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3,248,333

LOW pH DETERGENT BAR

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This invention relates to detergent compositions in the form of bars. Specifically, this invention relates to milled soap-free detergent bars providing an acid to neutral pH.

A detergent bar having an acid pH has been deemed desirable since the normal skin has a pH in the acid range (approximately 5.7). It has been postulated that if a satisfactory cleansing action can be obtained without disturbing this acid mantle of the skin, an acceptable detergent bar providing such action would be especially useful to people with exceptionally sensitive skins as well as to normally healthy individuals. Since normal alkali metal soap has a pH in the range from about 10.4 to 10.6, it is not possible to provide a detergent bar which depends primarily on soap for its cleansing action and which also provides an acid pH. With the advent of synthetic detergents, an acid bar became a practical reality.

The usual non-soap synthetic detergent bar does not contain 100% active synthetic detergent. It is very difficult to process a bar containing only synthetic detergent and such bars would be prohibitively expensive. For these reasons, a "filler" material is normally added to the bar to aid in processing the bar and to help give acceptable use characteristics to the bar. Examples of such filler materials which have been used in the past include starch and insoluble soaps.

The use of starch as a principal filler has normally resulted in bars with relatively high wear rates. The use of insoluble soap as a filler material, although acceptable in usual non-soap detergent bars, is unacceptable in bars having an acid reaction. An object of this invention is to provide a milled soap-free detergent bar having an acid to neutral pH and having desirable physical, performance, and appearance characteristics.

The object of this invention can be achieved with a milled non-soap synthetic detergent bar providing a pH of from about 4.5 to about 7 at a use concentration of about 1% by weight in water and comprising (1) from about 18% to about 50% by weight of synthetic detergent surfactant selected from the group consisting of fatty acid esters of sodium isethionate wherein said fatty acids contain from about 10 to about 16 carbon atoms and the sodium salt of an ester of sulfoacetic acid and a fatty alcohol containing from about 10 to about 16 carbon atoms; (2) from about 25% to about 65% by weight milled wheat flour; (3) from about 2% to about 20% by weight cornstarch; and (4) sufficient organic acid selected from the group consisting of lactic, acetic, tartaric, and citric acids to provide the pH range hereinbefore mentioned. All percentages used in the specification and the claims are by weight.

The synthetic detergent surfactants of the bars of this invention, as hereinbefore mentioned, are fatty acid esters of sodium isethionate and the sodium salts of esters of sulfoacetic acid and fatty alcohols. In order to have acceptable detergent properties, the fatty chains (acid and alcohol) should have a carbon chain length of no less than about 10 carbon atoms and no more than about 16 carbon atoms. The acyl groups and the alkyl chains derived from alcohols are normally derived from naturally occurring glycerides (e.g., tallow, coconut oil, palm oil, soybean oil, lard, etc.), but can also be derived synthetically (e.g., by oxidation of petroleum or by hydrogenation of carbon monoxide by the Fischer-Tropsch process). Since mixtures of acyl and alkyl groups are nor-

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mally used, it will be understood that there can be shorter and longer chain lengths present, preferably in small amounts. These acyl and alkyl groups can be partially unsaturated, but they will normally be predominately saturated.

It appears that these specific synthetic detergent surfactants are essential to the formulation of the bars of this invention since the wheat flour, hereinafter more fully described, tends to act as a load (i.e., lathering and cleansing inhibitor) for many anionic detergents, but this load effect is not excessive for the detergent surfactants described and claimed herein. The detergent surfactant preferred herein for its lathering characteristics is the coconut oil acid ester of sodium isethionate, desirably in an amount of about 22%–38% of the bar.

The wheat flour hereinbefore mentioned is essential to the formulation of the highly acceptable detergent bars of this invention. Bars prepared from wheat flour have superior use characteristics in that the wear rate is much more acceptable than for bars containing starch as a principal filler. Also, since wheat flour is available in a white bleached form, the addition of wheat flour to a bar does not cause color problems. When less than 25% by weight of the bar is wheat flour, the bar is difficult to process (milling, plodding and stamping) and does not have acceptable feel and wear characteristics. When more than 65% by weight of the bar is wheat flour, the portion of the formula which can be synthetic detergent surfactant and other desirable minor ingredients is insufficient to provide a bar with acceptable cleaning properties. About 40–55% by weight white bleached wheat flour is preferred in the bar.

The bar also contains from about 2% to about 20% cornstarch as a secondary filler. This cornstarch aids in processing the bar and lessens the tendency of the wheat flour to set up and form a sticky dough under processing conditions. About 3–5% by weight cornstarch is preferred in the bar.

As hereinbefore mentioned, the bar contains sufficient organic acid selected from the group consisting of acetic acid, lactic acid, tartaric acid and citric acid to provide a pH of from about 4.5 to 7 (preferably 5.5 to 6.5) at a bar use concentration of about 1% by weight. Other organic acids providing similar pH's can be used. These organic acids are normally present in amounts from about 1% to about 5% to give the aforementioned pH range. Lactic acid is the preferred acid and the preferred level is about 2% by weight of the bar.

Such compounds as glycerin, lanolin, lanolin derivatives and fatty acid esters of short chain alcohols such as isopropyl myristate can be added to the bar, if desired, to provide emollient action. These compounds and mixtures of these compounds can be used in amounts from about ½% to about 10% by weight of the bar. It is preferred to use a mixture of such ingredients. Specifically, it is preferred to use about 3% glycerin, 1% lanolin or lanolin derivative and 2% isopropyl myristate. Preferably, the lanolin derivative is the oil soluble liquid fraction of lanolin. This material, and the process for making it, are described in United States Letters Patent 2,758,125. The oil soluble liquid fraction of lanolin can be purchased under the trademark "Lantrol."

Other additives such as slip agents can be used, if desired. These slip agents impart a slippery soap-like feel to the detergent bar. Examples of these compounds are high molecular weight polymers such as the one sold by Union Carbide Company under the trade name "Polyox WSR-205." (These "Polyox" resins are ultra high molecular weight polymers of ethylene oxide. The molecular weight is in the range of a million or more.) These slip agents can be used in amounts up to about 1%. Prefer-

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ably, 0.1% to about 0.4% by weight of the bar is used to give the bar a smoother feel.

Other optional ingredients in minor amounts such as perfume, coloring material, bacteriostatic agent, e.g., hexachlorophene, and preservatives, can be added in amounts up to about 5% by weight of the bar.

Moisture is preferably present in the bar in an amount from about 3% to about 15% by weight of the bar. This moisture is a plasticizing agent during processing. With less than 3% by weight of the bar, the composition is difficult to process and with more than about 15% the bar tends to be too soft.

The bar is processed (milled) in a conventional manner. For example, the ingredients are added to an amalgamator and, after passing through the amalgamator, the compositions are milled on conventional soap mills and then fed to a plodder from whence they are extruded; the extruded bars are subsequently cut into conventional lengths and stamped, if desired, with appropriate indicia.

The following example illustrates, but does not limit, the practice of this invention.

Example

The following ingredients were added to a conventional amalgamator:

	Percent
Coconut-oil fatty acid ester of sodium isethionate	25.0
Milled, white, bleached wheat flour	52.5
Glycerin	3.0
Cornstarch	4.0
Lanolin derivative (Lantrol)	1.0
Isopropyl myristate	2.0
Lactic acid	2.0
Veegum "F" (colloidal magnesium aluminum silicate)	0.5
Water	9.0
Polyox WSR-205	0.3125
Minor ingredients	0.6875

The above composition was processed through an amalgamator and then milled on a conventional soap mill and the resulting flakes were fed to a plodder and extruded. The extruded bars were cut into suitable lengths. The resulting bars provided a pH of approximately 6.4 in water at a use concentration of 1%. These bars were highly acceptable white detergent bars and were successfully used in washing the human skin, especially sensitive skin.

When sodium lauryl sulfoacetate is substituted in an equal amount for the isethionate in the above composition, a bar of substantially equal physical characteristics and performance is obtained. When acetic, citric or tartaric acids are substituted in the above composition for the lactic acid to provide the required pH, the resulting bars can be successfully used to wash sensitive skin.

Bars having substantially equal physical and performance characteristics were prepared in the same manner as the bars of Example I, and in which the only differences were that 35.0% coconut-oil fatty acid ester of sodium

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isethionate and 42.5% milled, white, bleached wheat flour were used instead of 25.5% and 52.5% respectively.

What is claimed is:

1. A milled non-soap synthetic detergent bar providing a pH of from about 4.5 to about 7 at a use concentration of about 1% by weight in water and consisting essentially of (1) from about 18% to about 50% by weight of a synthetic detergent selected from the group consisting of fatty acid esters of sodium isethionate wherein said fatty acids contain about 10 to about 16 carbon atoms and the sodium salt of esters of sulfoacetic acid and fatty alcohols containing from about 10 to about 16 carbon atoms; (2) from about 40% to about 55% by weight milled wheat flour; (3) from about 3% to about 5% by weight cornstarch; (4) sufficient organic acid selected from the group consisting of lactic, acetic, tartaric, and citric acids to provide a pH in the range hereinbefore mentioned; and (5) from about 3% to about 15% by weight water.

2. The bar of claim 1 wherein the synthetic detergent is the coconut-oil fatty acid ester of sodium isethionate in an amount of 22% to 38% by weight, and said flour is a white bleached flour.

3. The bar of claim 2 wherein the organic acid is lactic acid.

4. A milled non-soap synthetic detergent bar consisting essentially of:

	Percent
(1) Coconut-oil fatty acid ester of sodium isethionate	About 25
(2) Milled, bleached wheat flour	About 52.5
(3) Glycerin	About 3
(4) Cornstarch	About 4
(5) Oil soluble liquid fraction of Lanolin	About 1
(6) Isopropyl myristate	About 2
(7) Lactic acid	About 2
and	
(8) Water	About 9

and having a pH of about 6.4

5. The bar of claim 4 wherein there is about 35% coconut-oil fatty acid ester of sodium isethionate and 42.5% milled, bleached wheat flour.

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