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(54) BAR SOAP WITH CATIONIC AGENT

(57) Composition of matter useful for cleaning and method of making thereof. The composition of matter comprising at least 10 wt. % of soap, where the soap is an anionic surfactant, and approximately 0.001 to approximately 1.0 wt. % of a cationic agent that is a quaternary amine.

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Description

Field of the invention

[0001] The present invention generally relates to solid bar soaps, and more particularly relates to solid bar soaps that contain anionic soap and a cationic active component.

Background of the invention

[0002] Personal care compositions such as solid bar soaps are widely available. Bar soaps are usually formulated with a variety of additives to provide benefits that are not inherent in the soap itself. Additives may be employed to, for example, enhance the lathering of the soap, to enhance the mildness of the soap, or to enhance its antibacterial properties.

[0003] Commercial bar soaps comprise at least one "soaps," which, for purposes of describing this component of the compositions of the present invention, have the meaning as normally understood in the art, namely, monovalent salts of monocarboxylic fatty acids. The counter ions of the salts generally include sodium, potassium, ammonium and alkanol ammonium ions, but may include other suitable ions known in the art. The bar soaps may also include adjuvant ingredients such as moisturizers, humectants, antibacterials, water, fillers, polymers, dyes, and fragrances.

[0004] Typically, the soap components in conventional bar soaps comprise salts of long chain fatty acids. The alkyl group of the fatty acids from about 8 carbon atoms, to about 20 carbon atoms in length. The particular length of the alkyl chain of the soaps is selected for various reasons including cleansing capability, lather capability, and cost.

[0005] Accordingly, it is desirable to produce bar soap with effective antibacterial properties. In addition, it is desirable to preserve the other functional requirements of the soap. Furthermore, other desirable features and characteristics of the present invention will become apparent from the subsequent detailed description of the invention and the appended claims, taken in conjunction with the accompanying drawings and this background of the invention.

Detailed description of the invention

[0006] The following detailed description of the invention is merely exemplary in nature and is not intended to limit the invention or the application and uses of the invention. Furthermore, there is no intention to be bound by any theory presented in the preceding background of the invention or the following detailed description of the invention.

[0007] Bar soaps often contain soap or fatty acids. Fatty acids have a carboxylic acid group coupled to an alkane, often a linear alkane. Soaps are salts of fatty acids. The alkane portion of the fatty acid or soap is hydrophobic and non-polar, allowing it to interact with greases, waxes, oils, proteins, and similar hydrophobic materials. The carboxylic portion of the fatty acid or soap is polar and interacts with polar materials, including water.

[0008] Soaps and fatty acids act as surfactants. Surfactants are defined as materials that lower the surface tension (or interfacial tension) between two liquids or between a liquid and a solid. In practice, most surfactants include a polar region, informally called the "head" and a non-polar region, informally called the "tail." Different surfactants have different numbers of heads and tails. For instance, some surfactants have a single head and a single tails. Other surfactants have a single head and two or more tail. Some surfactants have multiple heads and multiple tails. Proteins for instance, may act as surfactants with a large number of both polar and non-polar regions on a single molecule.

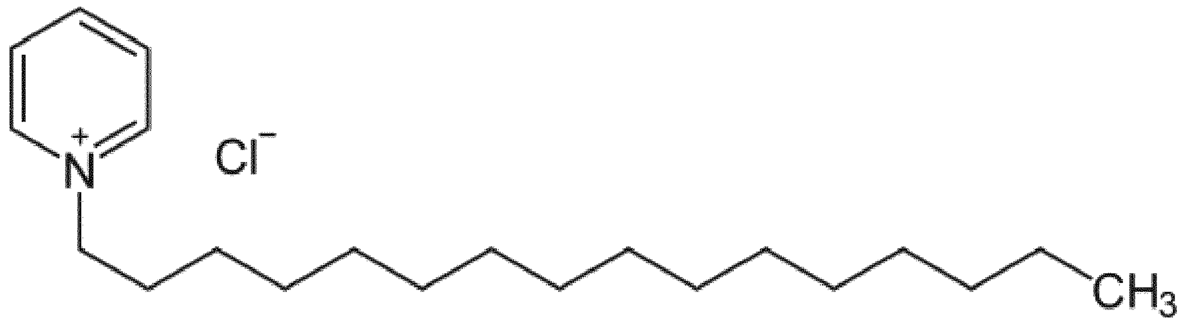
[0009] Surfactants are divided into four principle groups: anionic, non-ionic, cationic, and zwitterionic (also called amphoteric). The groupings are based on the chemical groups in the polar region of the surfactant. Anionic surfactants include an anionic group in the polar region. Examples of anionic groups include: sulfate, sulfonate, phosphate, and carboxylate groups. Cationic surfactants include a cationic group in the polar region. Examples of cationic groups include: primary, secondary, and tertiary amines and quaternary ammonium cations. Zwitterionic surfactants include both an anion group and a cation group in the polar region. Non-ionic surfactants have neither an anion group nor a cation group in the polar region. Examples of non-ionic hydrophilic groups include alcohols and ethers.

[0010] Because fatty acids contain a carboxylic acid group attached to an alkane region, they (and the corresponding soaps) are anionic surfactants. The head of the fatty acid has a negative charge. When in present as a solid, the negative charge may be balanced with a positive charge, for example sodium, potassium, ammonium, and/or similar positively charged species.

[0011] The fatty acid and/or soaps in bar soap formulations dissolve into polar solutions (e.g. water) and aid in the stabilization of non-polar molecules or parts of molecules in the solution. This reduces the energy to dissolve these molecules and also helps keep them from precipitating out of the solution. In order for the soap to have this function, however, it needs to maintain its hydrophilic and hydrophobic regions available to interact with other molecules. This has meant that cationic agents were not used with anionic soaps in soap formulations because the positive charge of the cationic species and the negative charge of the anionic soap would attract and form a stable complex with just the hydrophobic portions exposed. These hydrophobic complexes then precipitate out of the polar solution. Thus, the cationic agent and the anionic surfactants tend to neutralize each other with the result being that neither component performs its purpose as part of the soap. Handbook of Detergents Part A: Properties, Chapter 5 Anionic-Cationic Surfactant Mixtures, 1999. An example of this is an Esterquat or other fatty quaternary ammonium salts and a liquid soap formulation which produces a cloudy precipitate which resists dissolution under agitation or heat.

[0012] In the course of experimentation, Applicants have discovered that under some conditions, for example when formulated in a solid bar soap, cationic active compounds can be mixed with anionic surfactants and maintain the functionality of the cationic compound. Examples of this remarkable phenomenon, follow:

[0013] One useful cationic compound is cetylpyridinium chloride (CPC) according to one example of this disclosure. The structure, shown below, shows the amine with a positive charge. This compound has established antimicrobial properties. (FDA monograph on oral antiseptic drug products, page 6094).



[0014] Experimentation mixing CPC with a liquid soap formula resulted in precipitation of the CPC, apparently due to reaction with the anionic soaps. While attempting to compound soap solutions that would clean with additional antimicrobial properties, Applicants witnessed precipitate is developed after introducing CPC to the liquid soap mixtures. Neither thermal nor added mechanical energy would not return the mixture to a clear solution that would indicate solubilization of the precipitate, presumably the CPC-soap complex.

[0015] However, further experimentation has discovered that when formed into a solid and then used as a bar soap, a mixture of an anionic soap and the cationic agent retains the activity of the cationic active agent while still providing good performance as a bar soap, i.e. lather, cleaning, rinsing, smooth washdown, etc. This was unexpected as molecules of the cationic active agent and the anionic soap have some mobility at room temperature, allowing them to reorganize to low energy states. One of ordinary skill in the art would therefore expect that the cationic active agent and the anionic soap would form a relatively insoluble complex like that described in the experiment described above.

[0016] Instead, the cationic active agent appears to remain functional despite long term storage mixed with the anionic soap. Specifically, two month storage (aging test) at 40C and subsequent testing of the bar soap shows that the soap continues to exhibit both the desired soap properties as well as the anti-bacterially properties from the cationic agent.

[0017] The finding of continued functionality is demonstrated by the anti-bacterial and anti-odor properties of the soap as demonstrated in randomized controlled testing. Odor associated with human perspiration is the result of bacterial on the skin. The use of an antibacterial agent in soap can reduce the quantity of odor producing bacteria on the skin. This, in turn, reduces the amount of odor produced by the reduced number of bacteria. Thus, both reduced odor and reduced bacterial counts are evidence of effectiveness of the cationic antibacterial agent. In contrast, if the odor level and bacterial counts are not reduced, this is evidence that the cationic antibacterial agent is not performing its role in the composition. The potential interaction between anionic and cationic species is considered a likely cause for incapacitation of the cationic antibacterial agent.

[0018] Accordingly, one example according to this disclosure is a bar soap comprising: about 0.001 to about 1.0 wt. % cetylpyridinium chloride (CPC); about 40 to about 90 wt. % anionic surfactant; about 0.05 to about 10 wt. % Humectants and/or solvents, e.g. (PEG-6 methyl ether, PEG-8, PEG-12, glycerin and/or similar; and about 0.1 to about 3.0 wt. % fragrance and other additives.

[0019] An example according to this disclosure is a bar soap comprising: 70 to 80 wt. % anionic soap; 10 to 20 wt. % water; and 0.001 to 1.0 wt. % of a cationic antibacterial agent. In some examples, the cationic antibacterial agent includes an amine. For instance, the cationic antibacterial agent may be CPC. For instance, the antibacterial agent may be benzalkonium chloride (BAC) and/or benzethonium chloride (BZC). The soaps may include sodium tallowate, sodium cocoate, sodium palm kernelate, sodium palmate, and/or similar soaps including soaps with non-sodium cations.

[0020] Another example according to this disclosure is a bar soap comprising: 65 to 85 wt. % anionic soaps; 8 to 20 wt. % water; 0 to 10 wt. % talc; 0 to 10 wt. % fatty acid; 0 to 10 wt. % glycerin; 0.2 to 2.0 wt. % sodium chloride; 0.02 to 0.20 wt. % chelating agents; 0.3 to 2.5 wt. % PEG-6 Methyl Ether; 0.01 to 1.0 wt. % cationic antibacterial agent; and colorants and dyes (up to 4 wt. %).

[0021] The follow two independent experiments looked at the odor reduction and bacterial count reduction produced by use of a solid soap containing a cationic antibacterial agent and anionic soap (monovalent salts of monocarboxylic fatty acids).

[0022] Bacterial Testing for bar soap including CPC and anionic soap.

[0023] Testing was conducted with a solid bar soap comprising 0.02 wt. % CPC, the remainder comprising a bar soap base including: soap, water, talc, fatty acid, glycerin, sodium chloride, chelates, PEG-6 methyl ether. The solid bar soap was applied to a randomly selected axilla of each subject. The other axilla was washed with a water control.

[0024] Twenty six subjects completed this study. Each subject received the test article and a water control which were randomized to either the right or left axilla. Subjects were treated following baseline and at 24 hour intervals for a total of four treatments. Samples were taken and cultured on FTO agar to determine diphtheroid bacterial population and TSAWNY agar to determine total aerobic bacterial population.

[0025] The 0.02 wt. % CPC bar test sample showed significant reduction in total aerobic bacteria compared with the baseline. The baseline was 5.70 and the after treatment mean value of 5.30, with a p-value of 0.003. The water control showed a much smaller reduction with a baseline of 5.89 and an after treatment average of 5.81, with a p-value of 0.56. The measurement of diphtheroids similarly showed a reduction with the 0.02 wt. % CPC bar test sample compared with baseline. The baseline mean value was 3.92 and the after treatment mean value was 3.18, with a p-value of 0.046. The water control had a baseline of 3.99 and an after treatment mean value of 4.13, with a p-value of 0.65.

[0026] An analysis was also performed excluding samples with a low baseline recovery (n=15). Despite having approximately half the samples, the statistical results were stronger for this subset of samples with a p-value of 0.017 for the treatment arm and 0.85 for the water control. Accordingly, the treatment has a greater impact when there are more bacteria in the axilla. In any event, the testing shows even very low concentrations (0.02 wt. %) of CPC in an anionic soap base of a solid bar soap preserved the antibacterial functionality and significantly reduced the bacteria in the treated axilla.

[0027] Similarly, randomized testing was conducted where the outcome was assessed by odor control. The cationic antibacterial agent reduces the number of odor causing bacteria producing a resulting decrease in odor.

[0028] The test bar contained the following components: 0.06 wt. % cetylpyridinium chloride; with a bar soap base as previously described. The control for this test was a water wash. The test protocol was conducted according to ASTM E1207-02, Standard Guide for Sensory Evaluation of Axillary Deodorancy.

[0029] Following a 10 day conditioning period and 24 hours after a control wash, subjects participated in a baseline odor evaluation. Subjects were required to have an average odor intensity score ≥ 4.0 and < 8.0 in each axilla to remain in the study. Subjects could not have more than a 3 point difference in average right and left scores to remain in the study. Qualified subjects were then assigned a final subject number and randomly assigned to the product distribution.

[0030] Each of thirty six subjects completed five washes of one axilla with the bar soap product, once a day, for three consecutive days and twice on the fourth day. The other axilla was washed with water only. The application site consisted of an approximate 4 x 6 inch area centered in the axillary vault. Trained technicians instructed subjects for the bar soap wash. Subjects wore a 100% cotton white t-shirt laundered in unscented laundry detergent during the study period. Subjects were evaluated by the trained odor judges for malodor intensity at 8 and 12 hours following the fifth wash.

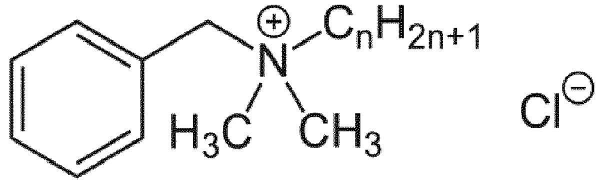
[0031] The results: the baseline (before wash) values for the test group had a mean of 6.28 and the control group had a mean of 6.28 with a p-value of 0.995. At eight hours, the bar soap group had a value of 4.06 and the water control group had a mean value of 4.93, with a p-value of <0.001 (which is below the 0.05 threshold usually used for statistical significance). At twelve hours, the test group had a mean value of 3.92 and the control group had a mean value 4.61, with a p-value of <0.001.

[0032] Based on this testing, the use of the soap with the cetylpyridinium chloride (CPC) was significantly more effective at reducing malodor compared with control. These results continue for at least 12 hours after washing with the CPC infused bar soap. Accordingly, based on the outcome of these experiments, the cationic antibacterial agent appears to retain its functionality despite being mixed in a solid bar soap with an anionic soap.

[0033] Similar work was performed using other cationic agents, including benzalkonium chloride (BAC) and benzethonium chloride (BZC). These cationic agents also showed similar reductions in bacterial counts and/or odor levels in randomized, controlled testing. Accordingly, the principle described here extends beyond the particular cationic antibacterial agent.

Benzalkonium chloride (BAC)

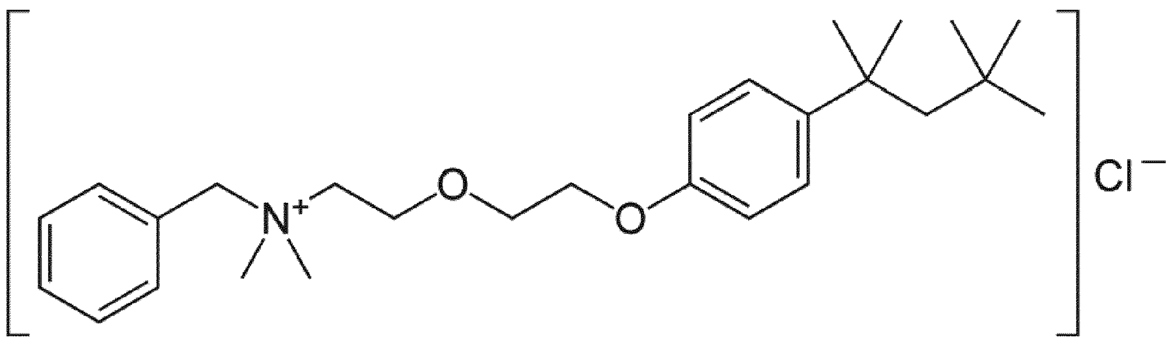
[0034]



n = 8, 10, 12, 14, 16, 18

Benzethonium chloride (BZC)

[0035]



[0036] A study was performed on bar soap made of 0.1 wt. % BAC in soap base and bar soap made of 0.05 wt. % BAC in soap base. Subject hands were contaminated according to ASTM E1174, Standard Test Method for Evaluation of the Effectiveness of Health Care Personnel Handwash Formulations and based values recorded. Before treatment baselines had log10 count of 9.15 for the 0.1 wt. % group and 9.14 for the 0.05 wt. % group. Subject hands where then subjected to 15 seconds of lather on wet hands, 30 seconds wash, and 30 second rinse. Both bar soaps achieved significant reduction in bacterial counts. The 0.1 wt. % bar dropping 2.35 log10 and the 0.05 wt. % bar dropping 2.27 log10. Thus each bar formulation reduced the count by over 99% (> two log10). This was consistent with the performance of a liquid antibacterial solution used as a control (Hibiclens, 2.46 log reduction, 15 sec wash, and 30 sec rinse).

[0037] A malodor study, similar to the one described above, was performed on 0.1 wt. % BAC soap. This study showed similar effectiveness to the 0.06 wt. % CPC described above. Accordingly, the functionality of the BAC is not merely continued functionality as an antibacterial but provides the desired anti odor properties.

[0038] A similar study was performed comparing bar soaps made with 0.2 wt. % BZC in soap base and 0.1 wt. % BZC in soap base. Subject hands were contaminated according to ASTM E1174, Standard Test Method for Evaluation of the Effectiveness of Health Care Personnel Handwash Formulations and based values recorded. Before treatment baselines had log10 count of 8.94 for the 0.2 wt. % group and 9.00 for the 0.1 wt. % group. Subject hands where then subjected to 15 seconds of lather on wet hands, 30 seconds wash, and 30 second rinse. Both bar soaps achieved significant reduction in bacterial counts. The 0.2 wt. % bar dropping 2.40 log10 and the 0.1 wt. % bar dropping 2.34 log10. Thus each bar formulation reduced the count by over 99% (> two log10). This was consistent with the performance of a liquid antibacterial solution used as a control (Hibiclens, 2.53 log10 reduction, 15 sec wash, and 30 sec rinse).

[0039] In other examples, the cationic agent is a conditioner for hair and/or skin. Some examples of suitable cationic agents that function as conditioners include polyquatermnium-7, polyquaternium-10, guar hydroxypropyl trimonium chloride, and cocamidopropyl PG-dimonium chloride phosphate.

[0040] The preparation of bar soap, as is well known by those skilled in soap manufacture, typically involves the use of water-soluble soap from a fat charge that is capable of providing a combination of individual soaps of fatty acids suitable for the formation of a solid bar. Individual soap compounds may be alkali metal, ammonium or substituted ammonium salts, preferably sodium or potassium salts, of long-chain fatty acids. Such fatty acids may be straight chain saturated or unsaturated fatty acids of from 8 to 24 carbon atoms, preferably from 14 to 18 carbon atoms. Suitable fatty acids are those of tallow, groundnut, cottonseed, palm, palm kernel, babassu, and coconut oils, for instance lauric, myristic, palmitic, oleic, and stearic acids and the acids of dehydrated hardened castor oil; or erucic and behenic acids. Some preferred soaps include, but are not limited to, sodium tallowate, sodium cocoate, sodium palm kernelate, and sodium palmate.

[0041] Additionally, surfactants may be added to the form the bar soap. These surfactants may include anionic, cationic, non-ionic, and/or zwitterionic surfactants, as well as combinations of these classes.

[0042] Suitable anionic surfactants include, but are not limited to, compounds in the classes known as alkyl sulfates, alkyl ether sulfates, alkyl ether sulfonates, sulfate esters of an alkylphenoxy polyoxyethylene ethanol, alpha-olefin sulfonates, beta-alkoxy alkane sulfonates, alkylaryl sulfonates, alkyl monoglyceride sulfates, alkyl monoglyceride sulfonates, alkyl carbonates, alkyl ether carboxylates, fatty acids, sulfosuccinates, sarcosinates, oxtoxynol or nonoxynol phosphates, taurates, fatty taurides, fatty acid amide polyoxyethylene sulfates, isethionates, or mixtures thereof. Additional anionic surfactants are listed in McCutcheon's Emulsifiers and Detergents, 1993 Annuals, (hereafter McCutcheon's), McCutcheon Division, MC Publishing Co., Glen Rock, N.J., pp. 263-266, incorporated herein by reference. Numerous other anionic surfactants, and classes of anionic surfactants, are disclosed in Laughlin et al. U.S. Pat. No. 3,929,678, incorporated herein by reference.

[0043] The bar soaps of the present disclosure also may contain nonionic surfactants. Typically, a nonionic surfactant has a hydrophobic base, such as a long chain alkyl group or an alkylated aryl group, and a hydrophilic chain comprising a sufficient number (i.e., 1 to about 30) of ethoxy and/or propoxy moieties. Examples of classes of nonionic surfactants include ethoxylated alkylphenols, ethoxylated and propoxylated fatty alcohols, polyethylene glycol ethers of methyl glucose, polyethylene glycol ethers of sorbitol, ethylene oxide-propylene oxide block copolymers, ethoxylated esters of fatty (C8-C18) acids, condensation products of ethylene oxide with long chain amines or amides, and mixtures thereof.

[0044] Exemplary nonionic surfactants include, but are not limited to, methyl gluceth-10, PEG-20 methyl glucose distearate, PEG-20 methyl glucose sesquistearate, C11-15 pareth-20, ceteth-8, ceteth-12, dodoxynol-12, laureth-15, PEG-20 castor oil, polysorbate 20, steareth-20, polyoxyethylene-10 cetyl ether, polyoxyethylene-10 stearyl ether, polyoxyethylene-20 cetyl ether, polyoxyethylene-10 oleyl ether, polyoxyethylene-20 oleyl ether, an ethoxylated nonylphenol, ethoxylated octylphenol, ethoxylated dodecylphenol, or ethoxylated fatty (C6-C22) alcohol, including 3 to 20 ethylene oxide moieties, polyoxyethylene-20 isohexadecyl ether, polyoxyethylene-23 glycerol laurate, polyoxy-ethylene-20 glyceryl stearate, PPG-10 methyl glucose ether, PPG-20 methyl glucose ether, polyoxyethylene-20 sorbitan monoesters, polyoxyethylene-80 castor oil, polyoxyethylene-15 tridecyl ether, polyoxyethylene-6 tridecyl ether, laureth-2, laureth-3, laureth-4, PEG-3 castor oil, PEG 600 dioleate, PEG 400 dioleate, and mixtures thereof. Numerous other nonionic surfactants are disclosed in McCutcheon's Detergents and Emulsifiers, 1993 Annuals, published by McCutcheon Division, MC Publishing Co., Glen Rock, N.J., pp. 1-246 and 266-272; in the CTFA International Cosmetic Ingredient Dictionary, Fourth Ed., Cosmetic, Toiletry and Fragrance Association, Washington, D.C. (1991) (hereinafter the CTFA Dictionary) at pages 1-651; and in the CTFA Handbook, at pages 86-94, each incorporated herein by reference.

[0045] Amphoteric or Zwitterionic surfactants can be broadly described as derivatives of secondary and tertiary amines having aliphatic radicals that are straight chain or branched, and wherein one of the aliphatic substituents contains from about 8 to 18 carbon atoms and at least one of the aliphatic substituents contains an anionic water-solubilizing group, e.g., carboxy, sulfonate, or sulfate. Examples of compounds falling within this description are sodium 3-(dodecylamino)propionate, sodium 3-(dodecylamino)-propane-1-sulfonate, sodium 2-(dodecylamino)ethyl sulfate, sodium 2-(dimethylamino) octadecanoate, disodium 3-(N-carboxymethyl-dodecylamino) propane-1-sulfonate, disodium octadecyliminodiacetate, sodium 1-carboxymethyl-2-undecylimidazole, sodium N,N-bis(2-hydroxyethyl)-2-sulfato-3-dodecoxypropylamine, sodium coconut N-methyl taurate, sodium oleyl N-methyl taurate, sodium tall oil acid N-methyl taurate, sodium palmitoyl N-methyl taurate, cocodimethylcarboxymethylbetaine, lauryldimethylcarboxymethylbetaine, lauryldimethylcarboxyethylbetaine, cetyldimethylcarboxymethylbetaine, lauryl-bis-(2-hydroxyethyl)carboxymethylbetaine, oleyldimethylgammacarboxypropylbetaine, lauryl-bis-(2-hydroxypropyl)-carboxyethylbetaine, cocoamidodimethylpropylsultaine, stearylamidodimethylpropylsultaine, laurylamido-bis-(2-hydroxyethyl)propylsultaine, disodium oleamide PEG-2 sulfosuccinate, TEA oleamido PEG-2 sulfosuccinate, disodium oleamide MEA sulfosuccinate, disodium oleamide MIPA sulfosuccinate, disodium ricinoleamide MEA sulfosuccinate, disodium undecylenamide MEA sulfosuccinate, disodium wheat germamido MEA sulfosuccinate, disodium wheat germamido PEG-2 sulfosuccinate, disodium isostearamideo MEA sulfosuccinate, cocoamphoglycinate, cocoamphocarboxyglycinate, lauroamphoglycinate, lauroamphocarboxyglycinate, capryloamphocarboxyglycinate, cocoamphopropionate, cocoamphocarboxypropionate, lauroamphocarboxypropionate, capryloamphocarboxypropionate, dihydroxyethyl tallow glycinate, cocamido disodium 3-hydroxypropyl phosphobetaine, lauric myristic amido disodium 3-hydroxypropyl phosphobetaine, lauric myristic amido glyceryl phosphobetaine, lauric myristic amido carboxy disodium 3-hydroxypropyl phosphobetaine, cocoamido propyl monosodium phosphitaine, lauric myristic amido propyl monosodium phosphitaine, and mixtures thereof.

[0046] The bar soaps may also include up to about 35% by weight of a combination of water-soluble polyhydric solvent(s) having three or more hydroxyl groups (3+-OH). Preferred water soluble organic polyols having two hydroxyl groups (2-OH) include propylene glycol, dipropylene glycol, butylene glycol, ethylene glycol, 1,7-heptanediol, monoethylene glycols, polyethylene glycols, polypropylene glycols of up to 8,000 molecular weight, mono-C1-4 alkyl ethers of any of the foregoing, and mixtures thereof. Preferred water-soluble polyhydric solvents that have at least three hydroxyl groups (3+-OH) include glycerine, and any sugar alcohol, such as sorbitol.

[0047] Examples of suitable sugar alcohols include tetritols such as erythritol, threitol, D-threitol, L-threitol, and D,L-threitol; pentitols such as ribitol, arabinitol, D-arabinitol, L-arabinitol, D,L-arabinitol and xylitol, hexitols such as allitol, dulcitol (galacitol), glucitol, sorbitol, (D-glucitol), L-glucitol, D,L-glucitol, D-mannitol, L-mannitol, D,L-mannitol, altritol, D-altritol, L-altritol, D,L-altritol, iditol, D-iditol, and L-iditol; and disaccharide alcohols such as maltitol, lactitol and isomalt.

[0048] The bar soaps of the present invention may optionally include monohydric alcohols. If present, such alcohols are provided at a concentration preferably no greater than about 4 percent by weight, and most preferably no greater than about 2 percent by weight.

[0049] The bar soaps of the present disclosure may contain optional ingredients well known to persons skilled in the art. Such optional ingredients typically are present, individually, from 0% to about 5%, by weight, of the composition, and, collectively, from 0% to about 20%, by weight, of the composition. Classes of optional ingredients include, but are not limited to, dyes, fragrances, pH adjusters, thickeners, fillers, viscosity modifiers, buffering agents, foam stabilizers, antioxidants, foam enhancers, chelating agents (such as diethylene triamine pentaacetic acid (DTPA) and 1-hydroxyethane 1,1-diphosphonic acid (HEDP)), opacifiers, sanitizing agents, preservatives, polymers, silicones, vitamin E or other vitamins, herb extracts, encapsulated materials, exfoliating agents, and similar classes of optional ingredients known to persons skilled in the art.

[0050] Specific classes of optional ingredients include alkanolamides as foam boosters and stabilizers; gums and polymers as thickening agents; inorganic phosphates, sulfates, and carbonates as buffering agents; EDTA and phosphates as chelating agents; and acids and bases as pH adjusters.

[0051] Examples of preferred classes of basic pH adjusters are ammonia; mono-, di-, and tri-alkyl amines; mono-, di-, and tri-alkanolamines; alkali metal and alkaline earth metal hydroxides; and mixtures thereof. However, the identity of the basic pH adjuster is not limited and any basic pH adjuster known in the art can be used. Specific, nonlimiting examples of basic pH adjusters are ammonia; sodium, potassium, and lithium hydroxide; monoethanolamine; triethylamine; isopropanolamine; diethanolamine; and triethanolamine.

[0052] Examples of preferred classes of acidic pH adjusters are the mineral acids and polycarboxylic acids. Nonlimiting examples of mineral acids are hydrochloric acid, nitric acid, phosphoric acid, and sulfuric acid. Nonlimiting examples of polycarboxylic acids are citric acid, glycolic acid, and lactic acid. The identity of the acidic pH adjuster is not limited and any acidic pH adjuster known in the art, alone or in combination, can be used.

[0053] While at least one exemplary embodiment has been presented in the foregoing detailed description of the invention, it should be appreciated that a vast number of variations exist. It should also be appreciated that the exemplary embodiment or exemplary embodiments are only examples, and are not intended to limit the scope, applicability, or configuration of the invention in any way. Rather, the foregoing detailed description will provide those skilled in the art with a convenient road map for implementing an exemplary embodiment of the invention, it being understood that various changes may be made in the function and arrangement of elements described in an exemplary embodiment without departing from the scope of the invention as set forth in the appended claims and their legal equivalents.

Claims

1. A solid cleaning composition, comprising:

at least 10 wt. % soap, wherein the soap is an anionic surfactant; and
approximately 0.001 to approximately 5.0 wt. % of a cationic agent, wherein the cationic agent is a quaternary amine.

2. The composition of claim 1, wherein the cationic agent is an antibacterial.

3. The composition of claim 1, wherein the cationic agent is a hair and/or skin conditioner.

4. The composition of claim 1, wherein the cationic agent comprises a chloride.

5. The composition of claim 4, wherein the cationic portion of the cationic agent comprises benzalkonium chloride (BAC).

6. The composition of claim 4, wherein the cationic agent comprises benzethonium chloride (BZC).

7. The composition of claim 6, wherein the soap comprises approximately 70 to approximately 90 wt. % of the composition.

8. The composition of claim 7, further comprising approximately 10 to approximately 20 wt. % water.

9. The composition of claim 8, wherein the solid cleaning composition retains the antibacterial functionality of the cationic agent after 2 months storage at 40C.

10. A method of forming an antibacterial soap, the method comprising:

mixing a soap base comprising:

at least 50 wt. % anionic soap;
0.001 to 1.0 wt. % cationic antibacterial agent, wherein the cationic antibacterial agent is a quaternary amine; and
8 to 20 wt. % water; and

forming the soap base into solid bars.

11. The method of claim 10, wherein the cationic antibacterial agent comprises benzalkonium chloride (BAC)

12. The method of claim 10, wherein a cationic portion of the cationic antibacterial agent comprises benzethonium chloride (BZC).

13. A composition of matter, comprising:

approximately 70 to approximately 90 wt. % anionic soap;
approximately 10 to approximately 20 wt. % water; and
approximately 0.001 to approximately 1.0 wt. % cationic antibacterial agent, wherein the cationic antibacterial agent is a quaternary amine.

14. The composition of claim 13, wherein the cationic antibacterial agent comprises benzalkonium chloride (BAC).

15. The composition of claim 14, wherein the cationic antibacterial agent comprises benzethonium chloride (BZC).

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 3929678 A **[0042]**

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