Title: LIQUID DETERGENT COMPOSITION FOR BODY CONTAINING BRANCHED SULFOACETATE BASE

Abstract: The present invention relates to a liquid detergent composition for the body, more particularly, the present invention relates to a liquid detergent composition for the body containing a branched sulfoacetate base as a main base, thereby the composition has an excellent foaming ability and reduces a need for excessive cleaning to obtain a superior feeling of use without irritating skin and hair.
LIQUID DETERGENT COMPOSITION FOR BODY CONTAINING BRANCHED SULFOACETATE BASE

The present invention relates to a liquid detergent composition for the human body, more particularly, the present invention relates to a liquid detergent composition for the body containing a branched sulfoacetate base as a main base, thereby the composition has an excellent foaming ability and reduces a need for excessive cleaning to obtain a superior feeling of use without irritating skin and hair.

The object of skin cleaning is to clean skin and maintain health thereof. Recently, the occurrence of sensitive and atopic skin has increased due to a combination of reasons such as a change of life environment, stress and the like, so a stability problem of a liquid detergent for the body is emphasized as well as skin cleaning. Studies about new low-irritant surfactants having a high stability have progressed well, and researchers have made efforts to improve their effect by mixing conventional surfactants having a relatively high stability with other
Representative anionic surfactants used in liquid detergents for the body are soap, which has been used for a long time, and more recently, sulfate forms such as alkyl sulfate and alkyl ester sulfate, amino acid forms such as acyl glutamin and glycine, and nonionic forms such as alkylglycoside. Sulfates and sulfonates among the surfactants are used in the liquid detergent as a main material due to a low price and excellent foaming ability and detergency, but sulfates and sulfonates exhibit effects of skin dryness, skin roughness and skin irritation caused by a need of excessive cleaning. The nonionic form, such as alkylglycoside, is good for skin dryness and skin irritation due to low detergency, but has a foaming ability, which is a basic property of detergent, that is poor, and a high price.

A sulfoacetate is usually used for an oral composition, and a sulfoacetate is disclosed in United States Patent No. 4603045, No. 4807649 and No. 3954962. However, an alkyl group used in the patents is linear form, most preferably sodium lauryl sulfoacetate.

[Disclosure]
The inventors of the present invention have studied to find a detergent composition for the body that has a foaming ability, which is the basic property of a detergent, that is excellent, and prevents skin tightness, dryness and the like caused by an excessive detergency of conventional anionic surfactants. As a result, the present inventors have developed a composition using branched sulfoacetate as a new surfactant to exhibit an excellent foaming ability, low detergency, and superior feeling of use without irritation.

Therefore, the object of the present invention is to provide a liquid detergent composition for the body that has an excellent foaming ability and reduces a need for excessive cleaning to obtain a superior feeling of use.

[Technical Solution]

To achieve the object, the present invention provides a liquid detergent composition for the body containing a branched sulfoacetate base represented by Chemical Formula 1, and amphoteric surfactants:

\[ \text{Chemical Formula 1:} \]

\[ \text{O} \]

\[ \text{R -} (\text{OCH}_2 \text{GHa})_a \text{O-CCH}_2 \text{SO}_3 \text{Na} \]

In the above, R is branched hydrocarbon having a
carbon number of 8 to 18, and n is an invariable of 1 to 5.

Further, the present invention provides a liquid detergent composition for the body further containing nonionic surfactants.

[Advantageous Effects]

The present invention can provide a detergent for the body containing a branched sulfoacetate base as a main base and amphoteric surfactants and nonionic surfactants as cosurfactants to prevent skin dryness and skin tightness after using the detergent by an excellent foaming ability and by reducing the need for excessive cleaning.

[Best Mode]

Hereinafter, the components comprising a detergent composition for the body of the present invention are described in detail.

A branched sulfoacetate contained in the liquid detergent composition for the body of the present invention as a new surfactant has a structure represented by the following Chemical Formula 1.

[Chemical Formula 1]

\[
\begin{align*}
\text{O} \\
\text{II} \\
\text{R}-(\text{OCH}_2\text{CH}_n\text{O}-\text{CCH}_2\text{SO}_3\text{Na})
\end{align*}
\]
In the above, \( R \) is branched hydrocarbon having a carbon number of 8 to 18, and \( n \) is an invariable of 1 to 5.

Most preferably, the carbon number of \( R \) is 13, and \( n \) is 3.

The expected structure is represented by the following Chemical Formula 2.

[Chemical Formula 2]

\[
\begin{align*}
\text{CH}_3 & \quad \text{CH}_3 & \quad O \\
\text{CH}_3(\text{CH}_2)_5(\text{CH}_2)_3(O\text{CH}_2\text{CH}_2)_n\text{O} & \quad \text{CCH}_2\text{SO}_3\text{Na} \\
\text{CH}_3 &
\end{align*}
\]

The branched sulfoacetate is contained in an amount of 5 to 20\% by weight based on the total weight of the composition, preferably 9 to 15\% by weight. If the branched sulfoacetate is less than 5\% by weight, a foaming ability and detergency are poor, and if the branched sulfoacetate exceeds 20\% by weight, a feeling of use and price aspect are poor.

The amphoteric surfactant used in the present invention exhibits a high surface activity and foaming ability, and also it has a component having a low polarity. The amphoteric surfactant in the present invention includes
cocamidopropylbetaine, cocobetaine, cocoamphocarboxypropionate, cocoamphocarboxy propionic acid, cocoamphoacetate, cocoamphodiacetate (cocoamphocarboxyglycinate), sodium lauroamphoacetate (sodium lauroamphocarboxyglycinate) and the like. The amphoteric surfactant is contained in an amount of at least 0.5% by weight based on the total weight of the composition, preferably 0.75 to 7% by weight, more preferably 1 to 4% by weight.

The liquid detergent composition for the body of the present invention contains the branched sulfoacetate base and amphoteric surfactant in a ratio of 2.5:1 to 3.5:1, preferably 3:1. When the composition contains the branched sulfoacetate and amphoteric surfactant according to a ratio of 3:1, an excellent foaming ability is acquired.

The total of the branched sulfoacetate and amphoteric surfactant is contained in an amount of more than 10% by weight based on the total weight of the liquid detergent composition because the composition provides an excellent foaming ability and prevents an excessive cleaning without irritating skin and hair.

The liquid detergent composition for the body of the present invention can further contain a nonionic surfactant
Examples of nonionic surfactant include aliphatic alcohol, sorbitan, sorbitol ester, alkylate polyglucoside, amine oxide and alkanolamide, of which preferably alkanolamide and alkylate polyglucoside are used. The nonionic surfactant content is not limited, and the nonionic surfactant is contained in an amount of more than 0.5% by weight based on the total weight of the composition, preferably 0.75 to 7% by weight, more preferably 1 to 5% by weight.

The liquid detergent composition for the body of the present invention can further contain polymers, for example, polyquaternium series (Polyquaternium-7, Polyquaternium-10 and the like), polyethyleneoxide, guargum and cellulose.

The liquid detergent composition for the body of the present invention can contain pigments, preservatives, sunscreen agents, perfumes and the like within the scope for maintaining the stability.

[Mode for Invention]

Hereinafter, the present invention is more specifically described with Examples and Comparative Examples. However, the present invention is not limited thereto.

Examples 1-3 and Comparative Examples 1-3
The liquid detergent composition for the body of Examples 1-3 and Comparative Examples 1-3 were prepared according to a following method, and each composition is given in Table 1 below.

1) Purified water was added in a beaker.

2) PEG-14M was wetted in a glycerin, and the resultant was added to the purified water of step 1.

3) Cocamide MEA was added to the mixture of step 2, and the resulting mixture was then heated to 70°C to dissolve.

4) EDTA-2Na and the remaining surfactants were gradually added to the mixture of step 3, and the reaction was terminated when all the reactants were completely dissolved.

<table>
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<th>Components (% by weight)</th>
<th>Comparative Example 1</th>
<th>Comparative Example 2</th>
<th>Comparative Example 3</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
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<tr>
<td>Purified water</td>
<td>To 100</td>
<td>To 100</td>
<td>To 100</td>
<td>To 100</td>
<td>To 100</td>
<td>To 100</td>
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<td>PEG-14M</td>
<td>0.1</td>
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<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Cocamide MEA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>NaCl</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>EDTA-2Na</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Sodium lauryl sulfate; SLES</td>
<td>11.25</td>
<td>11.25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sodium trideceth sulfoacetate; STSA</td>
<td>-</td>
<td>-</td>
<td>6.75</td>
<td>11.25</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Cocamidopropyl betaine; CAPB</td>
<td>3.75</td>
<td>3.75</td>
<td>2.25</td>
<td>3.75</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Comparative Example 1 has a ratio of sodium laureth sulfate (SLES) as a conventional sulfate surfactant and cocamidopropyl betaine (CAPB) as an amphoteric surfactant fixed at 3:1, and the total of SLES and CAPB is contained in an amount of 15% by weight. Comparative Example 2 further includes lauryl glucoside as a nonionic surfactant in an amount of 3% by weight as compared to Comparative Example 1. Comparative Example 3 contains sodium trideceth sulfoacetate (STSA) and cocamidopropyl betaine (CAPB) in a total amount of 9% by weight.

Examples 1-3 have a ratio of sodium trideceth sulfoacetate (STSA) as a branched sulfoacetate surfactant and cocamidopropyl betaine (CAPB) as an amphoteric surfactant fixed at 3:1, and the total of STSA and CAPB is contained in an amount of 15% by weight in Example 1 and 12% by weight in Examples 2 and 3. Example 3 further includes lauryl glucoside in an amount of 3% by weight.

Experimental Example 1: Comparison of Foaming Ability

In order to compare the foaming ability of Examples 1-3 and Comparative Examples 1-3, the foaming ability was measured using SITA R-2000 bubbles-measuring instrument,
which generates bubbles by rotor and then measures the height of the bubbles, as follows. The results thus obtained are given in Table 2 below.


2) Measuring method:
   (a) 500g of 1% sample solution was prepared using 5g of Examples 1-3 and Comparative Examples 1-3 and 495g of tap water.
   (b) 0.05g of artificial sebum solution was dropped into the sample solution of step (a) with stirring (the artificial sebum solution was prepared using triolein, squalane, myristic acid).
   (c) The sample solution of step (b) was prepared for measuring using SITA R-2000 bubbles-measuring instrument (condition: 800rpm/1min).
   (d) Height of the bubbles was measured after rotation of the rotor was stopped.
   (e) Foaming ability was measured according to the following appraisal standard for height in of bubbles:
       - very good: greater than 1450mm
       - good: 1350mm - 1450mm
       - moderate: 1250mm - 1350mm
       - poor: 1150mm - 1250mm
very poor: less than 1150mm

<table>
<thead>
<tr>
<th>Components</th>
<th>Comparative Example 1</th>
<th>Comparative Example 2</th>
<th>Comparative Example 3</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height of the bubbles (mm)</td>
<td>1330</td>
<td>1320</td>
<td>1280</td>
<td>1570</td>
<td>1450</td>
<td>1400</td>
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</table>

As can be seen from Table 2, the foaming ability of Example 1 containing sodium trideceth sulfoacetate (STSA) is greater than that of Comparative Example 1 containing sodium laureth sulfate (SLES) in the same amount as that of STSA in Example 1. Also, the lower the STSA content, the lower the foaming ability. The foaming ability of Comparative Example 3 having a total STSA and CAPB content of 9% by weight is less than that of Examples 1 to 3 having a total of SLES and CAPB content by weight of 15% for Example 1 and 12% for Examples 2 and 3. Therefore, when the total of STSA and CAPB is contained in an amount of more than 10% by weight as an active component, a formulation having a good foaming ability can be prepared.

**Experimental Example 2: Comparison of Detergency**

In order to examine the effect of reducing excessive cleaning and skin irritation of Examples 1-3 and Comparative Examples 1-3, an artificial sebum and Nile Red,
which is a fluorescent dye, were absorbed on a glass plate. The glass plate was then washed by solutions of Examples 1-3 and Comparative Examples 1-3, and a residual quantity of the artificial sebum was measured by a fluorescence analyzer, as follows. The results thus obtained are given in Table 3 below.

1) Equipment and instrument: fluorescence analyzer, stirrer, digital balance, glass plate.

2) Measuring method:

(a) An artificial sebum solution prepared using triolein, squalane and myristic acid was mixed with Nile Red, which is a fluorescent dye.

(b) The artificial sebum solution was attached on a glass plate by immersing for 2 minutes, and then the resultant was dried for 30 minutes.

(c) 1% sample solution was prepared using 2g of Examples 1-3 and Comparative Examples 1-3 and 198g of tap water.

(d) The glass plate with the attached artificial sebum solution was washed by the sample solution of step(c) for 20 minutes, and then the washed glass plate was dried for 24 hours.

(e) The artificial sebum remaining on the glass plate was extracted with ethanol, and the residual quantity of
the sebum was measured by a fluorescence analyzer

(f) Detergency was measured according to the following appraisal standard (Unit: mM).

- excessive detergency: residual quantity of the sebum is less than 0.2
- good detergency: residual quantity of the sebum is 0.2 ~ 0.25
- moderate detergency: residual quantity of the sebum is 0.25 ~ 0.3
- adequate detergency: residual quantity of the sebum is 0.3 ~ 0.35
- low detergency: residual quantity of the sebum is greater than 0.35

[Table 3]

<table>
<thead>
<tr>
<th>Components</th>
<th>Comparative Example 1</th>
<th>Comparative Example 2</th>
<th>Comparative Example 3</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual quantity of sebum (mM)</td>
<td>0.2</td>
<td>0.3</td>
<td>0.42</td>
<td>0.26</td>
<td>0.35</td>
<td>0.45</td>
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</tbody>
</table>

As can be seen from Table 3, the residual quantity of the sebum of Example 1 containing sodium trideceth sulfoacetate (STSA) is greater than that of Comparative Example 1 containing sodium laureth sulfate (SLES) in the same amount as that of STSA in Example 1. The residual
quantity of the sebum of Examples 2 and 3 containing a total of STSA and CAPB in an amount of 12% by weight is greater than that of Example 1 containing a total of STSA and CAPB in an amount of 15% by weight, therefore, it is confirmed that the lower the STSA content, the greater the residual quantity of the sebum. Also, the residual quantity of the sebum of Comparative Example 2 and Example 3 containing lauryl glucoside are greater than those of Comparative Example 1 and Examples 1 and 2, which do not contain lauryl glucoside. On the basis of the results, Example 3 has greater residual quantity of the sebum for a low detergency and skin softness, and generates bubbles excellently to provide a good usability.

**Experimental Example 3: Comparison of Use Effect**

A sensory evaluation was carried out with respect to five items, consisting of 1) abundant foaming ability, 2) soft and smooth touch, 3) good rinsing, 4) roughness, tightness and dryness (or moistness) of skin and 5) degree of skin irritation after use, according to the following method.

Forty females of age 20-40 years were selected as evaluating subjects, and Examples 1-3 and Comparative Examples 1-3 were provided to the evaluating subjects. Each
compound was used by each female for one week, and then use
effect and preference were researched. The results thus
obtained are given in Table 4 below.

<table>
<thead>
<tr>
<th>Components</th>
<th>Comparative Example 1</th>
<th>Comparative Example 2</th>
<th>Comparative Example 3</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) abundant foaming ability</td>
<td>3</td>
<td>3.1</td>
<td>3.5</td>
<td>4.8</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>2) soft touch</td>
<td>2.9</td>
<td>3.5</td>
<td>3.6</td>
<td>2.6</td>
<td>3</td>
<td>3.8</td>
</tr>
<tr>
<td>3) good rinsing</td>
<td>4</td>
<td>3.6</td>
<td>3.7</td>
<td>4.2</td>
<td>4</td>
<td>3.7</td>
</tr>
<tr>
<td>4) skin tightness</td>
<td>2.9</td>
<td>3.5</td>
<td>3.6</td>
<td>2.6</td>
<td>3</td>
<td>3.8</td>
</tr>
<tr>
<td>5) degree of irritation</td>
<td>4</td>
<td>4.5</td>
<td>4.5</td>
<td>4</td>
<td>4.5</td>
<td>4.8</td>
</tr>
</tbody>
</table>

(Notes) very good: 5, good: 4, moderate: 3, poor: 2, very poor: 1

As can be seen from Table 4, Example 3 containing
branched sulfoacetate, amphoteric surfactant and nonionic
surfactant exhibits an excellent foaming ability and soft
touch without skin tightness to provide the greatest use
effect.
[CLAIMS]

[Claim 1]

A liquid detergent composition for the body containing a branched sulfoacetate base represented by Chemical Formula 1 and amphoteric surfactant:

[Chemical Formula 1]

\[
\text{O} \\
\text{R}-(\text{OCH}_2\text{CH}_2)_n\text{O-C CH}_2\text{SO}_j\text{Na}
\]

In the above, \( R \) is branched hydrocarbon having a carbon number of 8 to 18, and \( n \) is an invariable of 1 to 5.

[Claim 2]

The liquid detergent composition for the body of claim 1, wherein the branched sulfoacetate base is contained in an amount of 5 to 20% by weight based on the total weight of the composition.

[Claim 3]

The liquid detergent composition for the body of claim 1, wherein the branched sulfoacetate base and amphoteric surfactant are contained in a ratio of 2.5:1 to 3.5:1.

[Claim 4]

The liquid detergent composition for the body of claim 1, wherein the total of the branched sulfoacetate
base and amphoteric surfactant is contained in an amount of more than 10% by weight based on the total weight of the composition.

[Claim 5]

The liquid detergent composition for the body of claim 1, wherein the composition has an excellent foaming ability.

[Claim 6]

The liquid detergent composition for the body of claim 1, wherein the composition further contains at least one nonionic surfactant.

[Claim 7]

The liquid detergent composition for the body of claim 6, wherein the composition has an excellent foaming ability and reduces a need for excessive cleaning to alleviate skin irritation.

[Claim 8]

Use as a liquid detergent for the body of the branched sulfoacetate base represented by Chemical Formula 1:

[Chemical Formula 1]
In the above, R is branched hydrocarbon having a carbon number of 8 to 18, and n is an invariable of 1 to 5.
**A. CLASSIFICATION OF SUBJECT MATTER**

*A61K 8/46(2006.01)1, A61Q 19/10(2006.01)1*

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 A61K 8/46, 7/48, 7/50, 8/72, C11D 1/02, A61Q 19/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal), PubMed, JPO, USPTO,

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<tr>
<th>Category</th>
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<td>A</td>
<td>US 5,683,683 A (ANTHONY A SCAFIDI) 4 November, 1997 See abstract, column 3-4 and 8-9</td>
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<td>A</td>
<td>US 4,807,649 A (ANTHONY B J EOGA) 28 February, 1989 See abstract, column 3 line 12- column 5 line 47, claim 1, 8 and 21</td>
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* Further documents are listed in the continuation of Box C

See patent family annex

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<th><strong>T</strong> later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</th>
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<td>document member of the same patent family</td>
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Date of the actual completion of the international search

31 DECEMBER 2007 (31 12 2007)

Date of mailing of the international search report

31 DECEMBER 2007 (31.12.2007)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No 82-42-472-7140

Authorized officer

PARK, Yeong Gwan

Telephone No 82-42-481-8407

Form PCT/ISA/210 (second sheet) (April 2007)
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<td>06.07.1999</td>
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