INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| A61K 7/50 | | |

| (21) International Application Number: | (14) International Filing Date: |
| PCT/US94/13223 | 16 November 1994 (16.11.94) |

| (30) Priority Data: | (43) International Publication Date: |
| 08/157,798 24 November 1993 (24.11.93) US | 8 June 1995 (08.06.95) |

| THE PROCTER & GAMBLE COMPANY | Published |
| [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US). | Without international search report and to be republished upon receipt of that report. |

| (72) Inventors: | |
| FURMAN, Christopher, Allen; 5396 Burgundy Place, Fairfield, OH 45014 (US). SCHELL, Charles; 6402 Ironwood Drive, Loveland, OH 45140 (US). WELCH, Timothy, James; 7684 Whitehall Circle East, West Chester, OH 45069 (US). DAMIANO, Jon, Joseph; 11118 Allenhurst Boulevard East, Sharonville, OH 45241 (US). |

| (74) Agents: | |
| REED , T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217 (US). |

| (54) Title: | ULTRA MILD LATHERING PERSONAL CLEANSING COMPOSITION |

| (57) Abstract | |
| A liquid skin cleanser composition with improved mildness and lathering characteristics, comprising: a) from about 3 parts to about 10 parts, by weight, of an alkyl ethoxylated sulfate anionic surfactant having an average degree of ethoxylation of at least about 2.0; b) from about 3 parts to about 10 parts of an amphoteric surfactant selected from the group consisting of betaine surfactants, imidazoline surfactants, aminooalkanoate surfactants, and iminodialkanoate surfactants, and mixtures thereof; c) from about 0.1 part to about 3 parts, by weight of an N-acylamino acid surfactant, or salt thereof; d) from about 0.01 part to about 0.5 parts, by weight of the composition, of a cationic cellulose ether derivative. |
**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>Austria</td>
<td>GB</td>
<td>United Kingdom</td>
<td>MR</td>
<td>Mauritania</td>
</tr>
<tr>
<td>AU</td>
<td>Australia</td>
<td>GE</td>
<td>Georgia</td>
<td>MW</td>
<td>Malawi</td>
</tr>
<tr>
<td>BB</td>
<td>Barbados</td>
<td>GN</td>
<td>Guinea</td>
<td>NE</td>
<td>Niger</td>
</tr>
<tr>
<td>BE</td>
<td>Belgium</td>
<td>GR</td>
<td>Greece</td>
<td>NL</td>
<td>Netherlands</td>
</tr>
<tr>
<td>BF</td>
<td>Burkina Faso</td>
<td>HU</td>
<td>Hungary</td>
<td>NO</td>
<td>Norway</td>
</tr>
<tr>
<td>BG</td>
<td>Bulgaria</td>
<td>IE</td>
<td>Ireland</td>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>BJ</td>
<td>Benin</td>
<td>IT</td>
<td>Italy</td>
<td>PL</td>
<td>Poland</td>
</tr>
<tr>
<td>BR</td>
<td>Brazil</td>
<td>JP</td>
<td>Japan</td>
<td>PT</td>
<td>Portugal</td>
</tr>
<tr>
<td>BY</td>
<td>Belarus</td>
<td>KE</td>
<td>Kenya</td>
<td>RO</td>
<td>Romania</td>
</tr>
<tr>
<td>CA</td>
<td>Canada</td>
<td>KG</td>
<td>Kyrgyzstan</td>
<td>RU</td>
<td>Russian Federation</td>
</tr>
<tr>
<td>CF</td>
<td>Central African Republic</td>
<td>KP</td>
<td>Democratic People’s Republic of Korea</td>
<td>SD</td>
<td>Sudan</td>
</tr>
<tr>
<td>CG</td>
<td>Congo</td>
<td>KR</td>
<td>Republic of Korea</td>
<td>SE</td>
<td>Sweden</td>
</tr>
<tr>
<td>CH</td>
<td>Switzerland</td>
<td>KZ</td>
<td>Kazakhstan</td>
<td>SI</td>
<td>Slovenia</td>
</tr>
<tr>
<td>CI</td>
<td>Côte d’Ivoire</td>
<td>LJ</td>
<td>Liechtenstein</td>
<td>SK</td>
<td>Slovakia</td>
</tr>
<tr>
<td>CM</td>
<td>Cameroon</td>
<td>LK</td>
<td>Sri Lanka</td>
<td>SN</td>
<td>Senegal</td>
</tr>
<tr>
<td>CN</td>
<td>China</td>
<td>LU</td>
<td>Luxembourg</td>
<td>TD</td>
<td>Chad</td>
</tr>
<tr>
<td>CS</td>
<td>Czechoslovakia</td>
<td>LV</td>
<td>Latvia</td>
<td>TG</td>
<td>Togo</td>
</tr>
<tr>
<td>CZ</td>
<td>Czech Republic</td>
<td>MC</td>
<td>Monaco</td>
<td>TJ</td>
<td>Tajikistan</td>
</tr>
<tr>
<td>DE</td>
<td>Germany</td>
<td>MD</td>
<td>Republic of Moldova</td>
<td>TT</td>
<td>Trinidad and Tobago</td>
</tr>
<tr>
<td>DK</td>
<td>Denmark</td>
<td>MG</td>
<td>Madagascar</td>
<td>UA</td>
<td>Ukraine</td>
</tr>
<tr>
<td>ES</td>
<td>Spain</td>
<td>ML</td>
<td>Mali</td>
<td>US</td>
<td>United States of America</td>
</tr>
<tr>
<td>FI</td>
<td>Finland</td>
<td>MN</td>
<td>Mongolia</td>
<td>UZ</td>
<td>Uzbekistan</td>
</tr>
<tr>
<td>FR</td>
<td>France</td>
<td></td>
<td></td>
<td>VN</td>
<td>Viet Nam</td>
</tr>
<tr>
<td>GA</td>
<td>Gabon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ULTRA MILD LATHERING PERSONAL CLEANSING COMPOSITION

TECHNICAL FIELD

The present invention is related to mild liquid personal cleanser compositions. (More specifically, the present invention relates to mild, lathering compositions, especially those that are useful for application to the hands and face.)

BACKGROUND OF THE INVENTION

The cleaning of skin with surface-active cleaning preparations has become a focus of great interest. Many people wash and scrub their skin with various surface active preparations several times a day. Liquid cleansers are highly preferred, especially for handwashing because of convenience and non-messiness. Mild personal cleansers are desired to minimize skin irritation, dryness, etc. A personal cleansing product having both of these preferred characteristics would be very desirable.

Skin cleansers should cleanse the skin gently, causing little or no irritation, without drying the skin after frequent routine use. Certain synthetic surfactants are particularly mild. However, a major drawback of mild liquid synthetic surfactant systems when formulated for skin cleansing is poor lather performance. Compared to the highest bar soap standards (bars which are rich in coconut soap and superfatted), these prior art liquid surfactant formulations have either poor lather or poor skin mildness performance. As may be expected, the lather performance is a function of the choice of surfactant and its concentration. The conceivable number of liquid surfactant compositions formulated with or without skin feel agents are numerous. Rheological and phase properties exhibited by prototypes vary widely (i.e., thin liquids, gels, thick pastes, solutions, emulsions). The phase stability of prototypes is for the most part acceptable over short time periods, but only a small fraction of them will maintain their original properties and acceptability over an extended period of time. See, e.g., U.S. Pat. Nos.: 4,338,211, Stiros, issued July 6, 1982; 4,310,433, Stiros, issued Jan. 12, 1982; and 4,842,850, Vu, issued June 27, 1989, all of said patents being incorporated herein by reference.

Optimization of lather as a single variable is a fairly straightforward process. The use of known high sudsing anionic surfactants with lather boosters yields acceptable lather volume. Unfortunately, highest sudsing anionic surfactants are, generally, also highest in skin irritation and are worst in clinical mildness. Surfactants that are among the mildest with minimal skin irritation, such as ammonium lauryl
ether (12 EO) sulfate (NH₄AE₁₂S) are extremely poor in lather. These two facts alone make the surfactant selection and the lather boosting optimization process a delicate balancing act. See, e.g., U.S. Pat. No. 4,338,211, supra, incorporated herein by reference.

In short, mildness is often obtained at the expense of effective cleansing and lathering which may be sacrificed for either mildness, product stability, or both.

The present invention offers a valuable combination of desirable properties to liquid skin-cleaning formulations.

Therefore, one object of this invention is the development of liquid skin cleaning compositions which exhibit improved mildness with good cleaning and lathering.

Another object of the present invention is the development of low cost liquid skin cleansers.

Other objects will become apparent from the detailed description below.

**SUMMARY OF THE INVENTION**

A liquid skin cleanser composition with improved mildness and lathering characteristics, comprising:

(a) from about 3 parts to about 10 parts, by weight, of an alkyl ethoxylated sulfate anionic surfactant having an average degree of ethoxylation of at least about 2.0;

(b) from about 3 parts to about 10 parts of an amphoteric surfactant selected from the group consisting of betaine surfactants, imidazoline surfactants, aminoalkanoate surfactants, and iminodialkanoate surfactants, and mixtures thereof;

(c) from about 0.1 parts to about 3 parts, by weight of an N-acylamino acid surfactant, or salt thereof;

(d) from about 0.01 parts to about 0.5 parts, by weight of the composition, of a cationic cellulose ether derivative.

**DETAILED DESCRIPTION OF THE INVENTION**

A liquid skin cleanser composition with improved mildness and lathering characteristics, comprising:

(a) from about 3 parts to about 10 parts, by weight, of an alkyl ethoxylated sulfate anionic surfactant having an average degree of ethoxylation of at least about 2.0;

(b) from about 3 parts to about 10 parts of an amphoteric surfactant selected from the group consisting of betaine surfactants, imidazoline surfactants, aminoalkanoate surfactants, and iminodialkanoate surfactants, and mixtures thereof;

(c) from about 0.1 parts to about 3 parts, by weight of an N-acylamino acid surfactant, or salt thereof.
(d) from about 0.01 parts to about 0.5 parts, by weight of the composition, of a cationic cellulose ether derivative, and
(e) water from 50 parts to 94 parts; and preferably
wherein said personal cleansing composition is substantially free of alkyl sulfate anionic surfactant, primary amines, and ammonia.

Preferably said liquid cleanser composition has a transmittance value at 420 nm in a 2.5 cm path length of no less than about 80 after storage at 38° C for 30 days.

Although it is not intended to necessarily limit the invention by theory, it is believed that ammonia, which is typically introduced into the compositions in the form of ammonium ions, and/or primary amines react with carbonyl functionalities present in compounds found in most perfume formulations to form Schiff bases. These Schiff bases discolor the compositions. Insofar as it is desired to use conventional perfume formulations in the present mild personal liquid cleanser compositions, the compositions hereof contain carbonyl-containing perfume compounds but preferably are essentially free of primary amines and ammonia. For purposed hereof, compositions substantially free of primary amines and ammonia includes the protonated as well as unprotonated forms of the compounds.

Once ammonia and primary amines are eliminated from the compositions, it becomes possible to prepare substantially colorless personal liquid cleansers. However, in order to formulate personal liquid cleansers which are also mild, it is desirable to use certain amphoteric surfactants which typically add some degree of color, usually a yellow tint, to the personal liquid cleanser. Whereas this is not significant in the formulation of most personal liquid cleansers (including the various-colored "clear" personal liquid cleansers) it is undesirable in the formulation of substantially colorless mild personal liquid cleansers. Thus, it is also a preferable aspect of this invention that the amphoteric surfactants utilized in the present mild personal liquid cleanser compositions be sufficiently colorless and free of primary amines and ammonia such that the mild personal liquid cleanser composition itself remains substantially colorless.

The invention, including preferred embodiments thereof, is described in more detail in the Detailed Description of the Invention, which follows.

The essential as well as a variety of optional components of the compositions of the present invention are described below.
Alkyl Ethoxylated Sulfate

The mild personal liquid cleanser composition hereof comprises from about 3 parts to about 10 parts, by weight, preferably from about 4 parts to about 8 parts of alkyl ethoxylated sulfate anionic surfactant.

Alkyl ethoxylated sulfate surfactants are well known in the art, and can be represented by the formula RO(C₂H₄O)ₓSO₃M, wherein R is alkyl or alkenyl of from about 8 to about 24 carbon atoms, x is 1 to 12, preferably 2 to 6, and M is a water-soluble cation such as an alkali or alkaline earth metal, preferably, sodium or potassium. The average degree of ethoxylated, i.e. the average value for x should be at least about 2.0.

Exemplary alkyl ethoxylated sulfates are condensation products of ethylene oxide and monohydric alcohols having from about 8 to about 24 carbon atoms. Preferably, R has from about 10 to about 18 carbon atoms. The alcohols can be derived from fats, e.g., coconut oil or tallow, or can be synthetic. Lauryl alcohol and straight chain alcohols derived from coconut oil are preferred herein. Such alcohols are typically reacted with from about 2 to about 12, preferably about 2 to about 6, more preferably about 3, molar proportions of ethylene oxide and the resulting mixture of molecular species having, for example, an average moles of ethylene oxide per mole of alcohol also within the above limits, is sulfated and neutralized.

Specific examples of alkyl ethoxylated sulfates which may be used in the present invention are the salts, especially sodium and/or potassium salts, of coconut alkyl triethylene glycol ethoxylated sulfate, tallow alkyl triethylene glycol ethoxylated sulfate, and tallow alkyl hexaoxyethylene sulfate. Typically the alkyl ether sulfates will comprise a mixture of individual compounds, said mixture preferably having an average alkyl chain length of from about 10 to about 16 carbon atoms, and an average degree of ethoxylation of from about 2 to about 6 moles of ethylene oxide. Especially preferred are narrow range alkyl ethoxylated sulfates such as those having ethoxylation levels primarily in the range of about 2 to about 6.

Amphoteric Surfactant

The amphoteric surfactant will be present in the mild personal liquid cleanser compositions hereof at levels of from about 3 parts to about 10 parts, by weight of the composition, preferably from about 4 parts to about 8 parts. The amphoteric component hereof is selected from the group consisting of amphoteric betaine, imidazoline, aminokainoate, and iminodialkanoate surfactants. Preferably, the ratio of the alkyl ethoxylated surfactant to the amphoteric surfactant will be from about 3:1 to about 1:1.5, more preferably from about 1.5:1 to about 1:1.5.
The imidazoline amphoteric surfactants hereof are depicted by Formula I:

\[
\begin{aligned}
R_3 \\
R_1 \text{CON}(\text{CH}_2)_n^\text{N}^+\text{-CH}_2Z \\
R_4 \\
R_2
\end{aligned}
\] (I)

wherein \( R_1 \) is C_8 - C_22 alkyl or alkenyl, preferably C_{12}-C_{16}, \( R_2 \) is hydrogen or CH_2CO_2M, \( R_3 \) is CH_2CH_2OH or CH_2CH_2OCH_2CH_2COOM, \( R_4 \) is hydrogen, CH_2CH_2OH, or CH_2CH_2OCH_2CH_2COOM, \( Z \) is CO_2M or CH_2CO_2M, \( n \) is 2 or 3, preferably 2, \( M \) is hydrogen or a cation, such as alkali metal or alkaline earth metal. Examples of "alkali metal" include lithium, sodium, and potassium. Examples of "alkaline earth metal" include beryllium, magnesium, calcium, strontium, and barium. This type of surfactant is classified herein as an "imidazoline" amphoteric surfactant for convenience, although it should be recognized that it does not necessarily have to be derived, directly or indirectly, through an imidazoline intermediate.

Suitable materials of this type are marketed under the tradenames MIRANOL and are understood to comprise a complex mixture of species, and can exist in protonated and non-protonated species depending upon pH with respect to species that can have a hydrogen at \( R_2 \). All such variations and species are meant to be encompassed herein.

Preferred surfactants of Formula I are monocarboxylates and dicarboxylates. Examples of these materials include cocoamphodiacetoxypropionate, cocoampho-carboxypropionic acid, cocoamphocarboxyglycinate (alternately referred to as cocoamphodiacetate), and cocoamphoacetate (alternately, cocoamphomoacetate).

Specific commercial products providing the amphoteric surfactant component of the present compositions include those sold under the trade names MIRANOL C2M CONC. N.P., MIRANOL C2M CONC. O.P., MIRANOL C2M SF, MIRANOL CM SPECIAL (Miranol, Inc.); ALKATERIC 2CIB (Alkaril Chemicals); AMPHOTERGE W-2 (Lonza, Inc.); MONATERIC CDX-38, MONATERIC CSH-32 (Mona Industries); REWOTERIC AM-2C (Rewo Chemical Group); and SCHERCOTERIC MS-2 (Scher Chemicals).

Suitable betaine surfactants hereof are depicted by compounds having the Formula (II):

\[
\begin{aligned}
O & \quad R_4 \\
\| & \quad \| \\
- \text{C-N-(CH}_2)_m & \quad - \text{N}^+\text{-Y-R}_1 \\
\| & \quad \| \\
R_5 & \quad R_3
\end{aligned}
\] (II)
wherein:

- $R_1$ is a member selected from the group consisting of \[ \text{COOM and CH-CH}_2\text{SO}_3\text{M} \]
  \[
  \quad \text{OH}
  \]
- $R_2$ is lower alkyl or hydroxyalkyl;
- $R_3$ is lower alkyl or hydroxyalkyl;
- $R_4$ is a member selected from the group consisting of hydrogen and lower alkyl;
- $R_5$ is higher alkyl or alkenyl;
- $Y$ is lower alkyl, preferably methyl;
- $m$ is an integer from 2 to 7, preferably from 2 to 3;
- $n$ is the integer 1 or 0;
- $M$ is hydrogen or a cation, such as an alkali metal or alkaline earth metal.

The term "lower alkyl" or "hydroxyalkyl" means straight or branch chained, saturated, aliphatic hydrocarbon radicals and substituted hydrocarbon radicals having from one to about three carbon atoms such as, for example, methyl, ethyl, propyl, isopropyl, hydroxypropyl, hydroxyethyl, and the like. The term "higher alkyl or alkenyl" means straight or branch chained saturated (i.e., "higher alkyl") and unsaturated (i.e., "higher alkenyl") aliphatic hydrocarbon radicals having from about eight to about 20 carbon atoms such as, for example, lauryl, cetyl, stearyl, oleyl, and the like.

Examples of surfactant betaines of Formula II wherein $n$ is zero which are useful herein include the alkylbetaines such as cocodimethylcarboxymethylbetaine, lauryldimethylcarboxymethylbetaine, lauryl dimethyl-alpha-carboxyethylbetaine, cetylhexadecylcarboxymethylbetaine, lauryl-bis-(2-hydroxyethyl)carboxymethylbetaine, stearyl-bis-(2-hydroxypropyl)carboxymethylbetaine, oleyldimethyl-gamma-carboxypropylbetaine, lauryl-bis-(2-hydroxypropyl)alpha-carboxyethylbetaine, etc. The sulfobetaines may be represented by cocodimethylsulfopropylbetaine, stearyldimethylsulfopropylbetaine, lauryl-bis-(2-hydroxyethyl)sulfopropylbetaine, and the like.

Amido betaines and amidosulfo betaine surfactants useful in the present invention are exemplified by compounds of Formula II wherein $n$ is one but otherwise corresponding to the above examples. Examples of surfactant betaines of Formula II wherein $n$ is one which are useful herein include the amido carboxybetaines, such as cocoamidodimethylcarboxymethylbetaine, laurylamidodimethylcarboxymethylbetaine, cetylaminodimethylcarboxymethylbetaine, laurylamido-bis-(2-hydroxyethyl)-carboxymethylbetaine, cocoamido-bis-(2-hydroxyethyl)-carboxymethylbetaine, etc. The amido sulfobetaines may be repre-
sent by cocoamidodimethylsulfopropylbetaine, stearylamidodimethylsulfopropylbetaine, laurylamido-bis-(2-hydroxyethyl)-sulfopropylbetaine, and the like.

The preferred betaine in the present invention is a member selected from the group consisting of surfactant amidocarboxybetaines and amidosulfobetaines. More preferred betaines are the surfactant amidocarboxybetaines, particularly cocoamidodimethylcarboxymethylbetaines (cocomidopropylbetaine), such as those sold by Goldschmidt Co. under the trade name Tegobetaine (F grade), and by Hoechst-Celanese under the trade name Genagen CAB. These most preferred betaines have the formula:

\[
\begin{align*}
\text{O} & \quad \text{CH}_3 \\
\parallel & \\
R'_3-\text{C-NH-(CH}_2)_{3-N}\text{-CH}_2-\text{COOM} & \quad \text{CH}_3
\end{align*}
\]

wherein \( R'_3 \) is selected from C8 to C18 alkyl radicals and M is hydrogen or a cation as defined above. In general, the preferred betaines hereof will have low levels of residual amide and sodium monochloroacetate.

Suitable aminoalkanoates and iminodialkanoates are represented by the Formulas (III) and (IV):

aminoalkanoates of the formula:

\[
R-\text{NH(CH}_2)_{n}\text{COOM} \quad \text{(III)}; \quad \text{and}
\]

iminodialkanoates of the formula:

\[
R-\text{N[(CH}_2)_{m}\text{COOM]}_{2} \quad \text{(IV)}
\]

wherein \( n \) and \( m \) are from 1 to 4, \( R \) is C8 - C22 alkyl or alkenyl, and M is hydrogen or alkali or an alkaline earth metal as previously described.

Examples of amphoteric surfactants falling within the aminoalkanoate formula include n-alkylamino-propionates and n-alkyliminodipropionates. Such material are sold under the tradename DERIPHAT by Henkel and MIRATANE by Miranol, Inc. Specific examples include N-lauryl-beta-amino propionic acid or salts thereof, and N-lauryl-beta-imino-dipropionic acid (DERIPHAT 160C) or salts thereof, and mixtures thereof.

The amphoteric surfactant provided as a raw material for use in the mild
personal liquid cleanser compositions hereof should preferably be sufficiently colorless such that it does not impact enough color to the total composition remains substantially colorless.

Amphoteric surfactants are often used in conventional personal liquid cleanser compositions at a level and supplied in a form that tend to impart a degree of color in excess of that which is preferred for the compositions herein. The amphoteric surfactants utilized in the present compositions should preferably be sufficiently colorless so that the overall transmittance value of the final product is within the limits set forth herein. Reduced color amphoteric surfactants raw materials can easily be produced by those skilled in the art, for instance, by the use of cleaner, purer raw materials and minimizing the period of time the surfactant or reaction mixture is exposed to elevated temperature during manufacture of the surfactant. Suitable surfactants are currently commercially available e. g. Tegobetaine (F Grade) from Goldschmidt.

Preferably, the amphoteric surfactant, as well as the other surfactants added to the composition, will exhibit an absorbance value in a 30 parts aqueous solution at 440nm in a 1.0cm path length of no greater than about 0.1, more preferably no greater than about 0.05, most preferably no greater than about 0.035.

**N-Acylamino Acid Surfactant**

The mild personal liquid cleanser compositions of the present invention comprise from about .1 parts to about 3 parts, preferable from about .25 parts to about 1 parts of N-acyl amino acid surfactant.

N-acyl amino acid surfactants, for purposes hereof, include N-acyl hydrocarbyl acids and salts thereof, such as those represented by Formula V, as follows:

\[
\begin{array}{c}
O \ R_2 \\
|| \\
R_1-C-N-(R_3)_n-COOM \\
\end{array}
\]  

\( (V) \)

wherein: \( R_1 \) is a \( C_8-C_{24} \) alkyl or alkenyl radical, preferably \( C_{12}-C_{18} \); \( R_2 \) is \( -H, \ C_1-C_4 \) alkyl, phenyl, or \( -CH_2COOM \), preferably \( C_1-C_4 \) alkyl, more preferably \( C_1-C_2 \) alkyl; \( R_3 \) is \( -CR^{4}_2 \) or \( C_1-C_2 \) alkoxy, wherein each \( R^4 \) independently is \( -H \) or \( C_1-C_6 \) alkyl or alkylester, and \( n \) is from 1 to 4, preferably 1 or 2, and \( M \) is \( -H \) or a cation as previously defined, preferably an alkali metal such as sodium or potassium.


Especially preferred are compounds of Formula V wherein \( R_2 \) is methyl and \( R_3 \)
is -CH$_2$-, an n is 1, which are known as the N-acyl sarcosinates, and acids thereof. Specific examples include lauroyl sarcosinate, myristoyl sarcosinate, cocooyl sarcosinate, and oleoyl sarcosinate, preferably in their sodium and potassium salt forms.

For the purposes of the surfactants described herein, it should be understood that the terms "alkyl" or "alkenyl" include mixtures of radicals which may contain one or more intermediate linkages such as ether or polyether linkages or non-functional substituents such as hydroxyl or halogen radicals wherein the radical remains of hydrophobic character.

**Cationic cellulose ether derivatives**

The mild personal liquid cleanser compositions of the present invention comprise from about 0.01 parts to 0.5 parts, preferably from 0.02 parts to 0.2 parts of a cationic cellulose ether derivative.

Cationic cellulose ether derivatives, for purposes hereof, is a polymeric quaternary ammonium salt of hydroxyethyl cellulose reacted with a trimethyl ammonium substituted epoxide.

Foam enhancers are well known in the art. Polyquaternium-10 (an industry term designated by the Cosmetic, Toiletry and Fragrance Association (CFTA) for a polymeric quaternary ammonium salt of hydroxyethyl cellulose reacted with a trimethyl ammonium substituted epoxide is a preferred polymer for foam enhancement. Polyquaternium-10 is commercially available from Union Carbide Corp. (Danbury, Connecticut, USA) under their UCARE POLYMER JR series of materials, e.g., UCARE POLYMER JR-30M, JR-125, and JR400.

**Water**

The mild personal liquid cleanser composition hereof will also comprise water. Generally, the composition will contain from about 50 parts to about 94 parts water, and preferably about 76 parts to about 90 parts water.

**Mild personal liquid cleanser Compositions**

The mild personal liquid cleanser hereof is substantially free of alkyl sulfate surfactants since alkyl sulfates are relatively harsh to the skin. It is recognized that there will generally be some alkyl sulfate present as a result of it being present in commercially available alkyl ethoxylated sulfate raw materials. For example, commercially available alkyl (3) ethoxylated sulfate typically contains about 20 parts by weight alkyl sulfate; commercially available alkyl (2) ethoxylated sulfate, about 25 parts to about 40 parts alkyl sulfate. For purposes hereof, substantially free of alkyl sulfate means the compositions hereof should have an alkyl sulfate:alkyl ethoxylated sulfate
(average degree of ethoxylation of 2.5 and above) weight ratio of no more than about 0.35, preferably no more than about 0.30, more preferably no more than about 0.25. For alkyl ethoxylated sulfate with an average ethoxylation level of less than 2.5, the ratio should be no more than about 0.40, preferably no more than about 0.35, more preferably no more than about 0.30, most preferably no more than about 0.25. It is preferred that no additional amount of alkyl sulfate be added other than that which occurs inherently with the alkyl ethoxylated sulfate.

Narrow range ethoxylates can be used to lower the alkyl sulfate: alkyl ethoxylated sulfate weight ratio. "Narrow range ethoxylates" refer to alkyl ethoxylated sulfate surfactants that have been processed to reduce alkyl sulfates and, optionally, alkyl ethoxylated sulfates outside of the desired range of ethoxylation. The use of narrow range ethoxylates can be used to lower the alkyl sulfate: alkyl ethoxylated sulfate weight ratio, including to ratios as low as about 0.2 or even about 0.1, and less.

The present mild personal liquid cleanser compositions are preferably substantially free of amide foam boosters such as fatty (e.g. C_{12}-C_{20}) mono- and di-alkanol amides, since these materials can be harsh to the skin and are not needed in the present compositions. "Substantially free of amide foam boosters" means the compositions hereof can contain no more than about 1.0 parts, by weight of the amide foam booster, preferably no more than about 0.5 parts, more preferably no more than about 0.2 parts. Most preferably, no amide foam booster is added.

As a preferable aspect hereof, the mild personal liquid cleanser compositions are substantially free of ammonia and primary amines. "Substantially free of ammonium ions and free primary amines" means that the compositions hereof preferably contain no more than about 0.1 parts, by weight, of ammonia (including ammonium ions) and primary amines (including free amines and protonated primary amines), more preferably no more than about 0.05 parts.

It is also preferred that no other ingredients that are unduly harsh to the skin be added to the mild mild personal liquid cleanser compositions hereof.

The mild personal liquid cleanser compositions of the present invention are preferably colorless, and can remain substantially colorless over prolonged periods of time. Substantially colorless, as used herein, means the mild personal liquid cleansers are both clear and are characterized by lack of color. More specifically, the mild personal liquid cleanser compositions hereof have a transmittance value at 420nm in a 2.5cm path length of no less than about 80 after storage at 38°C for 30 days, preferably no less than about 85. Transmittance value is measured utilizing a spectrophotometer in accordance with conventional techniques known in the art.
Additional Ingredients

The compositions of the present invention can contain a wide variety of optional ingredients useful or known for use in the art for hand soaps and other mild personal liquid cleanser compositions. Exemplary additional ingredients are described below.

Additional surfactants that can be used include other anionic, nonionic, and amphoteric surfactants, as well as zwitterionic and cationic surfactants.

Anionic Surfactants

A suitable class of anionic surfactants are the water-soluble, organic salts of the general formula:

\[
R_1\text{-SO}_3\text{-M}
\]

wherein \( R_1 \) is chosen from the group consisting of a straight or branched chain, saturated aliphatic hydrocarbon radical having from about 8 to about 24, preferably about 12 to about 18, carbon atoms; and M is a cation. Important examples are the salts of an organic sulfuric acid reaction product of a hydrocarbon of the methane series, including iso-, neo-, and n-paraffins, having about 8 to about 24 carbon atoms, preferably about 12 to about 18 carbon atoms and a sulfonating agent, e.g., \( \text{SO}_3, \text{H}_2\text{SO}_4 \), oleum, obtained according to known sulfonation methods, including bleaching and hydrolysis. Preferred are alkali metal sulfonated \( \text{C}_{12-18} \) paraffins.

Additional examples of anionic surfactants which come within the terms of the present invention are the reaction products of fatty acids esterified with isethionic acid and neutralized with sodium hydroxide where, for example, the fatty acids are derived from coconut oil; sodium or potassium salts of fatty acid amides of methyl tauride in which the fatty acids, for example, are derived from coconut oil. Other anionic synthetic surfactants of this variety are set forth in U.S. Patents 2,486,921; 2,486,922; and 2,396,278; incorporated by reference.

Still other anionic surfactants include the class designated as succinamates. This class includes such surface active agents as disodium N-octadecylsulfosuccinamate; tetrasodium N-(1,2-dicarboxyethyl)-N-octadecylsulfosuccinamate; diamyl ester of sodium sulfosuccinic acid; dihexyl ester of sodium sulfosuccinic acid; dioctyl esters of sodium sulfosuccinic acid.

Other suitable anionic surfactants utilisable herein are olefin sulfonates having about 12 to about 24 carbon atoms. The term "olefin sulfonates" is used herein to mean compounds which can be produced by the sulfonation of a-olefins by means of uncomplexed sulfur trioxide, followed by neutralization of the acid reaction mixture in conditions such that any sulfones which have been formed in the reaction are hydrolyzed to give the corresponding hydroxy-alkanesulfonates. The sulfur trioxide
can be liquid or gaseous, and is usually, but not necessarily, diluted by inert diluents, for example by liquid SO₂, chlorinated hydrocarbons, etc., when used in the liquid form, or by air, nitrogen, gaseous SO₂, etc., when used in the gaseous form.

Another class of anionic surfactants are the b-alkyloxy alkane sulfonates. These compounds have the following formula:

\[
\begin{align*}
&\text{OR}_2 \quad \text{H} \\
&\quad | \quad | \\
&\text{R}_1 - \text{C} - \text{C} - \text{SO}_3\text{M} \\
&\quad | \quad | \\
&\text{H} \quad \text{H}
\end{align*}
\]

where \( \text{R}_1 \) is a straight chain alkyl group having from about 6 to about 20 carbon atoms, \( \text{R}_2 \) is a lower alkyl group having from about 1 (preferred) to about 3 carbon atoms, and \( \text{M} \) is a water-soluble cation.

Many additional synthetic anionic surfactants are described in McCutcheon's, Emulsifiers and Detergents, 1989 Annual, published by M. C. Publishing Co., which is incorporated herein by reference. Also U.S. Patent 3,929,678, Laughlin et al., issued December 30, 1975, discloses many other anionic as well as other surfactant types and is incorporated herein by reference. Soaps, of course, also fall within the scope of anionic detergents surfactants that can be used.

**Nonionic Surfactants**

A wide variety of nonionic surfactants can be used. Nonionic surfactants include those broadly defined as compounds produced by the condensation of alkylene oxide groups (hydrophilic in nature) with an organic hydrophobic compound, which may be aliphatic or alkyl aromatic in nature. Examples of classes of nonionic surfactants are:

1. The polyethylene oxide condensates of alkyl phenols, e.g., the condensation products of alkyl phenols having an alkyl group containing from about 6 to about 20 carbon atoms, preferably from about 6 to about 12, in either a straight chain or branched chain configuration, with ethylene oxide, the said ethylene oxide being present in amounts equal to from about 10 to about 60 moles of ethylene oxide per mole of alkyl phenol. The alkyl substituent in such compounds may be derived from polymerized propylene, diisobutylene, octane, or nonane, for example.

2. Those derived from the condensation of ethylene oxide with the product resulting from the reaction of propylene oxide and ethylene diamine products which may be varied in composition depending upon the balance between the hydrophobic and hydrophilic elements which is desired. For example, compounds containing from about 40 parts to about 80 parts polyoxyethylene by weight and having a molecular
weight of from about 5,000 to about 11,000 resulting from the reaction of ethylene oxide groups with a hydrophobic base constituted of the reaction product of ethylene diamine and excess propylene oxide, said base having a molecular weight of the order of about 2,500 to about 3,000, are satisfactory.

3. The condensation product of aliphatic alcohols having from about 8 to about 18 carbon atoms, in either straight chain or branched chain configuration, with ethylene oxide, e.g., a coconut alcohol ethylene oxide condensate having from about 10 to about 30 moles of ethylene oxide per mole of coconut alcohol, the coconut alcohol fraction having from about 10 to about 14 carbon atoms.

4. Long chain tertiary amine oxides corresponding to the following general formula:

\[ \text{R}_1\text{R}_2\text{R}_3\text{N} \rightarrow \text{O} \]

wherein \( \text{R}_1 \) contains an alkyl, alkenyl or monohydroxy alkyl radical of from about 8 to about 18 carbon atoms, from 0 to about 10 ethylene oxide moieties, and from 0 to about 1 glyceryl moiety, and \( \text{R}_2 \) and \( \text{R}_3 \) contain from about 1 to about 3 carbon atoms and from 0 to about 1 hydroxy group, e.g., methyl, ethyl, propyl, hydroxyethyl, or hydroxypropyl radicals. The arrow in the formula is a conventional representation of a semipolar bond. Examples of amine oxides suitable for use in this invention include dimethyl-dodecylamine oxide, oleyldi(2-hydroxyethyl) amine oxide, dimethyloctylamine oxide, dimethyl-decylamine oxide, dimethyl-tetradecylamine oxide, 3,6,9-trioxoheptadecyl-diethylamine oxide, di(2-hydroxyethyl)-tetradecylamine oxide, 2-dodecyl(dimethyl)amine oxide, 3-dodec oxy-2-hydroxypropyldi(3-hydroxypropyl) amine oxide, dimethylhexadecylamine oxide.

5. Long chain tertiary phosphine oxides corresponding to the following general formula:

\[ \text{R}\text{R}'\text{R}''\text{P} \rightarrow \text{O} \]

wherein \( \text{R} \) contains an alkyl, alkenyl or monohydroxyalkyl radical ranging from about 8 to about 18 carbon atoms in chain length, from 0 to about 10 ethylene oxide moieties and from 0 to about 1 glyceryl moiety and \( \text{R}' \) and \( \text{R}'' \) are each alkyl or monohydroxyalkyl groups containing from about 1 to about 3 carbon atoms. The arrow in the formula is a conventional representation of a semipolar bond. Examples of suitable phosphine oxides are:

dodecyldimethylphosphine oxide, tetradecyldimethylphosphine oxide, tetradecylmethyl-ylethylphosphine oxide, 3,6,9-trioxo-octadecyldimethylphosphine oxide, cetyldimethylphosphine oxide, 3-dodec oxy-2-hydroxypropyldi(2-hydroxyethyl) phosphine oxide, stearyldimethylphosphine oxide, cety lethylpropylphosphine oxide, oleyidiethylphosphine oxide, dodecyl-diethylphosphine oxide,

6. Long chain dialkyl sulfoxides containing one short chain alkyl or hydroxy alkyl radical of from about 1 to about 3 carbon atoms (usually methyl) and one long hydrophobic chain which include alkyl, alkenyl, hydroxy alkyl, or keto alkyl radicals containing from about 8 to about 20 carbon atoms, from 0 to about 10 ethylene oxide moieties and from 0 to about 1 glyceryl moiety. Examples include: octadecyl methyl sulfoxide, 2-ketotridecyl methyl sulfoxide, 3,6,9-trioctadecyl 2-hydroxyethyl sulfoxide, dodecyl methyl sulfoxide, oleyl 3-hydroxypropyl sulfoxide, tetradecyl methyl sulfoxide, 3-methoxytridecyl methyl sulfoxide, 3-hydroxytridecyl methyl sulfoxide, 3-hydroxy-4-dodecoxypentyl methyl sulfoxide.

7. Polysorbates, e.g., sucrose esters of fatty acids. Such materials are described in U.S. Patent 3,480,616, e.g., sucrose cocoate (a mixture of sucrose esters of a coconut acid, consisting primarily of monoesters, and sold under the tradenames GRILLOTEN LSE 87K from RITA, and CRODESTA SL-40 from Croda).

8. Alkyl polysaccharide nonionic surfactants are disclosed in U.S. Patent 4,565,647, Llenado, issued January 21, 1986, having a hydrophobic group containing from about 6 to about 30 carbon atoms, preferably from about 10 to about 16 carbon atoms and a polysaccharide, e.g., a polyglycoside, hydrophilic group. The polysaccharide can contain from about 1.0 to about 10, preferably from about 1.3 to about 3, most preferably from about 1.3 to about 2.7 saccharide units. Any reducing saccharide containing 5 or 6 carbon atoms can be used, e.g., glucose, galactose and galactosyl moieties can be substituted for the glucosyl moieties. (Optionally the hydrophobic group is attached at the 2-, 3-, 4-, etc. positions thus giving a glucose or galactose as opposed to a glucoside or galactoside.) The intersaccharide bonds can be, e.g., between the one position of the additional saccharide units and the 2-, 3-, 4-, and/or 6-positions on the preceding saccharide units.

Optionally, and less desirably, there can be a polyalkyleneoxide chain joining the hydrophobic moiety and the polysaccharide moiety. The preferred alkyleneoxide is ethylene oxide. Typical hydrophobic groups include alkyl groups, either saturated or unsaturated, branched or unbranched containing from about 8 to about 18, preferably from about 10 to about 16, carbon atoms. Preferably, the alkyl group is a straight chain saturated alkyl group. The alkyl group can contain up to about 3 hydroxy groups and/or the polyalkyleneoxide chain can contain up to about 10, preferably less than 5, alkylene moieties. Suitable alkyl polysaccharides are octyl, nonyldecyl, un-
decyldodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, and octadecyl, di-, tri-, tetra-, penta-, and hexaglucosides, galactosides, lactosides, glucose, fructo-
sides, fructose and/or galactoses. Suitable mixtures include coconut alkyl, di-, tri-,
tetra-, and pentagalucosides and tallow alkyl, tetra-, penta-, and hexaglucosides.

9. Polyethylene glycol (PEG) glyceryl fatty esters, as depicted by the formula
RC(O)OCH₂CH(OH)CH₂(OCH₂CH₂)ₙ OH wherein n is from about 5 to about 200, preferably from about 20 to about 100, more preferably from about 30 to about 85,
and RC(O)- is an ester wherein R comprises an aliphatic radical having from about 7
to 19 carbon atoms, preferably from about 9 to 17 carbon atoms, more preferably
from about 11 to 17 carbon atoms, most preferably from about 11 to 14 carbon
atoms. The combinations of n from about 20 to about 100, with C₁₂-C₁₈,
preferably C₁₂-C₁₅ fatty esters, for minimized adverse effect on foaming, is
preferred.

Suitable glyceryl fatty ester portions of these surfactants include glyceryl
cocoate, glyceryl tallowate, glyceryl palmate, glyceryl stearate, glyceryl laurate,
glyceryl oleate, glyceryl ricinoleate, and glyceryl fatty esters derived from
triglycerides, such as palm oil, almond oil, and corn oil.

Other surfactants that can be used include soluble cationic surfactants, such as
quaternary ammonium surfactants, and other amphoteric and zwitterionic surfactants
known to those in the art.

**Conditioning Agent**

Optional components include from 0.1 to 1.5 parts of conditioning agents such
as vegetable oils prepared from non-conjugated polyunsaturated fatty esters which
are conjugated and elaidinized then modified by Dies-Alder addition with a member
of the group consisting of acrylic acid, fumaric acid and maleic anhydride. The
adducts and their preparation are described in U.S. Patent No. 4,740,367, Force, et
al., April 26, 1988, incorporated herein by reference, the adducts being marketed
under the trade name Ceraphyl GA (Van Dyke). Preferred vegetable oil adducts are
those prepared from soybean oil and adducts derived by Dies-Alder addition of vege-
table oils with fumaric acid. A preferred method of preparing adducts herein is to
react two moles of vegetable oil with one mole of the dieneophile in the presence of
catalytic amounts of iodine, the conjugation and elaidinization agent. This produces
a 50:50 blend of adduct together with the disproportionated (conjugated) vegetable
oil.

Another component includes the addition of petrolatum. Petrolatum can be any
grade of white or yellow petrolatum recognized in the art as suitable for human appli-

Examples of other moisturizers include the water soluble hexadecyl, myristyl, isodecyl or isopropyl esters of adipic, lactic, oleic, stearic, myristic or linoleic acids, as well as many of their corresponding alcohol esters (sodium isostearoyl-2-lactylate, sodium capryl lactylate), polyethylene glycol esters such as PEG (6) caprylic/capryl glycerate (Softigan 767), hydrolyzed protein and other collagen-derived proteins, aloe vera gel and acetamide MEA.

An optional component hereof is a soluble conditioning agent suitable for conditioning hair or skin. Skin conditioning proteolytic enzyme can also be used.

Suitable conditioners include, for example, soluble polyether siloxane copolymer, such as a polypropylene oxide modified dimethylpolysiloxane (e.g., Dow Corning DC-1248), although ethylene oxide or mixtures of ethylene oxide and propylene oxide may also be used. The ethylene oxide and polypropylene oxide level must be sufficiently high to provide solubility in water and the composition hereof.

**Antibacterial Agent**

The antibacterial agent when used can be present at a level of from about 0.01% to about 4%, typically from about 0.1% to about 2%, and preferably from about 0.5% to about 1%. The level is selected to provide the desired level of antibacterial activity and can be modified as desired. The preferred antibacterial agent is 2-hydroxy-4,2',4'-trichlorodiphenylether (TCS). Other halogenated antibacterial agents are set out below. Many antibacterial agents, known to those skilled in the art and disclosed in, e.g., U.S. Pat. Nos. 3,835,057 and 4,714,563, both incorporated hereinbefore by reference, may be used.

Suitable antibacterial agents include:

- 2-hydroxy-4,2',4'-trichlorodiphenylether (TCS);
- 2,6-dimethyl-4-hydroxychlorobenzene (PCMx);
- 3,4,4'-trichlorocarbanilide (TCC);
- 3-trifluoromethyl-4,4'-dichlorocarbanilide (TFC);
- 2,2'-dihydroxy-3,3',5,5',6,6'-hexachlorodiphenylmethane;
2,2'-dihydroxy-3,3',5,5'-tetrachlorodiphenylmethane;  
2,2'-dihydroxy-3,3',dibromo-5,5'-dichlorodiphenylmethane;  
2-hydroxy-4,4'-dichlorodiphenylether;  
2-hydroxy-3,5',4'-tribromodiphenylether; and  
1-hydroxyl-4-methyl-6-(2,4,4-trimethylpentyl)-2(1H)-pyridinone  
(Octopirox).

**Other Optional Components**

The skin cleansers herein can contain a variety of nonessential, optional ingredients suitable for improving such compositions in a variety of ways. Such conventional, optional ingredients are well known to those skilled in the art, e.g., antibacterial agents and preservatives such as HMDM Hydantoin, benzyl alcohol, methyl paraben, propyl paraben, 3-isothiazolines (Kathon CG sold by Rohm and Haas), imidazolidinyl urea, methylchloroisothiazolinone, and methylisothiazolinone can be used in amounts of from 1 to 5,000 ppm; thickeners and viscosity modifiers such as sodium sulfate, polyethylene glycols, sodium chloride, ammonium chloride, carboxymethylcellulose, methylcellulose, polyvinyl alcohol, and ethyl alcohol; suspending agents such as magnesium/aluminum silicate; perfumes, dyes; opacifiers such as ethylene glycol distearate, glycol monostearate, styrene acrylate copolymer, mica, behenic acid, and calcium stearate; sequestering agents such as disodium ethylendiamine tetraacetate; emollients, moisturizers and various other skin treating ingredients such as glycerin; buffers and builders such as citrates and phosphates. If present, such agents individually generally comprise from about 0.01% to about 5% by weight of the composition.

**Implement**

A body puff or sponge which is made of nylon mesh in the shape of a round sponge (about 4.5 inches in diameter) which when used in conjunction with this invention, is an effective system which enhances the delivery of mild skin cleansing and skin conditioning benefits. Such a puff is manufactured by the sponge factory (Bilange). The puff is comprised of three pieces of extruded tubular netting (scrim) which is folded numerous times to form a soft ball-like sponge, with a nylon rope attached. A suitable system of this type is disclosed in U.S. Patent Application Serial No. 08/080,668, filed June 18, 1993, Gordon, et al.

**Preferences**

This lists the preference levels of the raw materials from a low level to a mid
level to a high level as used in the preferred bar of the present invention.

Water/Solvent is low at 50 - 76 parts; medium at 76 - 90 parts and high at 90- 94 parts.
Cocamidopropyl Betaine is an Amphoteric and is low at 3 - 4 parts; midium at 4 - 8 parts and high at 8 - 10 parts.
MES*/Anionic is low at 3 - 4 parts; mid at 4 - 8 parts and high at 8 - 10 parts.
N-acylamino acid surfactant/Anionic lather booster is 0.1 - 0.25; 0.25 - 1; and 1 - 3 parts, respectively.
Polymer JR**/Polymeric lather booster: 0.01 - 0.02; 0.02 - 0.2; and 0.2 - 0.5 parts respectively.
Sodium Sulfate/Thickener #2: 0.1 - 1; 1 - 3; 3 - 5 parts respectively.
Polyol Alkoxy Ester/Thickener #1: 0.0 - 0.1; 0.1 - 0.5; 0.5 - 1.0 parts respectively.
Citric Acid/pH adjuster
DMCMD Hydantoin/Preservative
Tetra Sodium EDTA/Preservative
Fragrance/Perfume

* Mild ethoxylated surfactants
** A cationic cellulose ether derivative

**METHOD OF USE**

In its method aspect, the present invention comprises a method of washing the skin by contacting the skin with an amount of the cleanser compositions herein which is effective to clean the skin and rinsing the excess cleanser from the skin. An effective amount for any individual will depend upon variable factors such as amount of soil on the skin, type of soil on the skin, level of surfactant in the cleanser composition, etc. Generally, an effective amount will be from about 0.5 to about 5 grams per use.

**EXAMPLES**

The following Examples further describe and demonstrate the preferred embodiments within the scope of the present invention. The Examples are given solely for the purpose of illustration and are not to be construed as limitations of the present invention as many variations thereof are possible without departing from its spirit and scope.
Table 1:

Example 1: This example has ultra mildness because the relative levels of Cocamidopropyl betaine and sodium laureth sulfate are close to one another. Mildness is optimized when these two surfactants are close to a one to one anionic to amphoteric ratio on a molar basis. These two surfactants have comparable molecular weights.

Example 2: This example shows that mildness can be sustained even when raising surfactant levels of sodium laureth sulfate and sodium lauroyl sarcosinate. It is important to keep the relative ratio of cocamidopropyl betaine and sodium laureth sulfate close to one another (e.g., this ratio can range from 2:1 to 1:1.5; preferably 1:5:1 to 1:1.5).

Example 3: This example shows mildness being further enhanced by the further addition of polymer. Polymer acts as a humectant, preventing moisture loss from the skin. It also reduces the penetration of surfactant into the stratum corneum.

Comparative Example A: A leading commercially available liquid hand soap.

Table 1: Mildness examples

<table>
<thead>
<tr>
<th></th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>84.10</td>
<td>83.15</td>
<td>84.05</td>
</tr>
<tr>
<td>Cocamidopropyl Betaine</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Sodium Laureth Sulfate</td>
<td>5.8</td>
<td>6.3</td>
<td>5.8</td>
</tr>
<tr>
<td>Sodium Lauroyl Sarcosinate</td>
<td>0.5</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Lauryl Poliglucose</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>PEG-120 Methylglucose Dioleate</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Polyquaternium 10</td>
<td>0.05</td>
<td>0.01</td>
<td>0.1</td>
</tr>
<tr>
<td>Sodium Sulfate</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Polyol Alchoxy Ester</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Citric Acid</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>DMDM Hydantoin</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Tetra Sodium EDTA</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Fragrance</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Mildness rating

<table>
<thead>
<tr>
<th></th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>103</td>
<td>102</td>
<td>131</td>
</tr>
</tbody>
</table>

Table 1A:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative</td>
<td>Ex. 1</td>
</tr>
<tr>
<td>Example A</td>
<td></td>
</tr>
</tbody>
</table>
Table 2:  

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Ex. 4</th>
<th>Ex. 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>84.10</td>
<td>86.70</td>
</tr>
<tr>
<td>Cocamidopropyl Betaine</td>
<td>6.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Sodium Laureth Sulfate</td>
<td>5.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Sodium Lauroyl Sarcosinate</td>
<td>0.5</td>
<td>--</td>
</tr>
<tr>
<td>Lauryl Polyglucose</td>
<td></td>
<td>1.10</td>
</tr>
<tr>
<td>PEG-120 Methylglucose Dioleate</td>
<td>--</td>
<td>0.80</td>
</tr>
<tr>
<td>Polyquaternium 10</td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>Sodium Sulfate</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>--</td>
<td>0.20</td>
</tr>
<tr>
<td>Polyol Alkxy Ester</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Citric Acid</td>
<td>0.25</td>
<td>0.20</td>
</tr>
<tr>
<td>DMDM Hydantoin</td>
<td>0.2</td>
<td>0.20</td>
</tr>
<tr>
<td>Tetra Sodium EDTA</td>
<td>0.1</td>
<td>0.10</td>
</tr>
<tr>
<td>Fragrance</td>
<td>0.2</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Mildness rating\(^1\)  

103 \quad 53

\(^1\) As tested by a luminescent bacteria toxicity test (LBT), provided under the trade name of Microtox\(^\circledast\). The higher the number rating implies elevated mildness. References include:  


Table 2:  

Example 4: This example shows that the product can have more sodium laureth sulfate than cocamidopropyl betaine.

Example 5: This example shows that the product can have more cocamidopropyl betaine than sodium laureth sulfate.
Table 3:

Example 6: This example shows increased lather generation when Polyquaternium-10 is in the presence of sodium lauroyl sarcosinate. These two materials interact in such a way as to unexpectedly boost lather volumes. The full volume potential is not reached when both of these materials are not present.

Example 7: This example shows the low lather generation when both Sodium Lauroyl Sarcosinate and Polyquaternium-10 are not present.

Example 8: This example shows low lather generation when Sodium Lauroyl Sarcosinate is not present.

Example 9: This example shows low lather generation when Polyquaternium-10 is not present.

Comparative Example A: A leading commercially available liquid hand soap.

Table 3: Lather examples

<table>
<thead>
<tr>
<th></th>
<th>Example 6</th>
<th>Example 7</th>
<th>Example 8</th>
<th>Example 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>83.65</td>
<td>84.75</td>
<td>84.65</td>
<td>83.75</td>
</tr>
<tr>
<td>Cocamidopropyl Betaine</td>
<td>6.0</td>
<td>5.8</td>
<td>5.8</td>
<td>6.0</td>
</tr>
<tr>
<td>Sodium Laureth Sulfate</td>
<td>5.8</td>
<td>6.0</td>
<td>6.0</td>
<td>5.8</td>
</tr>
<tr>
<td>Sodium Lauroyl Sarcosinate</td>
<td>1.0</td>
<td>--</td>
<td>--</td>
<td>1.0</td>
</tr>
<tr>
<td>Lauryl Polyglucose</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>PEG-120 Methylglucose Dioleate</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Polyquaternium 10</td>
<td>0.1</td>
<td>--</td>
<td>0.1</td>
<td>--</td>
</tr>
<tr>
<td>Sodium Sulfate</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Polyoil Alkoxy Ester</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Citric Acid</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>DMDM Hydantoin</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Tetra Sodium EDTA</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.11</td>
</tr>
<tr>
<td>Fragrance</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Lather in ml²</td>
<td>440</td>
<td>280</td>
<td>310</td>
<td>300</td>
</tr>
</tbody>
</table>

Table 3A Comparative Example A:
A leading commercially available liquid hand soap.

**Table 3A: Lather examples**

<table>
<thead>
<tr>
<th></th>
<th>Example 6</th>
<th>Example A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>83.65</td>
<td>86.70</td>
</tr>
<tr>
<td>Cocamidopropyl Betaine</td>
<td>6.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Sodium Laureth Sulfate</td>
<td>5.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Sodium Lauroyl Sarcosinate</td>
<td>1.0</td>
<td>--</td>
</tr>
<tr>
<td>Lauryl Polyglucose</td>
<td>--</td>
<td>1.10</td>
</tr>
<tr>
<td>PEG-120 Methylglucose Dioleate</td>
<td>--</td>
<td>0.80</td>
</tr>
<tr>
<td>Polyquaternium 10</td>
<td>0.1</td>
<td>--</td>
</tr>
<tr>
<td>Sodium Sulfate</td>
<td>2.5</td>
<td>--</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>--</td>
<td>0.20</td>
</tr>
<tr>
<td>Polyol Alkoxy Ester</td>
<td>0.3</td>
<td>--</td>
</tr>
<tr>
<td>Citric Acid</td>
<td>0.25</td>
<td>0.2</td>
</tr>
<tr>
<td>DMDM Hydantoin</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Tetra Sodium EDTA</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Fragrance</td>
<td>0.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Lather in ml² 440 300

Lather generation in milliliters resulting in rotating cylinders with the test substance in the presence of water and a soil load.

**Example 10:** This example shows lather generation can be increased by increasing the level of sodium lauroyl sarcosinate. The presence of Polyquaternium 10 is needed to see an unexpected lather boost.

**Example 11:** This example shows higher levels of Polyquaternium 10.

**Table 4:**

<table>
<thead>
<tr>
<th></th>
<th>Example 10</th>
<th>Example 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>81.60</td>
<td>83.95</td>
</tr>
<tr>
<td>Cocamidopropyl Betaine</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Sodium Laureth Sulfate</td>
<td>5.8</td>
<td>5.8</td>
</tr>
<tr>
<td>Sodium Lauroyl Sarcosinate</td>
<td>3.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Polyquaternium 10</td>
<td>0.05</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Sodium Sulfate 2.5 2.5
Polyol Alkoxy Ester 0.3 0.3
Citric Acid 0.25 0.25
DMMD Hydantoin 0.2 0.2
Tetra Sodium EDTA 0.1 0.1
Fragrance 0.2 0.2

Table 5:
Example 12: This table gives an example of a possible use for this product as an antibacterial.

Table 5: Antibacterial example

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Example 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>84.40</td>
</tr>
<tr>
<td>Cocamidopropyl Betaine</td>
<td>5.0</td>
</tr>
<tr>
<td>Sodium Laureth Sulfate</td>
<td>5.0</td>
</tr>
<tr>
<td>Sodium Lauroyl Sarcosinate</td>
<td>2.0</td>
</tr>
<tr>
<td>Polyquaternium 10</td>
<td>0.05</td>
</tr>
<tr>
<td>Sodium Sulfate</td>
<td>2.5</td>
</tr>
<tr>
<td>Polyol Alkoxy Ester</td>
<td>0.3</td>
</tr>
<tr>
<td>Citric Acid</td>
<td>0.25</td>
</tr>
<tr>
<td>DMDM Hydantoin</td>
<td>0.2</td>
</tr>
<tr>
<td>Tetra Sodium EDTA</td>
<td>0.1</td>
</tr>
<tr>
<td>Fragrance</td>
<td>0.2</td>
</tr>
<tr>
<td>Triclosan</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Antibacterial liquid cleansers made in accordance with this invention are ultra mild.
What is Claimed is:

1. A mild personal cleansing composition comprising:
   (a) from about 3 parts to about 10 parts, by weight, of an alkyl ethoxylated sulfate anionic surfactant having an average degree of ethoxylation of at least about 2.0;
   (b) from about 3 parts to about 10 parts of an amphoteric surfactant selected from the group consisting of betaine surfactants, imidazoline surfactants, aminoalkanoate surfactants, and iminodialkanoate surfactants, and mixtures thereof;
   (c) from about 0.1 parts to about 3 parts, by weight of an N-acylamino acid surfactant, or salt thereof;
   (d) from about 0.01 parts to about 0.5 parts, by weight of the composition, of a cationic cellulose ether derivative, and
   (e) water from 50 parts to 94 parts.

2. A mild personal liquid cleanser composition according to Claim 1, wherein said composition comprises:
   (a) from about 4 parts to about 8 parts of said alkyl ethoxylated sulfate anionic surfactant having an average degree of ethoxylation of about 2 to about 12;
   (b) from about 4 parts to about 8 parts of said amphoteric surfactant selected from the group consisting of:
      (i) betaine surfactant of the formula:
        \[
        \begin{align*}
        & R_1 O R_4 & 1 \ R_2 \\
        & \downarrow & \downarrow \\
        & R_5 & C - N - (CH_2)_m N^+ - Y - R_1 \\
        & \downarrow & \downarrow \\
        & \downarrow & J_n R_3
        \end{align*}
        \]

        wherein \( R_1 \) is a member selected from the group consisting of
        COOM and CH-CH_2SO_3M
        \[
        \begin{align*}
        & \downarrow \\
        & OH
        \end{align*}
        \]
R₂ is lower alkyl or hydroxyalkyl;
R₃ is lower alkyl or hydroxyalkyl;
R₄ is a member selected from the group consisting of hydrogen and lower alkyl;
R₅ is higher alkyl or alkenyl;
Y is lower alkyl (C₁ to C₄);
m is an integer from 2 to 7;
n is the integer 1 or 0;
M is hydrogen or a cation;

(ii) imidazoline surfactants of the formula:

\[
\begin{align*}
\text{R} & \quad \text{R} \\
\text{R}_1\text{CON(CH}_2\text{H}_2\text{)}_n\cdot\text{N}^+\text{-CH}_2\text{Z} \\
\text{R}_2 & \quad \text{R}_4
\end{align*}
\]

wherein R₁ is C₈-C₂₂ alkyl or alkenyl, R₂ is hydrogen or CH₂CO₂M, R₃ is CH₂CH₂OH or CH₂CHOCH₂CH₂COOM, R₄ is hydrogen, CH₂CH₂OH, or CH₂CH₂OCH₂CH₂COOM, Z is CO₂M or CH₂CO₂M, n is 2 or 3, and M is hydrogen or a cation; and

(iii) aminoalkanoates of the formula:

\[\text{R-NH(CH}_2\text{H}_2\text{)}_n\text{COOM} \; \text{and}\]

iminodialkanoates of the formula:

\[\text{R-N[(CH}_2\text{H}_2\text{)}_m\text{COOM]}_2\]

wherein n and m are from 1 to 4, R is C₈ - C₂₂ alkyl or alkenyl, and M is hydrogen or alkali or alkaline metal;

(iv) and mixtures thereof;

and wherein said (a) and (b) have a ratio of about 2:1 to about 1:1.5 on a molar basis;

(c) from about 0.25 parts to about 1 parts, by weight of said N-acylamino acid surfactant, or salt thereof; said (c) selected wherein said N-acyl
amino acid surfactant, or salt thereof, and wherein said N-acyl amino acid surfactant is of the formula:

\[
\begin{align*}
O & \quad R_2 \\
\| & \quad | \\
R_1 & - C - N \cdot (-R_3 \cdot)n^+ \cdot COOM
\end{align*}
\]

wherein: \( R_1 \) is C\(_8\)-C\(_{24}\) alkyl or alkenyl;  
\( R_2 \) is -H, C\(_1\)-C\(_4\) alkyl, phenyl, or -CH\(_2\)COOM;  
\( R_3 \) is -C-R\(_4^2\); \( n \) is from 1 to 4; \( R^4 \) is H, C\(_1\) - C\(_6\) alkyl, or C\(_1\)-C\(_6\) alkylenester; and M is H or a cation, or a mixture thereof;  
(d) from about 0.02 parts to about 0.2 parts said cationic cellulose ether derivative, and  
(e) said water is from about 75 parts to about 90 parts.

3. A mild personal cleansing composition comprising:  
(a) from about 3 parts to about 10 parts, by weight, of an alkyl ethoxylated sulfate anionic surfactant having an average degree of ethoxylation of at least about 2.0;  
(b) from about 3 parts to about 10 parts of an amphoteric surfactant selected from the group consisting of betaine surfactants, imidazoline surfactants, aminoalkanoate surfactants, and iminodialkanoate surfactants, and mixtures thereof;  
and wherein said (a) and (b) have a ratio of about 2:1 to about 1:1.5 on a molar basis;  
(c) from about 0.1 parts to about 3 parts, by weight of an N-acylamino acid surfactant, or salt thereof;  
(d) from about 0.01 parts to about 0.5 parts, by weight of the composition, of a cationic cellulose ether derivative, and  
(e) water from 50 parts to 94 parts;  
wherein said personal cleansing composition is substantially free of alkyl sulfate anionic surfactant, primary amines.

4. A mild personal liquid cleanser composition as in Claim 3, wherein said N-acyl amino acid surfactant is an N-acyl sarcosinate surfactant; wherein said composition comprises from about 4 parts to about 8 parts of said alkyl ethoxylated sulfate, from about 4 parts to about 8 parts of said amphoteric surfactant, and from about 0.25
parts to about 1 parts of said N-acyl amino acid surfactant, from about 0.02 to about 1 parts cationic cellulose ether derivative.

5. A mild personal liquid cleanser composition as in Claim 4, wherein said cationic cellulose ether derivative is Polyquaternium-10 (an industry term designed by the Cosmetic, Toiletry and fragrance Association (CTFA) for the polymeric quaternary ammonium salt of hydroxyethyl cellulose reacted with trimethyl ammonium substituted epoxide).

6. A mild personal liquid cleanser composition as in Claim 5, wherein said mild personal liquid cleanser has a transmittance value of less than about 80 at 420 nm in a 2.5cm path length after 30 days at 38°C.

7. A mild personal liquid cleanser composition as in Claim 6, wherein said alkyl ethoxylated sulfate has an average ethoxylation of 3 to 4, said amphoteric is cocamidopropyl betaine, and said N-acyl amino acid surfactant is sodium lauroyl sarcosinate.

8. A mild personal liquid cleanser composition as in Claim 7, wherein said alkyl ethoxylated sulfate and said cocamidopropyl betaine are in a ratio of about 1.5:1 to about 1:1.5.

9. A mild personal liquid cleanser composition according to Claim 1, wherein said composition comprises:

(a) from about 4 parts to about 8 parts of said alkyl ethoxylated sulfate anionic surfactant having an average degree of ethoxylation of about 2 to about 12;

(b) from about 4 parts to about 8 parts of said amphoteric surfactant selected from the group consisting of:

(i) betain surfactant of the formula:

\[
\begin{array}{c}
\overset{n}{O} \overset{m}{R_5} \overset{n}{C - N - (CH_2)_m - N^+ - Y - R_1} \\
| \ | \\
| \ | \\
| \ | \\
| \ | \\
\end{array}
\]

\[
\overset{n_1}{R_4} \overset{n_2}{R_2} \\
| \ | \\
| \ | \\
\]


wherein $R_1$ is a member selected from the group consisting of
$\text{COOM}$ and $\text{CH-CH}_2\text{SO}_3\text{M}$
\[
\begin{align*}
\text{OH} \\
R_2 \\
\text{R}_4 \\
\text{Y} \\
\text{m} \\
\text{n} \\
\text{M}
\end{align*}
\]

$R_2$ is lower alkyl or hydroxyalkyl;
$R_3$ is lower alkyl or hydroxyalkyl;
$R_4$ is a member selected from the group consisting of hydrogen and lower alkyl;
$R_5$ is higher alkyl or alkenyl;
$Y$ is lower alkyl (C$_1$ to C$_4$);
$m$ is an integer from 2 to 7;
$n$ is the integer 1 or 0;
$M$ is hydrogen or a cation;

(ii) imidazoline surfactants of the formula:
\[
\begin{align*}
\text{R}_3 \\
\text{R}_1\text{CON(CH}_2\text{)}_n\text{N}^+-\text{CH}_2\text{Z} \\
\text{R}_4 \\
\text{R}_2
\end{align*}
\]

wherein $R_1$ is C$_8$-C$_{22}$ alkyl or alkenyl, $R_2$ is hydrogen or CH$_2$CO$_2$M, $R_3$ is
CH$_2$CH$_2$OH or CH$_2$CHOCH$_2$CH$_2$COOM, $R_4$ is hydrogen, CH$_2$CH$_2$OH, or
CH$_2$CH$_2$OCH$_2$CH$_2$COOM, $Z$ is CO$_2$M or CH$_2$CO$_2$M, $n$ is 2 or 3, and $M$ is hydro-
gen or a cation; and

(iii) aminoalkanoates of the formula:
\[
\text{R-NH(CH}_2\text{)}_n\text{COOM, and}
\]

iminodialkanoates of the formula:
\[
\text{R-N[[(CH}_2\text{)}_m\text{COOM]_2}
\]

wherein $n$ and $m$ are from 1 to 4, $R$ is C$_8$ - C$_{22}$ alkyl or alkenyl, and $M$ is hydrogen or alkali or alkaline metal;

(iv) and mixtures thereof;

and wherein said (a) and (b) have a ratio of about 2:1 to about 1:1.5 on a molar basis,
(c) from about 0.25 parts to about 1 parts, by weight of said N-acylamino acid surfactant, or salt thereof, said (c) selected wherein said N-acyl amino acid surfactant, or salt thereof, and wherein said N-acyl amino acid surfactant is of the formula:

\[
\begin{array}{c}
| \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ O \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ R_2 \\
| \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ R_1 - C - N - (-R_3^-)_n^- - COOM
\end{array}
\]

wherein: \( R_1 \) is \( C_8-C_{24} \) alkyl or alkenyl;
\( R_2 \) is \(-H, C_1-C_4 \) alkyl, phenyl, or \(-CH_2COOM; \)
\( R_3 \) is \(-C-R_4^4 \); \( n \) is from 1 to 4; \( R_4 \) is \( H, C_1-C_6 \) alkyl, or \( C_1-C_6 \) alkylester, and \( M \) is \( H \) or a cation, or a mixture thereof;

(d) from about 0.02 parts to about 0.2 parts said cationic cellulose ether derivative, and

(e) from about 0.1 parts to about 0.3 parts antibacterial agent;

(f) from about 0.1 parts to about 15 parts of an oily conditioning agent;

(g) said water is from about 75 parts to about 90 parts.