconut oil, or 50% tallow and 50% coconut oil.

The fatty acids which are used as such in the preferred bars of this invention vary in carbon chain length from about 8 to about 20 carbon atoms. It will be understood that the usual usage is of mixtures of fatty acids derived from natural sources. A preferred mixture of fatty acids is coconut oil fatty acids as hereinbefore described. These acids preferably constitute a substantial portion of the fatty acids used in the bar and the rest is preferably tallow fatty acids as hereinbefore described.

Fatty acids that are longer in chain length than about 20 carbons are too hard for desirable bar properties and fatty acids shorter in chain length than about 8 carbon atoms are too soft for advantageous inclusion in a bar. Therefore, the fatty acid component of the preferred bar should range in carbon chain length from about 8 to about 20 carbon atoms. Preferably the free fatty acids contain from about 8 to about 14 carbon atoms at least 25% of which contain 12 carbon atoms. The I.V. of these free fatty acids will normally range from about 0 to about 55. The tallow fatty acids will have an I.V. of from about 1 to about 55 and the coconut fatty acids will have an I.V. of from about 0 to about 8. This fatty acid should be present in an amount from about 2% to about 15% by weight of the bar, preferably from about 5% to about 10%; less than about 2% does not provide the proper lather building and emollient properties and more than 15% free fatty acids softens the bar undesirably.

The fatty acids improve the volume and quality of the lather, especially the quality. Free fatty acids tend to cause the lather to be more stable with small air bubbles which gives the user a lather which is characterized as "richer" and creamier. The fatty acids also tend to soften the skin which is considered desirable. Lastly and very importantly in a bar which contains large amounts of salt, the free fatty acids are plasticizers. Without the free fatty acids, the bar would form wet cracks to such an extent that the bar would be unmarketable.

The sodium chloride firms the bar, improves "recovery" of the smear, and permits processing the formula at the higher temperatures. It is believed that the higher processing temperatures permit one to mix the bar ingredients without "overworking" the soap to an unacceptable phase. When the soap is either "underworked" or "overworked" one obtains soap phases that cause undesirable smear. With this invention, one is able to control the amount of work which is done to the soap. As discussed hereinbefore the addition of high levels of salt improves the "recovery" of the smear in that the smear will dry out quickly and the bar will again be firm to the touch. The salt and the high processing temperatures also decrease the total amount of smear that is formed when the bar is in contact with only a small amount of water, i.e., the salt and the high processing temperature tend to decrease the bar's tendency to absorb water. A minimum of about 1% sodium chloride is required. Amounts greater than about 3% do not provide a noticeable improvement over the 3% level. The preferred amount of salt is from about 1.5% to about 2.5%.

From about 5% to about 18% by weight of the bar should be water. The water aids in the processing of the bar and is required for optimum processing conditions. Amounts of water in excess of about 18% create undesirable smear characteristics and the bar becomes too soft to process conveniently. The preferred amount of water is from about 10% to about 16%.

As discussed hereinbefore, good bar properties (e.g.,

good smear characteristics) are achieved by having the soap in its proper phase. This phase is achieved by properly working the soap. For a given composition the proper amount of work is determined by the temperature at which the soap is worked. The unique compositions of this invention can be worked at a sufficiently high temperature so that good mixing of the ingredients can be obtained without overworking the soap. High temperatures decrease the resistance of the soap mixture thereby reducing the amount of work done to the soap for a given amount of mixing.

Preferably, the soap bar compositions of this invention are worked in at least one step at a temperature of from about 110° F. to about 140° F. to achieve proper mixing. The compositions are normally worked in an additional step or steps at lower temperatures to complete the proper amount of working. It is preferred that the temperature in the "mixing" step be between about 110° F. and 125° F.

Other additives commonly included in toilet bars such as coloring matter, perfumes, antimicrobial agents and the like, can be used in minor amounts, if desired, in the bars of this invention without detracting from the desirable properties of the bars. In fact, it is a special advantage of this invention that additional ingredients can be thoroughly mixed into the bar without overworking the soap and thereby adversely affecting the smear.

All percentages, parts and ratios herein are by weight unless otherwise specified.

The following examples are illustrative of the practice of this invention.

EXAMPLE I

The bars of this example were prepared by first adding the indicated pounds of soap noodles (sodium soap prepared from 1:1 mixture of tallow and coconut oil hardened to an I.V. of about 25) containing about 10% moisture, about 7% free fatty acids derived from coconut oil, and about 0.6% NaCl to an amalgamator; premixing about 0.03 lb. of TiO₂, 0.201 lb. of an antibacterial composition (a 1:1:1 mixture of (1) a mixture of 3,5-di- and 3,4',5-tribromosalicylanilides; (2) 4,4'-dichloro-3-(trifluoromethyl)carbanilide; and (3) 3,4,4'-trichlorocarbanilide), about 0.178 lb. water, about 0.019 lb. of the soap noodles described hereinbefore and about 15 grams of dye; adding the premix to the amalgamator; adding about 0.005 lb. of EDTA, about 100 lb. of perfume and about 0.002 lb. of butylated hydroxy toluene to the amalgamator; milling the admixed ingredients to a thickness of about 0.007 in. three times at the indicated temperatures; and then extruding the milled composition to form bars. Where extra salt was added, it was added as the indicated amounts of a 25% salt solution after the premix, and it replaced soap noodles.

The bars were then tested by determining the Mullen at 90° F. to provide a measure of the hardness of the bars. It is preferred that the Mullen grade be above about 50 at 90° F. for proper processing. The bars were also tested by placing a bar in a Petri dish containing 100 ml. of water and another bar in a soap dish containing 5 ml. of water. After soaking for several hours, e.g., overnight, the bars were graded for amount and quality of the smear. The bars were also graded based on the amount of material left in the soap dish containing 5 ml. of water (5 ml. wet dish).

Composition.....	1	2	3	4	5
Soap noodles (pounds).....	9.56	9.52	9.47	9.42	9.37
Salt solution (pounds).....	0.00	0.16	0.36	0.56	0.76
Nominal percent NaCl in the bar.....	0.6	1.0	1.5	2.0	2.5

The compositions were all milled with a first mill temperature of about 120° F.; a second mill temperature of about 94° F.; and a third mill temperature of about 96° F.

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Composition.....	1	2	3	4	5
Mullen/90° F., smear grade.....	33	39	42	41	33
100 ml. soak, smear grade.....	5	5	4	5	6
5 milliliter soak.....	4	4	5	6	4
5 milliliter dish.....	3	4	4	4	5

Bar number 5 was picked by six trained observers as having the best overall smear.

EXAMPLE II

Bars identical in composition to the bars of Composition 5 of Example I were prepared with varying processing temperatures as indicated.

Composition.....	6	7	8	9	10
1st mill temperature ° F.....	93	115	120	131	139
2nd mill temperature ° F.....	95	93	95	93	93
3rd mill temperature ° F.....	97	95	98	97	97
Mullen/° F.....	43/91	54/93	61/91	62/98	62/98
Smear grade (100 ml. soak).....	5	6	6	3	3
Smear grade (5 ml. soak).....	4	5	5	5	5
5 ml. wet dish.....	3	4	5	5	5

The Mullen grades at higher temperatures are lower than they would be at 90° F. Bars having a Mullen of less than about 50 at about 90° F. are hard to process or stamp since they are soft and sticky.

EXAMPLE III

Twenty-eight pounds of noodles having the following composition were added to an amalgamator:

Component	Percent by weight
A mixture of sodium soaps prepared from a 50/50 mixture of tallow and coconut oil, hardened to an I.V. of about 24.5.....	80.3
Water.....	10.3
Coconut fatty acids.....	7.0
Cottonseed oil hardened to an I.V. of about 3.0.....	1.1
Sodium chloride.....	0.6
Sodium silicate (SiO ₂ :Na ₂ O of 2.58).....	0.3
Magnesium sulfate.....	0.4

Next one pound of minor ingredients including perfume, tetrasodium ethylenediaminetetraacetate, dye, and TiO₂ is added and lastly 0.36 pound of salt and 1.35 pounds of water are added and, after mixing, the batch was milled on a small laboratory mill to a flake thickness of 0.007 inch three times at temperatures of 111° F., 111° F., and 94° F., respectively and then extruded at a temperature of 93° F. and formed into bars. There was about 1.8% sodium chloride, about 12.6% water, about 7% coconut fatty acids, and about 76% soap in the finished bar. These bars had excellent lathering and smear characteristics.

When the same composition is milled twice on factory mills with a first mill temperature of about 130° F., substantially equivalent results are obtained.

What is claimed is:

1. A milled toilet bar composition free of synthetic organic detergent and consisting essentially of from about 70% to about 88% of soap selected from the group consisting of sodium soap and mixtures of sodium soap and potassium soap containing no more than about 25% potassium soap, said soap comprising from about 20% to about 80% of fatty acids containing from about 8 to about 14 carbon atoms of which at least about 25% contain 12 carbon atoms and from about 20% to about 80%

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fatty acids containing from about 16 to about 20 carbon atoms; from about 1% to about 3% sodium chloride; from about 2% to about 15% free fatty acid containing from about 8 to about 20 carbon atoms; and from about 5% to about 18% water, said bar being formed by a process comprising the step of milling the ingredients at a temperature of from about 110° F. to about 140° F.

2. The composition of claim 1 containing from about 5% to about 10% free fatty acid, from about 1.8% to about 2.5% sodium chloride, and from about 10% to about 16% water, the bar being processed by milling the ingredients at least once at a temperature of from about 110° F. to about 125° F.

3. The composition of claim 1 wherein the free fatty acids contain from about 8 to about 14 carbon atoms, at least 25% of which contain 12 carbon atoms.

4. The composition of claim 1 wherein the soap is derived from a mixture of about 50% tallow and about 50% coconut oil hardened to an I.V. of from about 1 to about 45.

5. The composition of claim 1 wherein the soap is derived from a mixture of about 80% tallow and about 20% coconut oil hardened to an I.V. of from about 1 to about 45.

6. The composition of claim 1 containing from about 1.8% to about 2.5% sodium chloride.

7. The composition of claim 1 containing from about 5% to about 10% free fatty acid.

8. The composition of claim 1 containing from about 10% to about 16% water.

9. The composition of claim 1 which is processed at a temperature of from about 110° F. to about 125° F.

10. The process of mixing soap bar ingredients essentially free from synthetic organic detergent and consisting essentially of from about 70% to about 88% of soap selected from the group consisting of sodium soap and mixtures of sodium soap and potassium soap containing no more than about 25% potassium soap, said soap comprising from about 20% to about 80% of fatty acids containing from about 8 to about 14 carbon atoms of which at least about 25% contain 12 carbon atoms and from about 20% to about 80% fatty acids containing from about 16 to about 20 carbon atoms; from about 1% to about 3% sodium chloride; from about 2% to about 15% free fatty acid containing from about 8 to about 20 carbon atoms; and from about 5% to about 18% water comprising the step of milling said ingredients at a temperature between about 110° F. and about 140° F. whereby the ingredients are thoroughly mixed without overworking the soap.

11. The process of claim 10 wherein the temperature is from about 110° F. to about 125° F.

12. The process of claim 10 wherein there is from about 1.8% to about 2.5% sodium chloride.

References Cited

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