The present invention provides an antimicrobial cleansing bar composition comprising 10 to 30 wt % soap, 20 to 45 wt % water soluble organic solvent, 20 to 40 wt % water, 3 to 20 wt % electrolyte other than soap and an antimicrobial agent.
LOW TOTAL FATTY MATTER (TFM) ANTIBACTERIAL CLEANSING BAR

FIELD OF THE INVENTION

[0001] The present invention relates to low total fatty matter antimicrobial cleansing bars.

BACKGROUND OF THE INVENTION

[0002] Conventional cleansing bars based on soap for personal washing usually contain over about 70% by weight total fatty matter, the remainder being water (about 10-20%) and other ingredients such as colour, perfume, preservatives, etc. Structurants and fillers are also present in such compositions in amounts, which replace some of the soap in the bar while retaining the desired hardness of the bar. A few known fillers include starch, kaolin and talc.

[0003] Hard non-milled cleansing bars containing moisture of less than 35% are also available. These bars have a TFM of about 30-65%. The reduction in TFM has usually been achieved by the use of insoluble particulate materials and/or soluble silicates. Milled bars generally have a water content about 8-15%, and the hard non-milled bars have a water content of about 20-35%.

[0004] It is important to deliver sensory properties such as lather and skin feel, preferably by incorporating benefit agents in the formulation without altering the process, ability and physical properties of the bar.

[0005] Currently most of the extruded cleansing bars contain some amount of soluble oil soap content which helps for lathering, and cleansing and insoluble oil soap content for structuring the cleansing bar. Normally any soap composition contains 5% to 30% of the weight of total soap is soluble soap and rest is insoluble soap. Essentially any cleansing bar will have at least 60% of insoluble soap based on the weight of total soap is used only for structuring the cleansing bar which does not play any role in cleansing. There are some cleansing bars with 40 to 50 TFM where TFM is compensated by skin beneficiary agents, moisturizers etc. Overall an extruded soap bar contains 60-76% of soap by weight of the composition which helps in structuring cleansing bar. Generally cast melt cleansing bars available in the market range from with 40-60 TFM.

[0006] Several bacteria prefer to live and multiply on the human skin. Some of these bacteria are known to cause body odour, pimples and acne. There is some evidence in the prior art to suggest that some of these conditions aggravate in a hot and humid climate. It is known that soaps, i.e. salts of fatty acids, per-se, have antimicrobial properties.

[0007] The increasing demand for vegetable oils, such as palm oil, (one of the main sources of oils and fatty acids used by soap manufacturers), and consequent soaring prices has led to severe constraints on the sustainability of the soaps and detergents Industry, as it is becoming increasingly difficult to provide high TFM soaps at a competitive cost, while still making reasonable profits.

[0008] As a result, the trend is towards lower TFM soaps, being a cost-effective measure. However, lowering of TFM has a direct and negative effect on the antimicrobial or antibacterial property of the soap compositions.

[0009] Therefore, there is a need to have low TFM cleansing bars in which lowering of TFM does not compromise on the antimicrobial or antibacterial property of the soap compositions.

SUMMARY OF THE INVENTION

[0010] WO 03/010273 A1 (Unilever) discloses a transparent soap bar comprising: (iii) from 30 to 60 percent by weight of the soap bar of total fatty matter wherein from 1 to 15 percent by weight is the salt of 12-hydroxystearic acid or a precursor thereof; (iv) from 20 to 50 percent by weight of the soap bar of at least one polyhydric alcohol; and (iii) water. There is no mention of antimicrobial properties of the bar.

[0011] TW341598 (R&G, 1998) relates to a transparent cast molded personal cleansing soap bar. The invention however only demonstrates higher TFM soaps with the desired hardness. There is no mention of antimicrobial properties of the bar.

[0012] Cleansing compositions which show antimicrobial action but which at the same time are mild and gentle to the skin are generally difficult to formulate.

[0013] There is also a need to have a low TFM cleansing bar which has antimicrobial properties and is mild at the same time.

[0014] There still is an unmet need for antibacterial cleansing bar having relatively lower TFM and relatively lower levels of antimicrobial agents.

[0015] There is also a need to provide cleansing bar compositions having relatively lower TFM, which exhibit relatively high antimicrobial activity.

DETAILED DESCRIPTION OF THE INVENTION

[0016] The present invention provides a low TFM mild cleansing bar with good physical, cleansing and sensorial properties.

[0017] One aspect of the present invention provides a cleansing bar composition comprising 10 to 30 wt % soap, 20 to 45 wt % water soluble organic solvent, 20 to 40 wt % water, 3 to 20 wt % electrolyte other than soap and an antimicrobial agent.

[0018] These and other aspects features and advantages will become apparent to those of ordinary skill in the art from a reading of the following detailed description and the appended claims.

[0019] Various components of the composition are described in greater detail below.

[0020] The present invention provides a cleansing bar composition comprising 10 to 30 wt % soap, 20 to 45 wt % water soluble organic solvent, 20 to 40 wt % water, and 3 to 20 wt % electrolyte other than soap and an antimicrobial agent.

[0021] It was a surprising finding of the present invention that the optimum ratio of soap to water and water soluble organic solvent resulted in a low TFM cleansing bar having good antimicrobial properties and at the same time having being mild and having hardness comparable to a 40 TFM bar and which is capable of being stamped.

[0022] Total Fatty Matter

[0023] The term total fatty matter is used very widely and popularly in the field of soaps and detergents. The term Total Fatty Matter, abbreviated to “TFM”, is used to denote the percentage by weight of fatty acid and triglyceride residues present in the personal wash composition without taking into account the accompanying cations. For a soap having 18 carbon atoms, an accompanying sodium cation will gener-
ally amount to about 8 percent by weight. Other cations may be employed as desired, for example zinc, potassium, magnesium, alkyl ammonium and aluminium.

[0024] The TFM content of disclosed composition is at most 35 wt %, more preferably between 15 to 35 wt %, and most preferably 20 to 30% based on weight of the composition.  

[0025] Soaps of Fatty Acids  

[0026] The term soap means salts of fatty acids. Preferably, the soap is soap of C8 to C18 fatty acids, more preferably of C10 to C18 fatty acids. It is particularly preferred that the soap includes at least 40 wt % of soap of C10 to C18 fatty acids, more preferably at least 50 wt % and most preferably at least 70 wt % of the total soap content. It is also preferred that the cleansing bars of the present invention includes at most 60 wt % of the soaps of C10 to C22 fatty acids, preferably at most 50 wt % and most preferably at most 30 wt % of the total soap content. It is preferred that 30% to 60% of the total soap content is insoluble soap and 40 to 70% of the total soap content is soluble soap.

[0027] The cation may be an alkali metal, alkaline earth metal or ammonium ion, preferably alkali metals. Preferably, the cation is selected from sodium or potassium. The soap may be saturated or unsaturated. Saturated soaps are preferred over unsaturated soaps for stability. The oil or fatty acids may be of vegetable or animal origin.

[0028] The soap may be obtained by saponification of oils, fats or fatty acids. The fats or oils generally used to make soap bars may be selected from tallow, tallow stearins, palm oil, palm stearins, soya bean oil, fish oil, castor oil, rice bran oil, sunflower oil, coconut oil, babassu oil, and palm kernel oil. The fatty acids may be from coconut, rice bran, groundnut, tallow, palm, palm kernel, cotton seed or soyabean.

[0029] The fatty acid soaps may also be synthetically prepared (e.g. by the oxidation of petroleum or by the hydrogenation of carbon monoxide by the Fischer-Tropsch process). Resin acids, such as those present in tall oil, may also be used. Naphthenic acids may also be used.

[0030] The term water-soluble soap wherever used in this description means soap having solubility greater than 2 g/100 g water at 25°C.

[0031] Insoluble and Soluble Soaps  

[0032] Soap bars consist of mixture of soaps with different chain lengths and chain saturations. They are classified as soluble soaps and insoluble soaps. The soluble soaps usually form a hexagonal liquid crystalline phase with water which dissolves in water during washing and provides lather. The insoluble soaps stay in crystalline formats in the bar and provide mechanical strength. The solid crystals present in the soap bar can include kappa, zeta, eta and delta phases. The amount of soluble and insoluble phase in the soap bar is strongly dependent on the water content and the amount of sheermocking the soap bar has been subjected to at temperatures above or below the Knoff point of the soap molecules. Increasing water content results in an increase in the amount of soluble soap and consequently a reduction in soap hardness. Addition of small quantities of electrolyte and perfume can also influence the liquid and solid ratio. Electrolyte reduces the soap solubility and therefore increasing the solid phase amount while perfume increases the soluble soap amount. (Kirk-Othmer *Chemical Technology of Cosmetics*, 2012).

[0033] Soap Phases  

[0034] It is generally known that soap (cleansing products) exists as a mixture of solid, liquid crystal & isotropic liquid phases. Characterization of these phases is made using low angle X ray diffraction or NMR. Solid phase is further characterized by size.

[0035] For the purpose of present invention, the solid phase includes the solid crystals and the liquid phase includes the liquid and the liquid crystal phase.

[0036] Liquid crystal phase is formed due to aggregation of micelles & their arrangement pattern, namely—lamellar, hexagonal, these are characterized by NMR due to differential relaxation times (*Hand book of detergents Part-E— Uri Zoeller*).

[0037] In conventional extruded soap, a mixture of two separate crystal types forms at thermodynamic equilibrium. One crystal type, referred to as delta phase, is composed of the less soluble saturated long-chain soaps (e.g., C16 and C18 soaps) and is dispersed in a continuum of another crystal type composed of the more soluble saturated short-chain soaps and unsaturated soaps (e.g., C12 and C18:1 soaps), referred to as eta phase. The configuration of less soluble soaps dispersed in a continuum of more soluble soaps can be compared to “bricks and mortar” structure. The continuous phase (the “mortar”), which is composed of the more soluble soaps, will also contain more water than the dispersed phase (the “bricks”), which is composed of the less soluble soaps. Further, because solid soap and water have different refractive indices (n=1.5 for solid soap, n=1.0 for water), these two phases will have different refractive indices. Thus, incident light can be scattered as it passes through the different phases in the cleansing bar. Large dispersed soap crystals, entrapped air, and surface roughness will also scatter light, and dark objects present in the cleansing bar will absorb light.

[0038] For the purpose of the present invention, “insoluble soap” refer to monovalent salts of saturated fatty monocarboxylic acids having a carbon chain length of 16 to 24, preferably 18 to 22. “Soluble” soap on the other hand refers to monovalent salts of saturated fatty monocarboxylic acids having a carbon chain length of 8 to 14 and monovalent salts of oleic acid and polyunsaturated fatty monocarboxylic acids having a carbon chain length of 8 to 24.

[0039] It is particularly preferred that the soap includes at least 40 wt % of soaps of C8 to C14 fatty acids, more preferably at least 50 wt % and most preferably at least 70 wt % of the total soap content. It is also preferred that the cleansing bar of the present invention includes at most 60 wt % of the soaps of C10 to C22 fatty acids, preferably at most 50 wt % and most preferably at most 30 wt %.

[0040] Non-Soap Surfactant  

[0041] In addition to the soap of fatty acids, preferred bars may include a non-soap surfactant, which acts as a co-surfactant and which is selected from anionic, non-ionic, zwitterionic, amphoteric and cationic surfactants. Preferred bars include 0.0001 to 15 wt % co-surfactants based on the weight of the composition. More preferred bars include 2 to 10 wt % co-surfactant and most preferred compositions include 2.5 to 6 wt % co-surfactant based on the weight of the composition.

[0042] Suitable anionic surfactants include water soluble salts of organic sulphuric reaction products having in the molecular structure an alkyl radical containing from 8 to 22 carbon atoms, and a radical chosen from sulphonic acid or sulphonic acid ester radicals, and mixtures thereof.
Examples of suitable anionic surfactants are sodium and potassium alcohol sulphates, especially those obtained by sulphating the higher alcohols produced by reducing the glycerides of tallow or coconut oil; sodium and potassium alkyl benzene sulphonates such as those in which the alkyl group contains from 9 to 15 carbon atoms; sodium alkyl glyceryl ether sulphates, especially those ethers of the higher alcohols derived from tallow and coconut oil; sodium coconut oil fatty acid monoglyceride sulphates; sodium and potassium salts of sulphonic acid esters of the reaction product of one mole of a higher fatty alcohol and from 1 to 6 moles of ethylene oxide; sodium and potassium salts of alkyl phenol ethylene oxide ether sulphate with from 1 to 8 units of ethylene oxide molecule and in which the alkyl radicals contain from 4 to 14 carbon atoms; the reaction product of fatty acids esterified with isethionic acid and neutralized with sodium hydroxide where, for example, the fatty acids are derived from coconut oil and mixtures thereof.

The preferred water-soluble synthetic anionic surfactants are the alkali metal (such as sodium and potassium) and alkaline earth metal (such as calcium and magnesium) salts of higher alkyl benzene sulphonates and mixtures with olefin sulphonates and higher alkyl sulphates, and the higher fatty acid monoglyceride sulphates.

Suitable nonionic surfactants can be broadly described as compounds produced by the condensation of alkylene oxide groups, which are hydrophilic in nature, with an organic hydrophobic compound which may be aliphatic or alkyl aromatic in nature.

The length of the hydrophilic or polyoxyalkylene radical which is condensed with any particular hydrophobic group can be readily adjusted to yield a water-soluble compound having the desired degree of balance between hydrophilic and hydrophobic elements.

Particular examples include the condensation product of aliphatic alcohols having from 8 to 22 carbon atoms in either straight or branched chain configuration with ethylene oxide, such as a coconut oil ethylene oxide condensate having from 2 to 15 moles of ethylene oxide per mole of coconut alcohol; condensates of alkylphenols whose alkyl group contains from 6 to 12 carbon atoms with 5 to 25 moles of ethylene oxide per mole of alkylphenol; condensates of the reaction product of ethyleneediamine and propylene oxide with ethylene oxide, the condensate containing from 40 to 80 percent of polyoxyethylene radicals by weight and having a molecular weight of from 5,000 to 11,000; tertiary amine oxides of structure R₂NO, where one group R is an alkyl group of 8 to 18 carbon atoms and the others are each methyl, ethyl or hydroxyethyl groups, for instance dimethyldodecylamine oxide; tertiary phosphine oxides of structure R₂PO, where one group R is an alkyl group of from 10 to 18 carbon atoms, and the others are each alkyl or hydroxyalkyl groups of 1 to 3 carbon atoms, for instance dimethyldodecylphosphine oxide; and dialkyl sulphonates of structure R₂SO where the group R is an alkyl group of from 10 to 18 carbon atoms and the other is methyl or ethyl, for instance methyltetradecyl sulphoxide; fatty acid alkylamides; alkylene oxide condensates of fatty acid alkylamides and alkyl mercaptans.

Suitable cationic surfactants that can be incorporated are alkyl substituted quaternary ammonium halide salts e.g. bis (hydrogenated tallow) dimethyldimethyammonium chlorides, cetyltrimethyl ammonium bromide, benzalkonium chlorides and dodecylmethylpolyoxyethylene ammonium chloride and amine and imidazole salts for e.g. primary, secondary and tertiary amine hydrochlorides and imidazole hydrochlorides.

Suitable amphoteric surfactants are derivatives of aliphatic secondary and tertiary amines containing an alkyl group of 8 to 18 carbon atoms and an aliphatic radical substituted by an anionic water-solubilising group, for instance sodium 3-dodecylamino-propionate, sodium 3-dodecylamino-propane sulphonate and sodium N-2-hydroxy-dodecyl-N-methyltaurate.

Suitable zwitterionic surfactants are derivatives of aliphatic quaternary ammonium, sulphonium and phosphonium compounds having an aliphatic radical of from 8 to 18 carbon atoms and an aliphatic radical substituted by an anionic water-solubilising group, for instance 3-(N,N-dimethyl-N-hexadecylammonium) propane-1-sulphonate betaine, 3-(dodecylmethyl sulphonium) propane-1-sulphonate betaine and 3-(cetyltrimethylphosphonium) ethane sulphonate betaine.

Further examples of suitable detergent-active compounds are compounds commonly used as surface-active agents given in the well-known textbooks "Surface Active Agents", Volume I by Schwartz and Perry and "Surface Active Agents and Detergents", Volume II by Schwartz, Perry and Berch.

Water Soluble Organic Solvent

The water soluble organic solvent is preferably selected from the group consisting of polyol, hydrocarbons and mixtures thereof. The water soluble organic solvent is preferably in the range of 20 to 45 wt %, more preferably in the range of 25% to 40 wt %, and most preferably in the range of 30 to 40 wt % based on the weight of the composition.

Preferred cleansing bar includes 20% to 45 wt % polyols based on the weight of the composition. Preferred polyols include one or more of glycerol, sorbitol, propylene glycol or polyethylene glycol. Usually a mixture is used. More preferred bar includes 25 to 40 wt % polyols and most preferred bars include 30 to 40 wt % of polyols. Polyhydric alcohols (polyols), such as propylene glycol, may serve as diluents to thin out the otherwise thick mixture of caustic soda and fatty acids.

Other polyhydric alcohols such as glycerol perform as a humectant and moisturizer. A mixture of polyols is usually used. When included, polyethylene glycol used in the invention preferably has a molecular weight of from 200 to 1500 Da.

When sorbitol is included, it is preferably present in 5 to 40 percent, more preferably 8 to 25 percent by weight of the composition. When glycerol is included, it is preferably present in 0.5 to 40 percent, more preferably 0.5 to 25 percent by weight of the composition. When polyethylene glycol is included, it is preferably present in 1 to 15 percent more preferably 2 to 10 percent by weight of the composition. When propylene glycol is included, it is preferably present in 0.1 to 15 percent, more preferably 2 to 10 percent by weight of the composition. It is preferred that the composition includes a mixture of sorbitol, polyethylene glycol and propylene glycol. It is most preferred to further include glycerol in addition to the above listed three polyhydric alcohols.

Polyhydric alcohols suitable for use according to the invention include poly (ethylene glycol), propylene
glycol, glycerol and sorbitol, i.e., they include dihydric alcohols and polymers with hydroxyl groups. Especially preferred is a mixture of glycerocein and sorbitol. The polyhydric alcohol is suitably added a) before saponification or b) before and after saponification.

[0058] Hydrotopes include but are not limited to sodium cumene sulphonate, sodium toluene sulphonate, sodium xylene sulphonate & sodium alkyl aryl sulphonate, their derivatives and combinations thereof.

[0059] Electrolyte

[0060] Optimum electrolyte content is critical for the present invention as the electrolyte content influences a variety of soap parameters. Addition of small quantities of electrolyte influences the liquid and solid phase ratio. Increasing the electrolyte reduces the soap solubility and therefore increasing the solid phase amount, on the other hand lowering electrolyte levels will make the cleansing bar soft.

[0061] The electrolyte contents of the present invention is preferred in the range of 3 to 20 wt %, more preferably in the range of 3.5 to 15 wt % and most preferably in range of 4 to 10 wt % by weight of the composition. Preferred electrolytes of the present invention include sodium sulfate, sodium chloride, sodium acetate, sodium citrate, potassium chloride, potassium sulfate, sodium carbonate and other mono, di or tri salts of alkaline earth metals, more preferred electrolytes are sodium chloride, sodium sulfate, sodium citrate, potassium chloride and especially preferred electrolytes are sodium chloride, sodium sulfate, and sodium citrate and combinations thereof. For the avoidance of doubt is clarified that the electrolyte is a non-soap material.

[0062] Antibacterial Activity and Antimicrobial Agent

[0063] The cleansing compositions include an antimicrobial agent which preferably is an antibacterial agent. The agent is primarily responsible for antibacterial action. Suitable antibacterial agents include Suitable antibacterial agents include 2-hydroxy-4,4'-trichlorodi phenylether (DP300); 2,6-dimethyl-4-hydroxylorbenzene (PCMX); 3,4,4'-trichlorocarbanilide (TCC); 3-trifluoromethyl-4,4'-dichlorobenzamide (TFC); 2,2'-dihydroxy-3,3',5,5',6,6'-hexachlorophenylmethane; 2,2'-dihydroxy-3,3',5,5',tetra chlorophenylmethane; 2,2'-dihydroxy-3,3',dibromo-5,5'- dichlorodiphenylmethane; octylmethylene, 2-hydroxy-4,4'-dichlorodi phenylether; 2-hydroxy-3,5,4'-tetrabromophenylether; and 1-hydroxy-1-methyl-6-(2,4,4-trimethylpentyl)-3(3H)-pyridinone (Octopirox), thymol and terpenol. Particularly preferred antibacterial agents are thymol and terpenol, optimally used in combination. In preferred compositions, the content of thymol ranges from 0.05 to 5 wt %, more preferably 0.1 to 1 wt % and most preferably 0.1 to 0.4 wt %. Above the preferred range, the compositions may have strong smell, which may not be preferred by some consumers. However, suitable strong masking agents like perfumes can be used to mask the strong odor of thymol or terpenol. As an alternative to thymol; thyme oil or thyme extract may also be added. Thyme oil or thyme extract is obtained from the thyme plant. Thyme plant refers to a plant belonging ge genus Thymus and includes but is not limited to Thymus vulgaris, Thymus zygis, Thymus satureoides, Thymus mastichina, Thymus brousseonetti, Thymus maroccanus, Thymus pullidus, Thymus algeriensis, Thymus serpyllum, Thymus pulegoide, and Thymus citriodorus.

[0064] Skin hygiene is of high priority to present day consumers. Consumers all over the world use various kinds of skin hygiene compositions.

[0065] Skin generally contains several different microorganisms in concentrations exceeding millions or even billions of colony forming units (cfu) per square centimetre (cm²). Many of these microorganisms are harmless, but there are also various pathogenic types or sub-species present, such as Escherichia coli, also referred to as E. coli, and Staphylococcus aureus, also referred to as S. aureus. Several other bacteria can be found in the skin flora, such as Staphylococcus epidermidis, also referred to as S. epidermidis, which is generally non-pathogenic, but is thought to be causing unpleasant body odour. Therefore present day consumers prefer cleansing products, especially skin cleansing products that can provide antiseptic action.

[0066] Sanitizing and disinfecting soap compositions comprising chlorine-based antimicrobial agent such as triclosan require rather long contact time to provide antiseptic action. In practice, users, in particular children, do not spend long time in cleaning and as a result, cleaning with such compositions does not provide adequate prevention from surface or topical infection or adequate protection against diseases. The user, in spite of cleaning hands, is likely to have skin with relatively inadequate bacterial removal and may cause contamination of further minute and/or inanimate surfaces and lead to spreading of pathogens and consequent diseases. Users in general and children in particular who wash contaminated hands before meals with slow-acting antimicrobial compositions for relatively short time are at risk of contracting diseases.

[0067] The efficacy of anti-bacterial activity of skin cleansing products containing bacteriostatic agents, however, can be measured in a variety of ways.

[0068] The efficacy of anti-bacterial activity of skin cleansing products containing bacteriostatic agents is generally measured in two types of assays. The first type measures the effect of anti-bacterial agents deposited on skin and is thus reflect of substantive effects. The second type measures the ability of the formulation to cause quick kill (less than 1 minute) of bacteria as determined by in-vitro solution tests.

[0069] The time of contact of bacteria with the cleanser in the in vitro, short time kill assay is somewhat reflective of cursory wash conditions. In fact, a cursory wash may take much less than one minute.

[0070] Since many or most people who wash with cleansing bars may not use the bar for longer than a few seconds (the average wash time for children may be 10 seconds or less), it becomes apparent that there is a need to deliver anti-bacterial activity in a short period of time (e.g., 60 seconds or less, preferably 30 seconds or less) and, therefore, ways for reassuring quick-kill effect on bacteria are quite critical.

[0071] Therefore, people prefer compositions that give more efficacious antimicrobial action in a short period, preferably lesser than 2 minutes and in many cases less than one minute or sometimes as low as 15 seconds.

[0072] Preferred antimicrobial compositions include 0.05 to 5 wt % terpineol, more preferably 0.1 to 1 wt %, and most preferably 0.4 to 0.6 wt % terpineol based on the weight of the composition. Most of the useful fast acting antimicrobial compositions have terpineol higher than 0.05 wt %, but lesser than 1 wt %. Below the preferred range, the kinetics.
of microbial kill was lower. Above the preferred range, the compositions were found to have strong smell, which may not be preferable to some consumers. Terpineol is preferably selected from alpha-terpineol, beta-terpineol, gamma-terpineol or mixtures thereof, alpha-terpineol being particularly preferred. Terpineol may be added to the antimicrobial compositions in purified form.

As an alternative to terpineol, pine oil, which includes terpineol, may also be added to the mild personal cleansing compositions.

Alcohol

Prior to saponification process, volatile alcohol and water are added to the mixture to be saponified. Ethanol is an especially preferred volatile alcohol. Saponification may be carried out by using a suitable alkali. Preferred examples include caustic soda and soda carbonate. Caustic soda is especially preferred.

The cleansing bar also preferably includes 0.05 to 5 wt % alcohol, more preferably from 0.1 to 4 wt % and most preferably from 0.9 to 3 wt % based on the weight of the composition. These include ethanol and isopropyl alcohol. Isopropyl alcohol is more preferred.

Opacifier

An opacifier may be optionally present in the composition. When opacifiers are present, the cleansing bar is generally opaque, i.e. "opacification". Examples of opacifiers include titanium dioxide, zinc oxide and the like. A particularly preferred opacifier that can be employed when an opaque rather than a transparent soap composition is desired is ethylene glycol mono- or di-stearate, for example in the form of a 20% solution in sodium lauryl ether sulphate. An alternative opacifying agent is zinc stearate. Transparency is compromised when light passing through is scattered, this can happen if due larger soap crystals.

The product can take the form of a water-clear, i.e. transparent, liquid soap, in which case it will not contain an opacifier, or alternatively, it can take the form of an opaque liquid soap containing an opacifier such as that herein defined.

Water

Preferred cleansing bar includes 20 to 40 wt % water, more preferably 20 to 35 wt % and most preferably 22 to 30 wt % water based on the weight of the composition.

pH

The pH of preferred bars is 8 to 11, more preferably 9 to 11.

The pH of a solution is expressed as the negative logarithm of the hydrogen ion activity which is related to a millivolt potential of the pH indicating electrode. This electrode is calibrated with standard buffer mixtures whose pH values lie on either side (acidic & basic) of that of the solution which is being measured. About 1 gm of the soap bar is weighed in a beaker & made up to 100 grams by adding distilled water. This mixture is then heated to 50°C for 10 minutes with stirring, the solution is then cooled to 25°C and pH is measured.

Mildness-Test for Zein Number

Personal cleansing products are frequently marketed based on their degree of mildness to the skin of the user. Unfortunately, many surfactants in common use tend to bind to the skin proteins, which can result in irritation. Moreover different surfactants bind to skin proteins to varying degrees. Cleansers that do not leave residual surfactants on the skin are therefore more desirable for use.

The purpose of the Zein test is to investigate the irritation potential (harshness) of any cleansing composition which typically contains surfactants. Zein is a yellow corn protein which is similar to keratin and which is present in the skin and hair. Zein is denatured (solubilized) by irritant products (e.g., the surfactant product diluted in a specific amount of water). The more Zein dissolved by the solution, the higher is the predicted irritation potential. Conversely, mild compositions cause lesser dissolution of Zein. The Zein test provides a rapid and convenient screen for irritation potential, especially for compositions that contain surface active agents. The Zein number (also called Zein value) is a fairly standard parameter used by the cosmetics industry.

It was a surprising finding of the present invention that the optimum level and correct blend of soap to polyl and water and the level of electrolytes is critical for desired mildness and antimicrobial efficacy. The particular combination of ingredients of the cleansing bar of the present invention have made possible to provide a cleansing bar with good antimicrobial efficacy despite being low in TFM content.

The present invention provides a cleansing bar composition comprising 10 to 30 wt % soap, 20 to 45 wt % water soluble organic solvent, 20 to 40 wt % water, 3 to 20 wt % electrolyte other than soap and an antimicrobial agent.

In a preferred aspect the present invention provides a composition, wherein liquid phase of the composition makes up at least 65% by weight.

In another preferred aspect the present invention provides a composition, wherein total fatty matter of the composition is at most 35% by weight of the composition.

In another preferred aspect the total fatty matter, surfactant is up to 15% by weight of the composition.

It is preferred that the antimicrobial agent is from 0.00005 to 5% by weight of the composition. More preferably, the antimicrobial agent is from 0.00005 to 1.5% by weight of the composition and most preferably from 0.00003 to 0.75% by weight of the composition.

It is further preferred that the antimicrobial agent is selected from the group of Thymol, Terpineol an oligodynamic metal or combinations thereof.

In a preferred aspect of the present invention provides a composition, the oligodynamic metal is present in the range of 0.5 ppm to 100 ppm based on the weight of the composition, more preferably from 0.2 ppm to 50 ppm and most preferably from 0.1 ppm to 10 ppm.

In a preferred aspect of the present invention is provided a composition, wherein said metal is selected from Silver, Copper, Zinc or Gold. It is further preferred that the said metal is silver It is preferred that said silver is present in the form of a compound selected from silver oxide, silver nitrate, silver acetate, silver sulfate, silver benzoate, silver salicylate, silver carbonate, silver citrate or silver phosphate.

It is preferred that the composition has zein value which is at most 200, more preferably at most 180 and most preferably at most 160.

It is preferred that the water soluble organic solvent is a polyl.

In a preferred aspect of the present invention provides a composition, 40 to 70 wt % of the soap content is soluble soap, i.e. 40 to 70 wt % of 10 to 30% soap by weight of the composition.
It is preferred that at least 50% of the total soap content is soluble soap, more preferably at least 55% and most preferably at least 60%.

It is preferred that 30% to 60% of the total soap content is insoluble soap.

In a preferred aspect of the present invention is provided a composition, wherein ratio of solid phase to liquid phase of the soap composition is in the range of 1:1.85 to 1:10.

It is preferred that the iodine value of the soap is preferably at most 20, more preferably at most 10 and most preferably at most 10.

It is preferred free alkali content in the composition is less than 0.5%.

In preferred aspect of the present invention, soluble to insoluble soap ratio ranges from 1:1.1 to 1:0.7, more preferably from 1:0.95 to 1:0.65 and most preferably from 1:0.85 to 1:0.6.

In another preferred aspect of the present invention, soap to (polyol+water) ratio is preferably in the range of 0.3:1 to 0.65:1 more preferably from 0.3:1 to 0.6:1 and most preferably from 0.2:1 to 0.5:1.

It is preferred that the hardness of the composition of the present invention ranges from a penetration value of 3000 to 9500, more preferably from 4000 to 8000 and most preferably from 6000 to 7500.

It is preferred that the zein value of the composition of the present invention ranges from 400 to 80, more preferably from 300 to 100 and most preferably from 200 to 120.

It is preferred that the antimicrobial efficacy of the composition of the present invention in terms of log reduction ranges most preferably from 1 log to 5 log, more preferably from 1.5 log to 4 log and most preferably from 2 to 3.5 log in about 30 seconds time.

A preferred process for preparing the composition of the present invention, the process comprising steps of: preparing a melt of the composition at a temperature in the range of 40 to 90°C; pouring the melt into a suitable mould, cooling the composition to a temperature in the range of 20 to 30°C; and demoulding the composition.

A preferred method of reducing antimicrobial activity on a surface comprising the steps of applying a composition of the present invention and rinsing the surface with a suitable solvent or wiping the surface with a suitable wipe. It is further preferred that the step of rinsing or wiping the surface is carried out within 5 minutes of applying the composition.

It is preferred to use the composition of the present invention for personal hygiene.

Suitably the present invention can be made in the form of toilet blocks, laundry bars and the like.

Other Preferred Ingredients

In addition to the ingredients described earlier, preferred cleansing bar may include other ingredients.

A preferred bar may include up to 30 wt % benefit agents. Preferred benefit agents are moisturizers, emollients, sunscreens and anti-ageing compounds. The agents may be added at an appropriate step during the process of making the bars. Some benefit agents may be introduced as macro domains.

Examples of moisturizers and humectants include cetyl alcohol, CARBOPOL® 934, ethoxylated castor oil, paraffin oils, lanolin and its derivatives. Silicone compounds such as silicone surfactants like DC® 3225C (Dow Corning) and/or silicone emollients, silicone oil (DC-200® ex. Dow Corning) may also be included. Sunscreens such as 4-tertiary butyl 4'-methoxy dibenzoylethamine (available under the trade name PARISOL® 1789 from Givaudan) or 2-ethyl hexyl methoxy cinamate (available under the trade name PARISOL® MCX from Givaudan) or other UV-A and UV-B sun-screeners may also be added. Lipids such as cholesterol, ceramides, and pseudoceramides, and exfoliant particles such as polyethylene beads, walnut shells, apricot seeds, flower petals and seeds may also be present. Structurants such as maltodextrin or starch may be used to structure the bars. Preferred bars may also include essential oils such as bergamot and citrus or insoluble extracts of avocado, grape, grapeseed, myrrh, cucumber, watercress, calendula, elder flower, geranium, linden blossom, amaranth, seaweed, gingko, ginseng and other plant extracts.

Further optional ingredients include chelating agents such as ethylene diamine tetra acetic acid, preservatives (e.g. GLYDANT®) and antifoamants, and natural and synthetic perfumes. Catonic polymers may be included as conditioners. These include POLYQUATERNIUM®, MERQUAT® polymers, and JAGUAR® polymers.

The composition can also optionally include other ingredients conventionally used in soap such as lather boosters, hemectants such as glycerine, moisturisers, colourants and opacifiers.

Other adjacent materials may include germicides and preservatives. These ingredients normally will be in amounts less than 2 wt %, usually less than 0.5 wt %. Other optional ingredients like anti-oxidants, perfumes, polymers, chelating agents, colourants, deodorants, dyes, emollients, moisturizers, enzymes, foam boosters, germicides, antimicrobials, lathering agents, pearlescers, skin conditioners, stabilisers, superfastating agents, sunscreens may be added in suitable amounts in the process of the invention. Preferably, the ingredients are added after the saponification step and before filtering. Sodium metabisulphate, ethylene diamine tetra acetic acid (EDTA), borax and ethylene hydroxy diphosphonic acid (EHPD) are preferably added to the formulation.

It is preferred that the cleansing bar has no or essentially no opacifiers. By opacifiers is meant compounds which limit the quantity of light passing through the solid composition. When opacifiers are present, the solid composition is generally opaque, i.e., “opacification”. Examples of opacifiers include titanium dioxide, zinc oxide and the like.

Process

Processes for production of soaps have been described by F. W. Wells in “Soap and Chemical Specialties”, Vol. XXXI, No. 6 and 7, June and July 1955.

The soap of the present invention is obtained by saponifying fatty acids or oil or their blends. Suitable fatty acids are the C8-C22 fatty acids. Fatty acids particularly suitable for the invention include stearic acid, laurie acid and palmitic acid. These can also be obtained from plant and/or animal sources, for example tallow fatty acids, palm fatty acids.

The invention will be further described by the following illustrative non-limiting examples. All parts therein are by weight% unless otherwise specified.
EXAMPLES

[0126] Control and preferred embodiments of melt cast cleansing bars were made by the usual process.

[0127] In a batch size of 1 kg, 100 g palm kernel fatty acid, 200 g glycerin, 90 g stearic and palmitic acid and, 20 g castor oil and butylated hydroxyl toluene (0.1 g) were taken in a vessel and heated till the components were in a fluid state. Solution of 37% sodium citrate dehydrate was added in heated oil blend. Followed by the addition of 47% strength caustic soda lye till the mixture was completely neutralized and there was excess alkali amounting to 0.05%. 25 g additional ethanol was then added followed by addition of common salt, EDTA, EHDP, sodium lauryl sulphate, sorbitol (70% percent solution in water), sodium chloride, sorbitol and sodium metabisulphite (SMBS). The mixing was continued until a clear homogeneous mixture was obtained. Total moisture content in formula was 27% of formulation.

[0128] The soap mass was then filtered and colour and perfume were added, followed by cooling in a Schicht cooler. The cast bars were then matured under ambient conditions. After this maturation the bars were cut to a suitable size and matured for another 48 hr. The elongated bars were sliced into unit sized billets which were further stamped in stamping dies to give them distinctive rounded shape.

### TABLE 1

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Control 1</th>
<th>Control 2</th>
<th>Electrolyte &lt; 3%</th>
<th>Electrolyte &lt; 3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFM</td>
<td>20</td>
<td>23</td>
<td>26.57</td>
<td>37.23</td>
</tr>
<tr>
<td>Sodium Salt of fatty acid</td>
<td>22</td>
<td>25</td>
<td>22.46</td>
<td>40.6</td>
</tr>
<tr>
<td>Soluble Soap</td>
<td>13</td>
<td>15</td>
<td>13.26</td>
<td>21.51</td>
</tr>
<tr>
<td>Insoluble Soap</td>
<td>9</td>
<td>10</td>
<td>9.20</td>
<td>19.99</td>
</tr>
<tr>
<td>% Insoluble Soap</td>
<td>41</td>
<td>40</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>% Soluble Soap</td>
<td>59</td>
<td>60</td>
<td>59</td>
<td>53</td>
</tr>
<tr>
<td>Sodium Lauryl Sulphate</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7</td>
</tr>
<tr>
<td>Polyethylene glycol 200</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5</td>
</tr>
<tr>
<td>Glycerine</td>
<td>22.00</td>
<td>20.00</td>
<td>23.00</td>
<td>10</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>0.80</td>
<td>0.80</td>
<td>0.80</td>
<td>1.2</td>
</tr>
<tr>
<td>Sodium Citrate</td>
<td>6.00</td>
<td>6.00</td>
<td>2.00</td>
<td>0</td>
</tr>
<tr>
<td>Sorbitol</td>
<td>14.00</td>
<td>14.00</td>
<td>16.80</td>
<td>12</td>
</tr>
<tr>
<td>Thymol</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.1</td>
</tr>
<tr>
<td>Terpineol</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Silver Oxide</td>
<td>0.00010</td>
<td>0.00010</td>
<td>0.00010</td>
<td>0.00005</td>
</tr>
<tr>
<td>Water</td>
<td>25.00</td>
<td>23.00</td>
<td>36.00</td>
<td>18</td>
</tr>
<tr>
<td>Total Polyol + Water</td>
<td>61.00</td>
<td>57.00</td>
<td>69.80</td>
<td>52.00</td>
</tr>
<tr>
<td>Ratio of Soap to (polyol + water)</td>
<td>0.37:1</td>
<td>0.44:1</td>
<td>0.32:1</td>
<td>0.78:1</td>
</tr>
<tr>
<td>Other minor ingredients</td>
<td>upto 100</td>
<td>upto 100</td>
<td>upto 100</td>
<td>upto 100</td>
</tr>
</tbody>
</table>

[0129] The compositions E1 and E2 are the examples of the present invention, whereas Control 1 and Control 2 fall outside the scope of the invention for the reasons as provided in the third column of the table.

[0130] The data in table 1 of cleansing bar having different solid to liquid (water+polyols) phase ratio compositions read with the hardness and sensory data in Tables 2 and 3 respectively indicates that soap to (polyol+water) ratio is critical for getting right hardness and sensory properties despite low TFM and particularly low structuring (insoluble soap).

### Test Methodology

**Example 1**

**Zein Number Procedure**

[0131] The procedure followed herein is based on the one reported in E. Gotte, Skin Compatibility of Tensides Measured by Their Capacity for Dissolving Zein Protein, Proc. IV International Congress of Surface Active Substances, Brussels, 1964, pp 85-90. This method involves measuring the solubility of Zein (corn protein) in cleansing compositions as follows:

[0132] 5% of zein powder was stirred in 1% solution of the product at 35° C. for one hour. The mixture was centrifuged at 3000 rpm for 10 minutes. The solution was filtered to remove any un-dissolved zein powder. The amount of solubilized zein was determined by measuring Nitrogen content of the filtrate by micro Kjeldhal method. This estimate is then converted to calculate milligrams of Nitrogen estimated per gram of the product. This is referred to as the Zein number and indicates the amount of Zein dissolved by the surfactants in the cleansing composition per gram of the product.

[0133] The greater the zein score, harsher is the cleansing composition.
TABLE 2

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Zein Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>144.74</td>
</tr>
<tr>
<td>E2</td>
<td>156.83</td>
</tr>
<tr>
<td>40 TFM cast melt Antibacterial soap</td>
<td>216.29</td>
</tr>
<tr>
<td>Unilever 63 TFM Antibacterial soap</td>
<td>428.48</td>
</tr>
<tr>
<td>Neutral pH moisturizing beauty cleansing bar</td>
<td>149.14</td>
</tr>
<tr>
<td>70 TFM Antibacterial soap from market</td>
<td>453.13</td>
</tr>
</tbody>
</table>

[0134] Data in Table 3 shows that the cleansing bars of the present invention, E1 and E2 are mild and their mildness is comparable to a Neutral pH moisturizing beauty cleansing bar.

Example 2

Antimicrobial Efficacy of the Composition

[0135] The basic bactericidal activity of the composition was determined by the ASTM 2783 method. It describes a suspension-based, quantitative, microbiology lab test for establishing the capability of a product to produce a reduction in the number of viable bacterial cells of relevant microorganisms under conditions defined by the standard. A test suspension of bacterial cells is added to a prepared sample of the test substance diluted with sterile deionised water. At the specified contact time, an aliquot is taken and the bactericidal and/or bacteriostatic activity is immediately suppressed by dilution or filtration neutralization. The number of surviving bacteria in each sample is determined using standard culture plating techniques and the reduction in viable counts is calculated.

[0136] A brief description of the procedure is as follows:

[0137] About 10^7 bacterial cells (E. coli ATCC 10536) were taken in a test tube and contacted with 8% diluted composition of Example 1 (and the other comparative compositions for a period of 10, 30 seconds. The bacteria were taken out after 10 & 30 seconds of contact and the viable cells were counted by serial dilution and plating on agar plates. The data is presented in log (viable E. coli) which is the log of the number of viable E. coli remaining after 30 seconds of contact. Thus if 10^5 bacteria remained, log (viable E. coli) is 4. Log reduction is achieved through difference of log (initial E. coli) minus log (viable E. coli).

TABLE 3

<table>
<thead>
<tr>
<th>S. No</th>
<th>Product Name</th>
<th>S. aureus: Log survived</th>
<th>E. coli: Log survived</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TFM</td>
<td>10 sec</td>
<td>30 sec</td>
</tr>
<tr>
<td>1</td>
<td>High TFM Antibacterial soap from Market</td>
<td>73</td>
<td>7.02</td>
</tr>
<tr>
<td>2</td>
<td>E2</td>
<td>23</td>
<td>6.51</td>
</tr>
<tr>
<td>3</td>
<td>E3</td>
<td>23</td>
<td>6.51</td>
</tr>
<tr>
<td>4</td>
<td>E4</td>
<td>23</td>
<td>6.51</td>
</tr>
</tbody>
</table>

[0138] E3—Composition of E2 with Silver, Thymol and Terpineol replaced by 0.3 wt % of TCN based on the weight of the composition.

[0139] E4—Composition of E2 with Silver, Thymol and Terpineol replaced by 0.1 wt % of Thymol and 0.25 wt % Terpineol based on the weight of the composition.

[0140] Data in Table 3 show that the soaps of the present invention despite being low TFM provide antimicrobial efficacy better or at least as good as other marketed high TFM antibacterial cleansing bars.

Example 3

NMR Analysis

[0141] The measurements were made by Bruker Minispec Wide line NMR spectrometer. The spectrometer has an operating frequency of 5-60 MHz for protons (1H nucleus). A 10 mm sample probe was used and the magnet temperature was 35 deg. C. FID CPMG (Free induction decay Carr-Purcell Melboom-Gill Relaxation Dispersion) technique was used for determining the relative phase volumes of various phases present in soap, the pulse sequence and the data acquisition. The first 400 data points were recorded from the FID signal following 90° pulse at used (FID CPMG technique) were reported an interval of 0.2 micro seconds. The signal was then refocused using a train of 180° pulses CPMG with a value of t=100 (Micro seconds).

TABLE 4

<table>
<thead>
<tr>
<th>S. No</th>
<th>Product Name</th>
<th>Solid phase Liquid phase</th>
<th>Liquid phase</th>
<th>Total liquid phase</th>
<th>Solid to Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Marketed-40 TFM cast melt bar</td>
<td>40</td>
<td>10</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>E2</td>
<td>20</td>
<td>16</td>
<td>63</td>
<td>79</td>
</tr>
</tbody>
</table>

[0142] Solid phase signifies the insoluble soap or brick which provides rigidity to the cleansing bar. Liquid phase & Liquid crystal phase comprise the mortar phase. In the above table it is seen that even with 50% reduction in brick phase it is possible to achieve a rigid stampable cleansing bar.

1. A cleansing bar composition comprising:
   a. 10 to 30 wt % soap,
   b. 20 to 45 wt % water soluble organic solvent,
   c. 20 to 40 wt % water,
   d. 3 to 20 wt % electrolyte other than soap, and
   e. an antimicrobial agent.

2. A composition as claimed in claim 1, wherein total fatty matter of the composition is at most 35% by weight of the composition.

3. A composition as claimed in claim 1, wherein non-soap surfactant is up to 15% by weight of the composition.

4. A composition as claimed in claim 1, wherein the antimicrobial agent is from 0.00005 to 5% by weight of the composition.

5. A composition as claimed in claim 1, wherein the antimicrobial agent is selected from the group of Thymol, Terpineol an oligodynamic metal or combinations thereof.

6. A composition as claimed in claim 5 wherein said metal is selected from Silver, Copper, Zinc or Gold.

7. A cleansing composition as claimed in claim 6 wherein said metal is Silver.

8. A cleansing composition as claimed claim 6 wherein said silver is present in the form of a compound selected.
from silver oxide, silver nitrate, silver acetate, silver sulfate, silver benzoate, silver salicylate, silver carbonate, silver citrate or silver phosphate.

9. A composition as claimed in claim 1, wherein the water soluble organic solvent is a polyol.

10. A composition as claimed in claim 1, wherein 40 to 70% of the soap content is soluble soap.

11. A composition as claimed in claim 1, wherein ratio of solid phase to liquid phase of the composition is in the range of 1:1.65 to 1:10.

12. (canceled) A composition as claimed in any one of the preceding claims 1 to 11, wherein iodine value of soap is at most 10.

13. A process for preparing the composition as claimed in claim 1, the process comprising steps of:
   a. preparing a melt of the composition at a temperature in the range of 40 to 90°C;
   b. pouring the melt into a suitable mould;
   c. cooling the composition to a temperature in the range of 20 to 30°C; and
   d. demoulding the composition.

14. A method of reducing antimicrobial activity on a surface comprising the steps of:
   a. applying a composition as claimed in any one of the preceding claims; and
   b. rinsing the surface with a suitable solvent or wiping the surface with a suitable wipe.

15. A method as claimed in claim 13, wherein the step of rinsing or wiping the surface is carried out within 5 minutes of applying the composition.

16. Use of the composition as claimed in claim 1 for personal hygiene.