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(57) Abstract

This invention is an improved mild personal cleansing syndet bar comprising: long chain alkyl sulfate having essentially saturated C_{15}-C_{22}, preferably C_{16}-C_{18}, alkyl chains, more preferably cetearyl sulfate, combined with a selected plasticizer.

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SYNDET BAR WITH LONG CHAIN ALKYL SULFATES FOR IMPROVED PROCESSABILITY AND BAR CHARACTERISTICS

TECHNICAL FIELD

This invention relates to cleansing bars based on synthetic surfactants and to processes of making them.

BACKGROUND OF THE INVENTION

Synthetic surfactant-based personal cleansing bars have attracted much interest recently because they tend to be milder to the skin than soap-based products. This mildness, however, comes with negatives to both the manufacturer and the consumer. The manufacturer experiences difficult processability due to the sticky nature of such products, as well as high raw material costs. The consumer experiences the negative performance properties of smear, bar softness and consequently high wear rates.

There is a strong need to develop a mild bar product that is easily processable on conventional equipment while having acceptable in-use characteristics.

OBJECTS OF THE INVENTION

This invention relates to skin cleansing syndet bar compositions which provide improved processability and still maintain consumer acceptable bar quality. Therefore, one object of this invention is to provide a composition which exhibits improved processability.

SUMMARY OF THE INVENTION

This invention is an improved mild personal cleansing syndet bar comprising: at least about 18% by weight long chain alkyl sulfate having essentially saturated C_{15}-C_{22}, preferably C_{16}-C_{18}, alkyl chains, preferably cetearyl sulfate, combined with a selected plasticizer preferably selected from paraffin, fatty acids, and polyethylene glycols, and mixtures thereof.

DETAILED DESCRIPTION OF THE INVENTION

To develop a mild synthetic surfactant-based bar without the processability and performance negatives outlined above, it is advantageous to think of the bar as two separate components: the matrix and the actives. The matrix provides the physical characteristics (processability and bar messiness) while the actives provide lathering and mild properties. The matrix, if not chosen correctly, can impede lather generation, cause poor bar feel, enhance wear rate beyond an acceptable level, and/or reduce product mildness. Likewise, the actives must be chosen so as to provide acceptable levels of lathering without negatively impacting mildness, a common tradeoff in formulations.

It will be appreciated that the development of an appropriate matrix is a delicate balancing act between plasticity and brittleness while not compromising lather performance. Typical matrix materials such as triglycerides, fatty alcohols, monoglycerides, etc., tend to form a sufficiently plastic matrix but also tend to depress lather potential. Other commonly used matrix materials such as salts, sugars, polysaccharides, etc., tend to make an overly brittle and water-soluble matrix that induces poor bar messiness performance.

Disclosed is a syndet bar comprising: (1) from about 18% to about 55%, preferably from about 20% to about 45%, of C_{15}-C_{22}, preferably C_{16}-C_{18}, essentially saturated long alkyl (chain) sulfates; (2) from about 10% to about 50%, preferably from about 15% to about 40% plasticizer; (3) from about 10% to about 45%, preferably from about 15% to about 40%, high lathering, mild surfactants; (4) from 0% to about 20%, preferably from 5% to about 15%, sodium soap; and (5) from about 2% to about 10%, preferably from about 3% to about 8%, water.

The long chain alkyl sulfates, as defined herein, comprise said long chain alkyl chains at a level of at least about 90%, preferably about 93%, and more preferably about 97%. The long chain alkyl sulfates are derived from corresponding saturated straight chain alcohols. The preferred alkyl sulfate has a ratio of C_{16}-C_{18} in the range of from about 100% C_{16} to about 100% C_{18} by weight. A commercially available C_{16}-C_{18} alkyl sulfate is

SIPON® EC-111 (formerly SIPEX® EC-111), sodium cetearyl sulfate, which is approximately 60% C_{16} and 36% C_{18}. SIPON® EC-111 is sold by Alcolac Company, Baltimore, MD 21226. Another source is Henkel Corp., Ambler, PA 19002. Henkel's sodium cetearyl sulfate, LANETTE E, is an estimated 50-50% C_{16}-C_{18} alkyl sulfate sold as an emulsifier.

The terms "synthetic bar," also "syndet bar," as used herein mean that the bar has more synthetic surfactant than soap unless otherwise specified. The term "AS syndet bar" means a syndet bar containing alkyl sulfate surfactant. The term "long chain" means C_{15} and C_{22}, and mixtures thereof.

The percentages, ratios, and parts herein are on a total composition weight basis, unless otherwise specified. All levels and ranges herein are approximations unless otherwise specified.

It is noted that surfactant mildness can be measured by a skin barrier destruction test which is used to assess the irritancy potential of surfactants. In this test the milder the surfactant, the lesser the skin barrier is destroyed. Skin barrier destruction is measured by the relative amount of radiolabeled water (^3H-H_2O) which passes from the test solution through the skin epidermis into the physiological buffer contained in the diffusate chamber. This test is described by T.J. Franz in the J. Invest. Dermatol., 1975, 64, pp. 190-195; and in U.S. Pat. No. 4,673,525, Small et al., issued June 16, 1987, incorporated herein by reference, and which disclose a mild alkyl glyceryl ether sulfonate (AGS) surfactant based synbar comprising a "standard" alkyl glyceryl ether sulfonate mixture. Barrier destruction testing surprisingly shows that the long chain alkyl sulfates are milder than standard AGS.

The long chain alkyl sulfate comprises 18-55% by weight of the bars of this invention. Other syndet bar ingredients are selected from: other surfactants, polymeric skin feel aids, moisturizers, plasticizers, fillers, etc. A preferred syndet bar comprises: about 20-45% of cetearyl sulfate; 5-15% soap; and about 1-35%, preferably about 5-30%, moisturizer; 10-50% plasticizers; and 2-10%, preferably 3-8%, water. To insure mildness and bar firmness, the synthetic detergent surfactant system in the bars

should contain the long chain alkyl sulfate.

Other detergent surfactants can be used; particularly from about 10% to about 50%, preferably from about 15% to about 40%, of lather enhancing detergent co-surfactant, e.g., mild ones, e.g., sodium lauroyl sarcosinate, alkyiglycerylether sulfonate, and sulfonated fatty acids. Numerous examples of other surfactants are disclosed in the patents incorporated herein by reference. They include limited amounts of other alkyl sulfates, anionic acyl sarcosinates, methyl acyl taurates, N-acyl glutamates, acyl isethionates, alkyl sulfosuccinates, alkyl phosphate esters, ethoxylated alkyl phosphate esters, trideceth sulfates, protein condensates, mixtures of ethoxylated alkyl sulfates and alkyl amine oxides, betaines, sultaines, and mixtures thereof. Included in the surfactants are the alkyl ether sulfates with 1 to 12 ethoxy groups, especially ammonium and sodium lauryl ether sulfates. Alkyl chains for these other surfactants are C_8-C_{22}, preferably C_{10}-C_{18}. The acyl esters of isethionic acid salts, with esters of C_{16}-C_{18} acyl isethionates and no more than 25% or lower C_{14} acyl groups are also useful. Preferred is stearoyl isethioniate with C_{14} 3%; C_{16} 50%; and C_{18} 47%. Alkyl glycosides and methyl glucose esters are preferred mild nonionics which may be mixed with other mild anionic or amphoteric surfactants in the compositions of this invention. The bars of this invention can have up to about 10% of shorter chain or traditional (coconut) alkyl sulfates and still maintain the mildness requirement of the bar.

A second essential material of the present invention is a plastic binder, also referred to herein as a plasticizer. The syndet bar of this invention also comprises from about 10% to about 50%, preferably from about 15% to about 40%, plasticizer. The plasticizer can be chosen from a group, but not limited to, paraffin, fatty acid, fatty alcohols, polyethylene glycols. The above-mentioned nonionic surfactants, e.g., tallow alcohol ethoxylates (TAE), e.g., TAE_{80}, TAE_8, etc., are also good plasticizers. Other plasticizers (binders) are identified in the published literature such as J. Amer. Oil Chem. Soc. 1982, 59, 442.

The preferred cation in the AS salt is sodium. However,

other cations such as triethanolammonium (TEA), ammonium, and K, etc., are also usable. As used herein the term "cationic polymer" includes naturally and synthetically derived cationic polymers. The abbreviation "CN" means coconut and "T" means tallow herein, unless otherwise specified. All percentages and proportions are by weight, unless otherwise specified.

A preferred synbar contains a mixture of free fatty acid (or polyethylene glycol) and paraffin at a ratio of from 3:1 to 1:1.

A preferred AS syndet bar also contains from about 10% to about 35% moisturizer, preferably one selected from glycerin and free fatty acid or mixtures thereof. In this case, the free fatty acid serves the purpose as moisturizing and plasticizer ingredient.

The syndet bar of this invention may comprise 0% to about 5% of a suitably fast hydrating cationic polymer. The polymers have molecular weights of from about 1000 to about 3,000,000.

The cationic polymer (skin conditioning agent) is selected from the group consisting of:

(I) cationic polysaccharides;

(II) cationic copolymers of saccharides and synthetic cationic monomers, and

(III) synthetic polymers selected from the group consisting of:

(A) cationic polyakylene imines

(B) cationic ethoxy polyalkylene imines, and

(C) cationic poly[N-[-3-(dimethylammonio)propyl]-N′-[3-(ethyleneoxyethylene dimethylammonio)propyl]urea dichloride].

Specific examples of members of the cationic polysaccaride class include the cationic hydroxyethyl cellulose JR 400 made by Union Carbide Corporation; the cationic starches Stalok® 100, 200, 300 and 400 made by Staley, Inc.; the cationic galactomannans based on guar gum of the Galactasol 800 series by Henkel, Inc. and the Jaguar Series by Celanese Corporation.

Examples of members of the class of copolymers of saccharides and synthetic cationic monomers include those composed of cellulose derivatives (e.g. hydroxyethyl cellulose) and N,N-di-

allyl,N-N-dialkyl ammonium chloride available from National Starch Corporation under the trade name Celquat.

The cationic synthetic polymers useful in the present invention are cationic polyalkylene imines, ethoxypolyalklene imines, and poly[N-[-3-(dimethylammonio)propyl]-N'-[3-(ethylene-oxyethylene dimethylammonio)propyl]urea dichloride] the latter of which is available from Miranol Chemical Company, Inc. under the trademark of Miranol A-15, CAS Reg. No. 68555-36-2.

Preferred cationic polymeric skin conditioning agents of the present invention are those cationic polysaccharides of the cationic guar gum class with molecular weights of 1,000 to 3,000,000. More preferred molecular weights are from 2,500 to 350,000. These polymers have a polysaccharide backbone comprised of galactomannan units and a degree of cationic substitution ranging from about 0.04 per anhydroglucose unit to about 0.80 per anhydroglucose unit with the substituent cationic group being the adduct of 2,3-epoxypropyltrimethyl ammonium chloride to the natural polysaccharide backbone. Examples are JAGUAR C-14-S, C-15 and C-17 sold by Celanese Corporation. In order to achieve the benefits described in this invention, the polymer must have characteristics, either structural or physical which allow it to be suitably and fully hydrated and subsequently well incorporated into the soap matrix.

Other ingredients of the present invention are selected for the various applications. E.g., perfumes can be used in formulating the skin cleansing products, generally at a level of from about 0.1% to about 1.5% of the composition. Alcohols, hydrotropes, colorants, and fillers such as talc, clay, calcium carbonate and dextrin can also be used. Cetearyl alcohol is a mixture of cetyl and stearyl alcohols. Preservatives, e.g., sodium ethylenediaminetetraacetate (EDTA), generally at a level of less than 1% of the composition, can be incorporated in the cleansing products to prevent color and odor degradation. Antibacterials can also be incorporated, usually at levels up to 1.5%. The following patents disclose or refer to such ingredients and formulations which can be used in the soap/synbars of this invention, and are incorporated herein by reference:

Pat. No.	Issue Date	Inventor(s)
4,234,464	11/1980	Morshauser
4,061,602	12/1977	Oberstar et al.
4,472,297	9/1984	Bolich et al.
4,491,539	1/1985	Hoskins et al.
4,540,507	9/1985	Grollier
4,673,525	6/1987	Small et al.
4,704,224	11/1987	Saud
4,812,253	3/1989	Small et al.
4,820,447	4/1989	Medcalf et al.
4,954,282	9/1990	Rys et al.

The syndet bars of this invention have a pH of from 4 to 9 in a 1% aqueous solution. The preferred pH is 5 to 8, more preferably about 7.

Laboratory Assessment of Bar

The following test procedures are used to evaluate the critical bar performance attributes of mildness and bar processability.

Rolling Cylinder Adhesion Test (RCAT) Methodology

The rolling cylinder adhesion test (RCAT) is designed to simulate the adhesion of the processed synbar formulation to the surfaces of the processing equipment (drying/flaking/plodding/-milling/stamping). It has been shown to correlate with stickiness of products during processing. This stickiness is inversely related to overall bar processability. The synbar of this invention has a Relative RCAT (Rolling Cylinder Adhesion Test) Value of less than 1, preferably less than 0.9, and more preferably less than 0.8. A Relative RCAT Value of 1 is assigned to a comparable bar made without the processing aid.

The equipment used for this test is the following. An inclined plane (15°) with raised edges is used as the base for the rolling cylinder. The cylinder itself is made from plexiglass tubing of 4" outer diameter and 11-7/8" overall length; it weighs 735.2 grams.

All evaluations are conducted in a constant temperature/-humidity environment at 80°F (26°C) and 15% relative humidity.

The synbar product to be tested is grated into small pieces (about 2 mm in length). About 20 grams of the grated product are spread evenly over the surface of the inclined plane (which is covered with Kraft freezer paper). The preweighed cylinder is then placed at the head of the inclined plane and allowed to roll freely over the material until it reaches the end of the run. The cylinder is reweighed, the difference being the weight of material adhering to it. The higher the amount of material adhering to the cylinder, the stickier the product and the more difficult to process. The data is expressed as a percentage of material stuck to the cylinder (RCAT %) relative to the amount of material available (20 grams).

In Table 1 below, syndet bar Examples 1-46 (described in more detail below in the Examples section of Table 5) are tested for stickiness using RCAT. Comparative Example 1 is a state-of-the-art syndet bar similar to the exemplified bars of Small et al., supra.

TABLE 1

Rolling Cylinder Adhesion (Stickiness) Test (RCAT) Values

Example	RCAT (%)	Rel. RCAT*
1	56.5	1.0 **
2	32.8	0.58***
3	18.5	0.33
4	17.5+	0.31
6	23.8	0.42
7	25.7	0.45
8	18.9	0.33
9	17.2+	0.30
10	18.2+	0.32
11	19.2	0.34
12	28.1	0.50
15	18.1	0.32
16	26.3	0.47
17	24.7	0.44
18	30.7	0.54
19	24.4	0.43
21	39.9	0.71

TABLE 1 (Continued)

Rolling Cylinder Adhesion (Stickiness) Test (RCAT) Values

Example	RCAT (%)	Rel. RCAT*
23	34.0	0.60
26	39.3	0.70
27	28.0	0.50
29	31.3	0.55
30	40.0	0.71
31	29.8	0.53
32	16.0+	0.28
33	23.5	0.42
34	20.0	0.35
43	26.0	0.46
44	12.0+	0.21
45	19.5	0.35
46	9.5+	0.17

*RCAT/56.5.

**State-of-the-art syndet bar.

***VEL® syndet bar.

+ Best bars of less stickiness.

The RCAT data is a measure of processability in that it correlates very well with stickiness during processing. Comparative Example 1 is difficult to process because the material adheres to cooling, plodding and stamping equipment during manufacture. All formulas which have a relative RCAT value of less than 1.0, therefore, are easier to process. Of Examples 3-46, for which data are available, all have lower RCAT values and improved processability.

The improved processability of these formulas is a direct result of the decreased hygroscopicity of these formulas.

Hygroscopicity Test (Processability)

Hygroscopicity is the tendency for a product to take up water under equilibrium conditions. It is a causative factor in the stickiness of materials. The higher the hygroscopicity, the stickier and more difficult to process a material tends to be.

Hygroscopicity is measured by shaving approximately one gram

of a bar product and knowing the initial weight and moisture accurately. The shaved product is placed in a constant temperature (80°F), constant humidity (80% R.H.) environment. The total weight of the sample is taken hourly until no further weight is gained. The difference between the initial and final weights is the increase in moisture content of the sample; this value, when combined with the initial moisture, is the hygroscopicity.

In Table 2, the Examples correspond to those shown in Table 1 and are described in detail in Table 5 hereinbelow. The experimental syndet bar Examples all have improved hygroscopicity over the standard bar Example 1.

TABLE 2

Hygroscopicity Values

Example	Hygroscopicity (%)	Relative Hygroscopicity*
1	26.83	1.0
16	9.24	0.34
23	9.29	0.35
24	7.59	0.28
25	9.54	0.32
26	6.69	0.25
27	7.73	0.29
28	7.73	0.29
29	8.12	0.30
30	8.42	0.31
31	9.28	0.35
32	7.40	0.28
33	8.69	0.32
34	9.70	0.36

*Hygroscopicity/26.83 = Standard

In Vitro Skin Barrier Penetration Test (Mildness)

This test was performed according to the procedure described in U.S. Pat. No. 4,812,253, Small et al., issued Mar. 14, 1989, said patent incorporated herein by reference.

Frequently, materials which tend to improve processability also tend to have other negatives, particularly in terms of product mildness. Referring to Table 3, using the barrier

destruction method to assess product mildness, individual raw materials sodium cetearyl sulfate is shown to be surprisingly more mild than the ultra mild sodium cocoglycerylether sulfonate, as well as a shorter chained AS, sodium dodecyl sulfate. The lower the number in Table 3 the milder the product.

TABLE 3

	mg ^3H_2O Transported
Water	0.137
Sodium Cetearyl Sulfate	0.302
Sodium Cocoglycerylether Sulfonate	0.458
Sodium Dodecyl Sulfate	1.289
Sodium Laurate	1.805

A Method of Making Syndet Bars

Crutching

1. Add melted sodium cetearyl sulfate to the crutcher.
2. Add predetermined quantity of Hamposyl L-30 solution to the crucher mix.
3. Add the predetermined quantity of AGS paste to the water in the crutcher. The AGS paste can be at ambient temperature or preheated to 150°F (65°C).
4. Turn on the agitator and recirculation pump and maintain temperature in crutcher at 130-150°F (54-65°C) by adjusting steam and water valves.
5. Allow contents in crutcher mix to return to 130-I50°F (54-65°C) prior to adding predetermined quantity of stearic acid.
6. Add to heated crutcher mix predetermined quantity of soap or NaOH to form in-situ soap.
7. Allow the contents in the crutcher to mix and/or react for about 15 minutes while maintaining the temperature at 130-150°F (54-65°C).
8. Add to heated crutcher mix the predetermined quantity of acyl isethionate. Allow contents in crutcher to mix for about 20 minutes while maintaining temperature at 130-150°F (54-65°C).
9. Add sodium chloride plasticizer and titanium dioxide to

the heated crutcher mix.

10. Add lauric and/or coconut fatty acids to crutcher mix and allow contents of crutcher to mix for about 15 minutes while maintaining temperature at 130-150°F (54-65°C).

Drying

The crutcher mix is dried and cooled using a combination flash chamber and chill roll or chill belt. The crutcher mix is first heated to approximately 300°F (149°C) by a heat exchanger and then flash dried in a chamber above the chill roll or chill belt. From the flash chamber the hot, dried mix is extruded onto the chill roll or chill belt. The chill belt or chill roll provides a uniform, thin, cool (85-95°F, 29-35°C) product in flake or chip form. Typical moisture for the flake is 1-10%, preferably about 2-4.5%. The ways to regulate the moisture, in the order of preference, are (1) increasing or decreasing steam pressure on the heat exchanger; (2) increasing or decreasing crutcher mix rate to the heat exchanger; and (3) increasing or decreasing crutcher mix temperature to the heat exchanger.

Amalgamating

The flakes are weighed and mixed in a batch amalgamator to obtain uniform flake size. Preweighed perfume is added to the flakes and mixed in the amalgamator to obtain the desired finished product perfume level. The perfumed flakes are transferred to the mix hopper or directly to the plodder.

Milling (Optional)

The 3-roll soap mills are set up with the first roll at 120°F (49°C) and the other two mills at about 44°F (7°C). The material is passed through the mills several times to provide a homogeneous mixture of perfume and dried flakes.

Plodding and Stamping

The plodder is set up with the barrel temperature at about 125°F (52°C) and the nose temperature at 120°F (49°C). The ideal plodder is a dual stage plodder that allows use of a vacuum of about 15-25 inches of Hg. The plugs should be cut in 5" sections and stamped with a cold die block using die liquor such as alcohol, if appropriate.

EXAMPLES

The following examples are illustrative and are not intended to limit the scope of the invention(s). The detailed methods of making milled bars is well known. All levels and ranges, temperatures, results etc., used herein are approximations unless otherwise specified.

The formulations illustrated in Examples 1 and 2 are comparative examles included for illustration. Example 1 is an AGS-based, state-of-the-art product, while Example 2 is an estimated formulation of Colgate-Palmolive VEL® syndet bar with $\leq$15.0% sodium cetearyl sulfate.

Examples 3-49 contain from 26-46% sodium cetearyl sulfate and represent the broad range of formulations acceptable within the matrix of this invention. The sodium cetearyl sulfate contains primary C_{16}-C_{18} alkyl chains.

COMPARATIVE EXAMPLE 1

Comparative Example 1 is the control bar for assessing processability of the bars of this invention. See Table 4. Using this comparative example, it will be shown that bars described below have improved processability without sacrificing mildness or other bar performance properties.

COMPARATIVE EXAMPLE 2

Comparative Example 2 is a standard syndet bar made by the Colgate-Palmolive Co. under the name Vel®. This product contains an estimated 10% to 15% sodium cetearyl sulfate, significantly less than the levels required in the present invention. Additionally, the Vel bar has unacceptable bar use properties such as smear and lather volume.

TABLE 4

Comparative Examples 1 and 2

(Wt.%)

Ingredient	Ex. 1	Ex. 2
Sodium Cocoglycerylether Sulfonate	53.7	-
Sodium Lauroyl Sarcosinate	12.5	-
Sodium Soap	7.2	-
Sodium Cocomonoglyceryl Sulfate	-	40-45
Sodium Cetearyl Sulfate	-	10-15
Cetearyl Alcohol	-	15.0
Stearic Acid	9.8	-
Lauric Acid	6.5	-
Coconut Oil	-	5.0
Coconut Fatty Acid	-	2.4
Sodium Chloride	4.0	10.9
Sodium Sulfate	-	6.3
Polyquaternium-7	1.0	-
Polyquaternium-10	0.5	-
Water	4.0	1.0

EXAMPLES 3-34

Examples 3-49 are all based on a matrix composed of sodium cetearyl sulfate (26-46%) and stearic acid (0-20%). To this matrix are added various lathering surfactants such as sodium lauroyl sarcosinate (0-20%); sodium cocoglycerylether sulfonate (0-35%); sodium cocoyl isethionate (0-17%); and sodium soap (0-15%). Lauric acid (0-20%) along with the stearic acid, are added to ensure product pH less than or equal to 7.5. Processing aids such as plasticizers (paraffin, cottonseed oil and PEG-8000), and fillers, calcium carbonate and dextrins are added (0-15%) to reduce stickiness and improve plodding.

TABLE 5

Ingredient	Ex. 3 (Wt.%)	Ex. 4 (Wt.%)	Ex. 5 (Wt.%)	Ex. 6 (Wt.%)
Sodium Cetearyl Sulfate	46.0	36.0	36.0	36.0
Sodium Lauroyl Sarcosinate	15.0	15.0	15.0	15.0
Sodium Cocoglyceryl-ether Sulfonate	-	-	-	15.0
Sodium Cocoyl Isethionate	15.0	15.0	17.3	-
Sodium Soap	-	10.0	7.5	8.0
Stearic Acid	20.0	20.0	20.0	20.0
Water	4.0	4.0	4.3	4.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 7 (Wt.%)	Ex. 8 (Wt.%)	Ex. 9 (Wt.%)	Ex. 10 (Wt.%)
Sodium Cetearyl Sulfate	38.0	38.0	36.2	36.0
Sodium Lauroyl Sarcosinate	12.5	15.0	12.1	11.9
Sodium Cocoglyceryl-ether Sulfonate	17.5	11.0	17.0	16.5
Sodium Soap	8.0	8.0	7.3	7.1
Stearic Acid	20.0	20.0	19.4	19.0
Sodium Chloride	-	4.0	3.0	5.0
Water	4.0	4.0	5.0	5.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 11 (Wt.%)	Ex. 12 (Wt.%)	Ex. 13 (Wt.%)	Ex. 14 (Wt.%)
Sodium Cetearyl Sulfate	34.4	34.4	36.0	35.0
Sodium Lauroyl Sarcosinate	11.5	11.5	15.0	15.0
Sodium Cocoglyceryl-ether Sulfonate	15.7	15.7	17.0	9.0
Sodium Cocoyl Isethionate	-	-	-	9.0
Sodium Soap	6.9	6.9	8.0	8.0
Stearic Acid	18.4	18.4	20.0	14.0
Lauric Acid	-	-	-	6.0
Sodium Chloride	8.0	8.0	-	-
Water	5.1	5.1	4.0	4.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 15 (Wt.%)	Ex. 16 (Wt.%)	Ex. 17 (Wt.%)	Ex. 18 (Wt.%)
Sodium Cetearyl Sulfate	35.3	35.3	33.5	45.0
Sodium Lauroyl Sarcosinate	15.0	15.0	14.3	5.0
Sodium Cocoglyceryl-ether Sulfonate	9.0	9.0	8.6	17.5
Sodium Cocoyl Isethionate	9.0	9.0	8.6	-
Sodium Soap	7.5	7.5	7.1	7.5
Sodium Lauryl Sulfate	-	-	5.0	5.0
Stearic Acid	14.0	14.0	13.3	16.0
Lauric Acid	6.0	6.0	5.7	4.0
Water	4.3	4.3	4.0	5.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 19 (Wt.%)	Ex. 20 (Wt.%)	Ex. 21 (Wt.%)	Ex. 22 (Wt.%)
Sodium Cetearyl Sulfate	40.0	40.0	45.0	45.0
Sodium Lauroyl Sarcosinate	8.0	10.0	-	-
Sodium Cocoglyceryl-ether Sulfonate	14.5	12.5	14.5	14.5
Sodium Soap	7.5	7.5	7.5	7.5
Sodium Lauryl Sulfate	5.0	5.0	8.0	8.0
Stearic Acid	18.0	18.0	18.0	18.0
Lauric Acid	2.0	2.0	2.0	2.0
Water	5.0	5.0	5.0	5.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 23 (Wt.%)	Ex. 24 (Wt.%)	Ex. 25 (Wt.%)	Ex. 26 (Wt.%)
Sodium Cetearyl Sulfate	26.3	32.0	32.0	26.3
Sodium Lauroyl Sarcosinate	15.0	13.8	13.8	15.0
Sodium Cocoglyceryl-ether Sulfonate	9.0	8.3	8.3	18.0
Sodium Cocoyl Isethionate	9.0	8.3	8.3	-
Sodium Soap	7.5	6.9	6.9	7.5
Stearic Acid	14.0	12.9	12.9	14.0
Lauric Acid	4.0	5.5	5.5	4.0
Paraffin	10.0	-	-	10.0
Calcium Carbonate	-	7.5	-	-
Dextrin	-	-	7.5	-
Water	5.3	4.8	4.8	5.2
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 27 (Wt.%)	Ex. 28 (Wt.%)	Ex. 29 (Wt.%)	Ex. 30 (Wt.%)
Sodium Cetearyl Sulfate	26.3	36.3	34.3	45.0
Sodium Lauroyl Sarcosinate	15.0	10.0	7.0	6.5
Sodium Cocoglyceryl-ether Sulfonate	18.0	18.0	18.0	28.5
Sodium Soap	7.5	7.5	7.5	-
Stearic Acid	14.0	14.0	14.0	-
Lauric Acid	4.0	4.0	4.0	-
Paraffin	-	5.0	-	15.0
PEG-8000	10.0	-	10.0	-
Water	5.2	5.2	5.2	5.2
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 31 (Wt.%)	Ex. 32 (Wt.%)	Ex. 33 (Wt.%)	Ex. 34 (Wt.%)
Sodium Cetearyl Sulfate	45.0	40.0	30.5	37.5
Sodium Lauroyl Sarcosinate	10.0	12.5	12.0	10.0
Sodium Cocoglyceryl-ether Sulfonate	28.5	27.5	16.0	25.0
Sodium Soap	-	-	7.5	-
Stearic Acid	-	-	13.0	-
Lauric Acid	-	-	6.0	-
Paraffin	11.5	-	-	-
Calcium Carbonate	-	-	-	7.5
PEG-8000	-	15.0	10.0	15.0
Water	5.0	5.0	5.0	5.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 35 (Wt.%)	Ex. 36 (Wt.%)	Ex. 37 (Wt.%)	Ex. 38 (Wt.%)
Sodium Cetearyl Sulfate	30.5	30.5	33.5	32.8
Sodium Lauroyl Sarcosinate	12.0	12.0	6.0	7.5
Sodium Cocoglyceryl-ether Sulfonate	16.0	16.0	19.0	18.3
Sodium Soap	7.55	7.5	7.5	7.5
Stearic Acid	6.0	9.5	6.0	6.0
Lauric Acid	13.0	9.5	13.0	13.0
PEG-8000	10.0	10.0	10.0	10.0
Water	5.0	5.0	5.0	5.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 39 (Wt.%)	Ex. 40 (Wt.%)	Ex. 41 (Wt.%)	Ex. 42 (Wt.%)
Sodium Cetearyl Sulfate	32.0	30.5	20.0	30.0
Sodium Lauroyl Sarcosinate	9.0	12.0	12.0	7.2
Sodium Cocoglyceryl-ether Sulfonate	17.5	16.0	11.0	33.0
Sodium Soap	7.5	7.5	12.0	4.3
Stearic Acid	6.0	6.0	12.0	5.9
Lauric Acid	13.0	13.0	18.0	3.9
Paraffin	-	10.0	-	-
PEG-8000	10.0	-	10.0	10.0
Water	5.0	5.0	5.0	5.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 43 (Wt.%)	Ex. 44 (Wt.%)	Ex. 45 (Wt.%)	Ex. 46 (Wt.%)
Sodium Cetearyl Sulfate	30.0	25.0	32.0	30.0
Sodium Lauroyl Sarcosinate	14.0	14.0	14.0	14.0
Sodium Cocoglyceryl-ether Sulfonate	7.0	7.0	7.0	7.0
Sodium Soap	10.0	10.0	10.0	10.0
Stearic Acid	20.0	20.0	20.0	5.0
Lauric Acid	5.0	5.0	5.0	20.0
Calcium Carbonate	-	5.0	5.0	-
PEG-8000	10.0	10.0	10.0	10.0
Water	5.0	5.0	5.0	5.0
Total	100.0	100.0	100.0	100.0

TABLE 5 (Continued)

Ingredient	Ex. 47 (Wt.%)	Ex. 48 (Wt.%)	Ex. 49 (Wt.%)
Sodium Cetearyl Sulfate	25.0	28.1	29.5
Sodium Lauroyl Sarcosinate	13.0	11.1	14.0
Sodium Cocoglyceryl-ether Sulfonate	16.0	14.7	7.0
Sodium Soap	10.0	6.9	10.0
Stearic Acid	20.0	12.0	20.0
Lauric Acid	5.0	5.5	5.0
Calcium Carbonate	-	7.5	-
PEG-8000	7.0	9.2	10.0
JR-400	-	-	0.5
Water	5.0	5.0	5.0
Total	100.0	100.0	100.0

Examples 33, 43 and 49 are highly preferred syndet bars which are easy to process while still performing well in terms of bar properties.

Claims

1. A personal cleansing syndet bar comprising: from about 18% to about 55% of essentially saturated long chain C_{15}-C_{22} alkyl sulfate; from 0% to about 20% of soap; and from about 10% to about 50% of a plastic binder selected from the group consisting of: paraffin waxes, fatty acids, wherein said plastic binder has a melting point of from about 23°C to about 110°C; wherein said plastic binder is selected from the group consisting of paraffin, nonionic surfactants, fatty acid, fatty alcohols, and polyethylene glycols, and mixtures thereof; and wherein said syndet bar has a pH of from about 4.0 to about 8.5.

2. A personal cleansing syndet bar according to Claim 1 wherein said plastic binder is selected from the group consisting of: paraffin waxes and fatty acids.

3. The syndet bar of Claim 1 or 2 wherein the level of long chain alkyl sulfate is from about 20% to about 45% by weight of said bar and said soap is from about 5% to about 15% by weight of said bar; and wherein said plastic binder melting point is from about 30°C to about 100°C and wherein said long chain is C_{16}-C_{18}.

4. The personal cleansing syndet bar of Claim 1 or 2 wherein said bar primarily comprising: from about 15% to about 40% of said plastic binder; and wherein said long chain alkyl sulfate is present at a level of from about 20% to about 40% and is a saturated long chain alkyl sulfate surfactant saturated alkyl chains of from about 16 to about 18 carbon atoms; and from about 15% to about 40% of a mild cosurfactant.

5. The syndet bar of Claim 4 wherein said mild cosurfactant selected from the group consisting of higher lathering sodium lauroyl sarcosinate, alkyl glycerylether sulfonate, sodium cocoyl isethionate, stearoyl isethionate, and mixtures thereof, and from about 2.0% to about 10% water and wherein said syndet bar is a milled bar and has a pH of from about 5 to about 8.

6. The syndet bar of Claim 1 or 2 wherein said soap-synthetic bar contains other components selected from: moisturizers, colorants, solvents, fillers, other surfactants, polymeric skin feel and mildness aids, perfumes, and preservatives, and water at a level of from about 3% to about 8% wherein said bar contains said C_{16} and C_{18} alkyl chains having a ratio of from about 4:1 to about 1:4.

7. The syndet bar of Claim 3 wherein said long chain alkyl sulfate is at least 90% C_{16} and C_{18}.

8. The personal cleansing syndet bar of Claim 4 wherein said mild cosurfactant is selected from the group consisting of sodium lauroyl sarcosinate, alkyl glycerylether sulfonate, sodium cocoyl isethionate, stearoyl isethionate, and mixtures thereof, and is from about 2.0% to about 10% water; and wherein said syndet bar is a milled bar and said pH is from about 5 to about 8; and wherein said bar contains said C_{16} and C_{18} alkyl chains having a ratio of from about 4:1 to about 1:4 and contains from about 15% to about 40% of a mixture of free fatty acids and paraffin at a ratio of from about 3:1 to about 1:1.

9. The syndet bar of Claim 3 wherein said plastic binder is a mixture of free fatty acid and polyethylene glycol at a ratio of from about 3:1 to about 1:1.

INTERNATIONAL SEARCH REPORT

PCT/US 91/07774

International Application No

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 C11D17/00; C11D10/04

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	C11D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X A	EP,A,0 281 028 (HENKEL) 7 September 1988 see page 2, line 1 - page 3, line 44; claims 1,3	1,2,4,5 6,8,9
X A	GB,A,1 294 754 (UNILEVER) 1 November 1972 see page 2, line 18 - page 3, line 43; claims 1-4,8-14; example 1	1,2 4-6,8,9
X	DD,A,32 812 (K. A. SCHUMANN ET AL.) 5 July 1965 see the whole document	1-3
X	EP,A,0 239 165 (C. VAN BUUREN) 30 September 1987 see page 4, line 30 - page 5, line 8; claims 1,2,4	1,2,6
X	DE,A,2 007 557 (UNILEVER) 10 September 1970 see claims 1-6	1-3

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° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
09 MARCH 1992	20. 03. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	SERBETSOGLOU A.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	FR,A,1 548 196 (SOCIETE BELGE DE L' AZOTE ET DES PRODUITS CHIMIQUES DU MARLY) 29 November 1968 see claims 1-5,7	1
A	JOURNAL OF THE AMERICAN OIL CHEMISTS' SOCIETY. vol. 59, no. 10, October 1982, CHAMPAIGN US pages 442 - 448; M. HOLLSTEIN ET AL.: 'Manufacture and Properties of Synthetic Toilet Soaps' see the whole document	1-9

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. US 9107774 SA 53537

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 09/03/92
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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