

[DESCRIPTION]

[TITLE OF INVENTION]

LIQUID DETERGENT COMPOSITION

[Technical Field]

5 [0001]

The present invention relates to a liquid detergent composition.

This application claims priority based on Japanese Patent Application No. 2018-060670 filed in Japan on March 27, 2018, the content of which is incorporated herein.

[Background Art]

10 [0002]

As a method of washing an object to be washed such as dishes and cooking utensils (hereinafter, generally referred to as a “dishes”), a method of directly applying a liquid detergent onto a washing tool such as a sponge and rubbing and washing an object to be washed with the washing tool, a method of diluting a dishwashing detergent with
15 water to prepare a diluted solution, applying the diluted solution to a washing tool such as a sponge, and rubbing and washing an object to be washed with the washing tool, and the like may be used.

[0003]

For example, Patent Literature 1 proposes a hard surface detergent composition
20 containing a specific acetal derivative, a surfactant, a builder, and water. According to the composition of Patent Literature 1, high detergency can be exhibited.

[Citation List]

[Patent Literature]

[0004]

25 [Patent Literature 1]

Japanese Unexamined Patent Application, First Publication No. H08-3590

[Summary of Invention]

[Technical Problem]

[0005]

5 However, in order to exhibit high detergency, it is necessary to rub an object to be washed using the liquid detergent of Patent Literature 1.

[0006]

 The present invention has been made in view of the above circumstances, and an object of the present invention is to provide a liquid detergent composition that exhibits
10 high detergency without applying heat or physical force.

[Solution to Problem]

[0007]

 A liquid detergent composition according to the present invention includes the following aspects.

15 [1] A liquid detergent composition including: (A) component; (B) component; and (C) component,

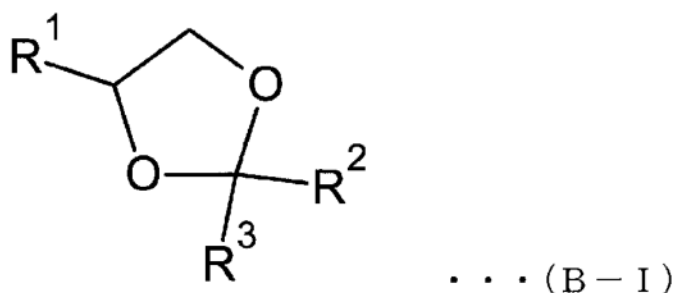
 in which the (A) component is an anionic surfactant,

 the (B) component is a compound represented by Formula (B-I),

 the (C) component is at least one selected from the group consisting of an
20 amphoteric surfactant and an amine oxide type surfactant, and

 a mass ratio represented by the (A) component/the (B) component is 0.06 to 45,

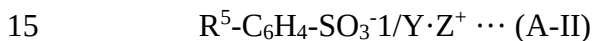
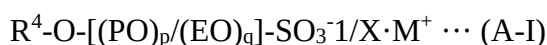
[0008]



[0009]

in Formula (B-I), R¹ represents a linear alkyl group having 1 to 14 carbon atoms, a branched alkyl group having 2 to 14 carbon atoms, a linear alkenyl group having 2 to 14 carbon atoms, a branched alkenyl group having 3 to 14 carbon atoms, a linear hydroxyalkyl group having 1 to 14 carbon atoms, a branched hydroxyalkyl group having 2 to 14 carbon atoms, or hydrogen, and R² and R³ each independently represent a linear alkyl group having 1 to 5 carbon atoms, a branched alkyl group having 2 to 5 carbon atoms, a linear alkenyl group having 2 to 5 carbon atoms, a branched alkenyl group having 3 to 5 carbon atoms, or hydrogen.

[2] The liquid detergent composition according to [1], in which the (A) component includes at least one selected from the group consisting of a compound (A1) represented by Formula (A-I) and a compound (A2) represented by Formula (A-II),



in Formula (A-I), R⁴ represents a linear or branched alkyl group having 8 to 18 carbon atoms; PO represents an oxypropylene group; EO represents an oxyethylene group; p represents an average number of repetitions of PO and satisfies $0 \leq p \leq 1$, q represents an average number of repetitions of EO and satisfies $0 \leq q \leq 5$; regarding [(PO)_p/(EO)_q], EO and PO may be added by random addition or block addition; M⁺ represents a counter ion; and X represents a valence of M⁺,

in Formula (A-II), R^5 represents a linear or branched alkyl group having 8 to 18 carbon atoms; Z^+ represents a counter ion; and Y represents a valence of Z^+ .

[3] The liquid detergent composition according to [1] or [2], in which the (B) component contains a compound (B1) represented by Formula (B-I) in which R^1 represents a linear hydroxyalkyl group having 1 to 14 carbon atoms or a branched hydroxyalkyl group having 2 to 14 carbon atoms; and R^2 and R^3 each independently represent a linear alkyl group having 1 to 5 carbon atoms or a branched alkyl group having 2 to 5 carbon atoms.

[4] The liquid detergent composition according to any one of [1] to [3], further including: a nonionic surfactant (D).

[5] The liquid detergent composition according to [4], in which the (D) component contains a compound (D1) represented by Formula (D-I),



in Formula (D-I), R^{11} represents a hydrocarbon group having 6 to 22 carbon atoms; X represents a divalent linking group; R^{12} represents a hydrogen atom, an alkyl group having 1 to 6 carbon atoms, or an alkenyl group having 2 to 6 carbon atoms; EO represents an oxyethylene group, PO represents an oxypropylene group, s represents an average number of repetitions of EO and is 3 to 100, t represents an average number of repetitions of PO and is 0 to 6, and regarding $[(EO)_s/(PO)_t]$, EO and PO may be added by random addition or block addition.

[6] The liquid detergent composition according to [4] or [5], in which a mass ratio represented by the (D) component/the (B) component is 3 to 105.

[7] The liquid detergent composition according to any one of [1] to [6], in which a content of the (A) component is preferably 0.5% to 30% by mass, more preferably 1% to 20% by mass, and even more preferably 3 to 10% by mass with respect to a total mass

of the liquid detergent composition.

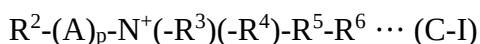
[8] The liquid detergent composition according to any one of [1] to [7], in which a content of the (B) component is preferably 0.2% to 8% by mass, more preferably 0.5% to 6% by mass, and even more preferably 1% to 4% by mass with respect to the total mass of the liquid detergent composition.

[9] The liquid detergent composition according to any one of [1] to [8], in which a content of the (C) component is preferably 0.05% to 5% by mass, more preferably 0.1% to 3% by mass, and even more preferably 0.2% to 1% by mass with respect to the total mass of the liquid detergent composition.

[10] The liquid detergent composition according to any one of [4] to [6], in which a content of the (D) component is preferably 0.02% to 0.5% by mass, more preferably 0.04% to 0.3% by mass, and even more preferably 0.06% to 0.2% by mass with respect to the total mass of the liquid detergent composition.

[11] The liquid detergent composition according to any one of [1] to [10], in which the (B) component is at least one selected from the group consisting of 2-isobutyl-2-methyl-1,3-dioxolane-4-methanol, 2,2-dimethyl-1,3-dioxolane-4-methanol, 1,3-dioxolane, and 2,2-dimethyl-1,3-dioxolane.

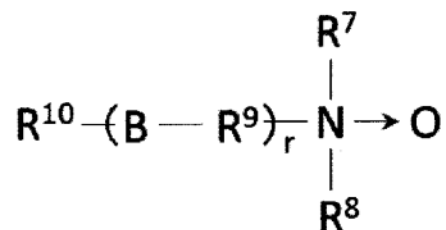
[12] The liquid detergent composition according to any one of [1] to [11], in which the (C) component is at least one selected from the group consisting of a compound represented by Formula (C-I) and a compound represented by Formula (C-II),



in Formula (C-I), R^2 represents a linear or branched alkyl group having 8 to 18 carbon atoms, and R^3 and R^4 each independently represent an alkyl group having 1 to 3 carbon atoms or a hydroxyalkyl group, A represents $-C(=O)-NH-X-$, X represents an alkylene group having 1 to 4 carbon atoms, p is 0 or 1, R^5 represents an alkylene group

having 1 to 2 carbon atoms, and R^6 represents $-\text{CO}_2^-$ or $-\text{SO}_3^-$,

[0010]



• • • (C-I I)

[0011]

- 5 in Formula (C-II), R^{10} represents a linear alkyl group having 8 to 18 carbon atoms, a branched alkyl group having 8 to 18 carbon atoms, a linear alkenyl group having 8 to 18 carbon atoms, or a branched alkenyl group having 8 to 18 carbon atoms, R^7 and R^8 each independently represent an alkyl group having 1 to 3 carbon atoms or a hydroxyalkyl group having 1 to 3 carbon atoms, R^9 represents an alkylene group having 1 to 4 carbon atoms, B represents $-\text{CONH}-$, $-\text{NHCO}-$, $-\text{COO}-$, $-\text{OCO}-$ or $-\text{O}-$, and r is 0 or 1.
- 10

[13] The liquid detergent composition according to any one of [1] to [12], in which pH at 25°C is preferably 6 to 12.5, more preferably 8 to 12.5, and even more preferably 10 to 12.5.

- 15 [14] The liquid detergent composition according to any one of [1] to [13], further including: water.

- [15] The liquid detergent composition according to [14], in which a content of the water is preferably 50% to 95% by mass, more preferably 60% to 93% by mass, and even more preferably 70% to 90% by mass with respect to the total mass of the liquid
- 20 detergent composition.

[16] A liquid detergent composition product including: the liquid detergent composition according to any one of [1] to [15]; and a container,

in which the liquid detergent composition is contained in the container.

[17] The liquid detergent composition product according to [16], in which the container is a trigger type spray container or a squeeze type spray container.

[Advantageous Effects of Invention]

[0012]

The liquid detergent composition according to the present invention can exhibit high detergency without applying heat or physical force.

[Brief Description of Drawings]

[0013]

Fig. 1 is a front view showing an example of a liquid detergent composition product according to the present invention.

Fig. 2 is a front view showing another example of a liquid detergent composition product according to the present invention.

[Description of Embodiments]

[0014]

<<Liquid Detergent Composition>>

A liquid detergent composition according to the present invention contains (A) component, (B) component, and (C) component.

[0015]

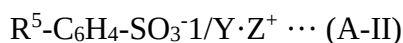
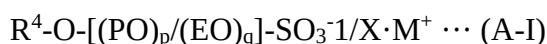
<(A) Component>

The (A) component is an anionic surfactant. Specific examples thereof include linear alkyl benzene sulfonates, α -sulfofatty acid ester salts, α -olefin sulfonates; linear or branched alkyl sulfates; linear or branched alkyl ether sulfates or alkenyl ether sulfates;

and linear or branched alkane sulfonates. Examples of salts thereof include salts of alkali metals such as sodium and potassium, salts of alkaline earth metals such as magnesium, and salts of alkanolamines such as monoethanolamine and diethanolamine.

[0016]

- 5 It is preferable that the (A) component contains at least one selected from the group consisting of a compound (A1) represented by Formula (A-I) and a compound (A2) represented by Formula (A-II).



- 10 In Formula (A-I), R^4 represents a linear or branched alkyl group having 8 to 18 carbon atoms; PO represents an oxypropylene group; EO represents an oxyethylene group; p represents an average number of repetitions of PO and satisfies $0 \leq p \leq 1$, q represents an average number of repetitions of EO and satisfies $0 \leq q \leq 5$; regarding $[(PO)_p/(EO)_q]$, EO and PO may be added by random addition or block addition; M^{+} represents a counter ion; and X represents a valence of M^{+} .
- 15

In Formula (A-II), R^5 represents a linear or branched alkyl group having 8 to 18 carbon atoms; Z^{+} represents a counter ion; and Y represents a valence of Z^{+} .

[0017]

- In Formula (A-I), R^4 represents a linear or branched alkyl group having 8 to 18 carbon atoms, preferably 10 to 16 carbon atoms, and more preferably 12 to 14 carbon atoms. From the viewpoint of detergency and environment, R^4 preferably represents an alkyl group derived from a vegetable oil and fat raw material. Examples of suitable oil and fat raw materials include palm kernel oil and coconut oil.
- 20

- p represents the average number of repetitions of PO, satisfies $0 \leq p \leq 1$, and p = 0 is more preferable.
- 25

q represents the average number of repetitions of EO and satisfies $0 \leq q \leq 5$, preferably $0 \leq q \leq 4$, and more preferably $0 \leq q \leq 2$.

M^+ represents a counter ion. For example, the counter ion is an ion of an alkali metal, an alkaline earth metal, ammonium or alkanolamine and may be a counter ion capable of forming a water soluble salt. Examples of the alkali metal include sodium and potassium. Examples of the alkaline earth metal include calcium, magnesium, and zinc. Examples of the alkanolamine include monoethanolamine, diethanolamine, and triethanolamine.

X represents a valence of M^+ and is preferably 1 or 2.

10 [0018]

In Formula (A-II), R^5 is a linear or branched alkyl group having 8 to 18 carbon atoms, and preferably 10 to 14 carbon atoms.

Z^+ represents a counter ion, and examples thereof are the same as those described for M^+ .

15 Y represents a valence of Z^+ and is preferably 1 or 2.

[0019]

Specific examples of the (A) component include linear alkyl (C10-C14) benzene sulfonic acid sodium salts, polyoxyethylene (1) linear alkyl (C12) sulfuric acid ester sodium salts, polyoxyethylene (2) linear alkyl (C12) sulfuric acid ester sodium salts, 20 polyoxyethylene (3) linear alkyl (C12) sulfuric acid ester sodium salts, polyoxypropylene (0.4) polyoxyethylene (1.5) linear alkyl (C12) sulfuric acid ester sodium salts, polyoxyethylene (1) linear alkyl (C12/C14 = 75/25; derived from natural oil and fat) sulfuric acid ester sodium salts, polyoxyethylene (2) linear alkyl (C12/C14 = 75/25; derived from natural oil and fat) sulfuric acid ester sodium salts, polyoxyethylene (3) 25 linear alkyl (C12/C14 = 75/25; derived from natural oil and fat) sulfuric acid ester

sodium salts, and polyoxypropylene (0.4) polyoxyethylene (1.5) linear alkyl (C12/C14 = 75/25; derived from natural oil and fat) sulfuric acid ester sodium salts.

[0020]

Among these, from the viewpoint of particularly easily obtaining the effect of
 5 the present invention, linear alkyl (C10-C14) benzene sulfonic acid sodium salts, polyoxyethylene (1) linear alkyl (C12/C14 = 75/25; derived from natural oil and fat) sulfuric acid ester sodium salts, polyoxyethylene (2) linear alkyl (C12/C14 = 75/25; derived from natural oil and fat) sulfuric acid ester sodium salts, polyoxyethylene (3) linear alkyl (C12/C14 = 75/25; derived from natural oil and fat) sulfuric acid ester
 10 sodium salts, and alkyl (C12) sulfuric acid ester sodium salts are preferable.

Here, for example, “polyoxyethylene (1)” means that the average number of repetitions of oxyethylene groups is 1 (the average number of added moles of ethylene oxide is 1).

“C12/C14 = 75/25; derived from natural oil and fat” means a mixture of one
 15 having a linear alkyl group having 12 carbon atoms and one having a linear alkyl group having 14 carbon atoms (mixing ratio: 75/25 (mass ratio)) and a linear alkyl group derived from natural oil and fat.

[0021]

The (A) component may be used alone or two or more types may be used in
 20 combination.

The content of the (A) component is preferably 0.5% to 30% by mass, more preferably 1% to 20% by mass, and even more preferably 3 to 10 with respect to the total mass of the liquid detergent composition.

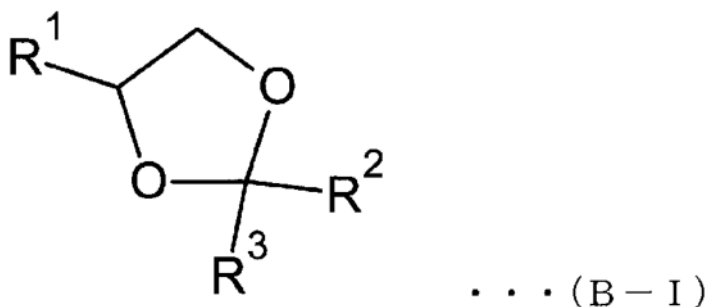
When the content of the (A) component is within the above range, the
 25 penetrability against dirt can be easily improved and the usability can be easily improved.

[0022]

<(B) Component>

The (B) component is a compound represented by Formula (B-I).

[0023]



5

[0024]

In Formula (B-I), R¹ represents a linear alkyl group having 1 to 14 carbon atoms, a branched alkyl group having 2 to 14 carbon atoms, a linear alkenyl group having 2 to 14 carbon atoms, a branched alkenyl group having 3 to 14 carbon atoms, a linear hydroxyalkyl group having 1 to 14 carbon atoms, a branched hydroxyalkyl group having 2 to 14 carbon atoms, or hydrogen, and R² and R³ each independently represent a linear alkyl group having 1 to 5 carbon atoms, a branched alkyl group having 2 to 5 carbon atoms, a linear alkenyl group having 2 to 5 carbon atoms, a branched alkenyl group having 3 to 5 carbon atoms, or hydrogen.

15 [0025]

It is preferable that the (B) component contains a compound (B1) represented by Formula (B-I) in which R¹ represents a linear hydroxyalkyl group having 1 to 14 carbon atoms or a branched hydroxyalkyl group having 2 to 14 carbon atoms; R² and R³ each independently represent a linear alkyl group having 1 to 5 carbon atoms or a branched alkyl group having 2 to 5 carbon atoms.

20

[0026]

Specific examples of the (B) component include 1,3-dioxolane, 2-methyl-1,3-dioxolane, 2,2-dimethyl-1,3-dioxolane, 2,2-dimethyl-1,3-dioxolane-4-methanol, 2-isobutyl-2-methyl-1,3-dioxolane-4-methanol, 2,2-dimethyl-1,3-dioxolane-4-ethanol, 2,2-dimethyl-1,3-dioxolane-4-propanol, 2,2-dimethyl-1,3-dioxolane-4-butanol, 2,2-dimethyl-1,3-dioxolane-4-pentanol, 2,2-dimethyl-1,3-dioxolane-4-hexanol, 2,2-dimethyl-1,3-dioxolane-4-heptanol, 2-isobutyl-2-methyl-1,3-dioxolane-4-propanol, 2-isobutyl-2-methyl-1,3-dioxolane-4-butanol, 2-isobutyl-2-methyl-1,3-dioxolane-4-pentanol, 2-isobutyl-2-methyl-1,3-dioxolane-4-hexanol, and 2-isobutyl-2-methyl-1,3-dioxolane-4-heptanol.

Among these, from the viewpoint of easily obtaining effect of the present invention, 2-isobutyl-2-methyl-1,3-dioxolane-4-methanol and 2,2-dimethyl-1,3-dioxolane-4-methanol are preferable.

[0027]

The (B) component may be used alone or two or more types may be used in combination.

The content of the (B) component is preferably 0.2% to 8% by mass, more preferably 0.5% to 6% by mass, and even more preferably 1% to 4% by mass with respect to the total mass of the liquid detergent composition.

When the content of the (B) component is within the above range, the penetrability against dirt can be easily improved.

[0028]

The mass ratio (hereinafter, also referred to as "A/B ratio") represented by the (A) component/the (B) component is 0.06 to 45, preferably 0.4 to 16, and more preferably 1 to 7.5.

When the A/B ratio is within the above range, the penetration detergency against dirt is easily improved.

[0029]

<(C) Component>

5 The (C) component is at least one selected from the group consisting of an amphoteric surfactant and an amine oxide type surfactant.

As the amphoteric surfactant, a betaine type surfactant may be used and examples thereof include alkyl dimethylamino acetic acid betaine, fatty acid amidopropyl dimethyl amino acetic acid betaine, alkyl hydroxy sulfobetaine, and fatty acid
10 amidohydroxy sulfobetaine.

Among these, a betaine type amphoteric surfactant having a fatty acid amide group and selected from the group consisting of fatty acid (having 8 or more and 22 or less carbon atoms) amidopropyl dimethyl amino acetic acid betaine and fatty acid (having 8 or more and 22 or less carbon atoms) amidopropyl hydroxy sulfobetaine is
15 preferable.

As the fatty acid (having 8 or more and 22 or less carbon atoms) amidopropyl dimethyl amino acetic acid betaine, lauric acid amidopropyl dimethyl amino acetic acid betaine, and coconut oil fatty acid amidopropyl dimethyl amino acetic acid betaine are more preferable.

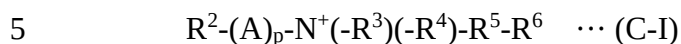
20 The (C) component is preferably a betaine type amphoteric surfactant having an alkyl group having preferably 8 to 22 carbon atoms, more preferably 10 to 18 carbon atoms, and even more preferably 12 to 16 carbon atoms.

Specific examples thereof include lauric acid amidopropyl dimethyl amino acetic acid betaine (ENAGICOL L-30B, manufactured by Lion Corporation), and
25 coconut oil fatty acid amidopropyl dimethyl amino acetic acid betaine (Tego Betain L7,

manufactured by Evonik Industries AG).

[0030]

As the amphoteric surfactant, it is preferable to use a compound represented by Formula (C-I).

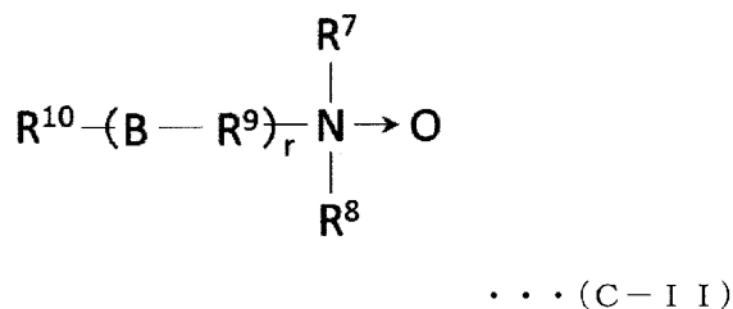


In Formula (C-I), R^2 represents a linear or branched alkyl group having 8 to 18 carbon atoms, and R^3 and R^4 each independently represent an alkyl group having 1 to 3 carbon atoms or a hydroxyalkyl group, A represents $-C(=O)-NH-X-$, X represents an alkylene group having 1 to 4 carbon atoms, p is 0 or 1, R^5 represents an alkylene group
 10 having 1 to 2 carbon atoms, and R^6 represents $-CO_2^-$ or $-SO_3^-$.

[0031]

Examples of the amine oxide type surfactant include alkyl amine oxide and alkyl amido propyl dimethyl amine oxide. Among these, a compound represented by Formula (C-II) is preferable.

15 [0032]



[0033]

In Formula (C-II), R^{10} represents a linear alkyl group having 8 to 18 carbon atoms, a branched alkyl group having 8 to 18 carbon atoms, a linear alkenyl group having
 20 8 to 18 carbon atoms, or a branched alkenyl group having 8 to 18 carbon atoms, R^7 and

R^8 each independently represent an alkyl group having 1 to 3 carbon atoms or a hydroxyalkyl group having 1 to 3 carbon atoms; R^9 represents an alkylene group having 1 to 4 carbon atoms, B represents -CONH-, -NHCO-, -COO-, -OCO- or -O-, and r is 0 or 1.

5 [0034]

The number of carbon atoms in the alkyl group or alkenyl group in R^{10} is 8 to 18 and preferably 10 to 14.

R^7 and R^8 each independently represent an alkyl group having 1 to 3 carbon atoms or a hydroxyalkyl group having 1 to 3 carbon atoms, preferably an alkyl group having 1 to 3 carbon atoms, and more preferably a methyl group. It is more preferable that both R^7 and R^8 represent a methyl group.

r is 0 or 1, and preferably 0.

[0035]

Specific examples of the amine oxide type surfactant include alkyl dimethyl amine oxide-based surfactants such as lauryl dimethyl amine oxide, coconut alkyl dimethyl amine oxide, lauryl diethyl amine oxide, and n-dodecyl dimethyl amine oxide; and alkanoyl amido alkyl dimethyl amine oxide-based surfactants such as lauric acid amido propyl amine oxide. Among these, alkyl dimethyl amine oxide-based surfactants are more preferable.

20 [0036]

The (C) component may be used alone or two or more types may be used in combination.

The content of the (C) component is preferably 0.05% to 5% by mass, more preferably 0.1% to 3% by mass, and even more preferably 0.2% to 1% by mass with respect to the total mass of the liquid detergent composition.

When the content of the (C) component is within the above range, the penetration detergency against dirt can be easily improved.

[0037]

<(D) Component>

5 The (D) component is a nonionic surfactant.

Examples of the (D) component include polyoxyalkylene type nonionic surfactants, alkylene oxide adducts of alkylphenols, higher amines, and the like, polyoxyethylene polyoxypropylene block copolymers, fatty acid alkanolamines, fatty acid alkanolamides, polyhydric alcohol fatty acid esters or alkylene oxide adducts thereof, polyhydric alcohol fatty acid ethers, alkyl (or alkenyl) amine oxides, alkylene oxide adducts of hydrogenated castor oil, sugar fatty acid esters such as sorbitan fatty acid esters, N-alkyl polyhydroxy fatty acid amides, and alkyl glycosides. The term “higher amine” means a primary to tertiary amine having 6 to 22 carbon atoms.

[0038]

15 Among these, the (D) component is preferably a polyoxyalkylene type nonionic surfactant from the viewpoint of viscosity and liquid stability.

Examples of the polyoxyalkylene type nonionic surfactant include a compound represented by Formula (D-I) (hereinafter, sometimes referred to as a “compound (D1)”).



20 [0039]

In Formula (D-I), R^{11} represents a hydrocarbon group having 6 to 22 carbon atoms, X represents a divalent linking group, R^{12} represents a hydrogen atom, an alkyl group having 1 to 6 carbon atoms, or an alkenyl group having 2 to 6 carbon atoms, EO represents an oxyethylene group, PO represents an oxypropylene group, s represents an average number of repetitions of EO and is 3 to 100, and t represents an average number

of repetitions of PO and is 0 to 6.

[0040]

In Formula (D-I), the number of carbon atoms in the hydrocarbon group represented by R^{11} is 6 to 22, preferably 8 to 22, and more preferably 10 to 18. The hydrocarbon group in R^{11} may be linear or branched, and may have or may not have an unsaturated bond.

Examples of -X- include -O-, -COO-, and -CONH-.

The number of carbon atoms of the alkyl group in R^{12} is 1 to 6 and preferably 1 to 3.

The number of carbon atoms of the alkenyl group in R^{12} is 2 to 6 and preferably 2 to 3.

[0041]

The compound (D1) in which -X- represents -O-, -COO- or -CONH- is obtained using a primary or secondary higher alcohol (R^{11} -OH), higher fatty acid (R^{11} -COOH) or higher fatty acid amide (R^{11} -CONH) as a raw material. R^{11} in these raw materials is the same as R^{11} in Formula (D-I).

[0042]

s is 3 to 100, which represents the average number of repetitions of EO (that is, the average number of added moles of ethylene oxide), and preferably 5 to 50. When s is equal to or less than the upper limit value, the HLB value does not become excessively high, and the detergency against oil dirt is easily improved. When s is equal to or larger than the lower limit value, the deterioration of the raw material odor of the (D) component itself can be easily prevented.

t is 0 to 6, which represents the average number of repetitions of PO (that is, the average number of added moles of propylene oxide), and preferably 0 to 3. When t is

larger than the upper limit value, the liquid stability of the detergent composition at high temperature tends to decrease.

[0043]

In a case where t is 1 or more, that is, in a case where the compound (D1) has
5 EO and PO, the addition method of ethylene oxide and propylene oxide is not particularly limited, and may be, for example, a random addition method or a block addition method. Examples of the block addition method include a method of adding ethylene oxide and then adding propylene oxide, a method of adding propylene oxide and then adding ethylene oxide, and a method of adding ethylene oxide, then adding
10 propylene oxide, and further adding ethylene oxide.

[0044]

As the compound (D1), particularly, a compound in which -X- represents -O- (alcohol type nonionic surfactant), or -X- represents -COO-, and R¹² is an alkyl group having 1 to 6 carbon atoms or an alkenyl group having 2 to 6 carbon atoms (fatty acid
15 alkyl (alkenyl) ester) is preferable.

[0045]

In a case where -X- represents -O-, the number of carbon atoms of R¹¹ is preferably 10 to 22, more preferably 10 to 20, and even more preferably 10 to 18. In a case where -X- represents -O-, R¹² preferably represents a hydrogen atom.

20 [0046]

In a case where -X- represents -COO-, the number of carbon atoms of R¹¹ is preferably 9 to 21 and more preferably 11 to 21. In a case where -X- represents -COO-, R¹² preferably represents an alkyl group having 1 to 6 carbon atoms or an alkenyl group having 2 to 6 carbon atoms, and more preferably an alkyl group having 1 to 3 carbon
25 atoms.

[0047]

Examples of the compound (D1) in which -X- represents -O- or -COO- include a compound obtained by adding 12 molar equivalents or 15 molar equivalents of ethylene oxide to an alcohol such as Diadol (trade name, C13 (C represents the number of carbon atoms; the same shall apply hereinafter)) manufactured by Mitsubishi Chemical Corporation, Neodol (trade name, a mixture of C12 and C13) manufactured by Shell Chemical Company, Safol 23 (trade name, a mixture of C12 and C13) manufactured by Sasol Ltd., or the like; a compound obtained by adding 12 molar equivalents or 15 molar equivalents of ethylene oxide to a natural alcohol such as CO-1214 or CO-1270 (trade name) manufactured by Procter & Gamble; a compound obtained by adding 7 molar equivalents of ethylene oxide to a C13 alcohol obtained by subjecting a C12 alkene obtained by trimerizing butene to an oxo method (trade name: Lutensol TO7, manufactured by BASF SE); a compound obtained by adding 9 molar equivalents of ethylene oxide to a C10 alcohol obtained by subjecting pentanol to the Gerbet reaction (trade name: Lutensol XP90, manufactured by BASF SE); a compound obtained by adding 7 molar equivalents of ethylene oxide to a C10 alcohol obtained by subjecting pentanol to the Guerbet reaction (trade name: Lutensol XL70, manufactured by BASF SE); a compound obtained by adding 6 molar equivalents of ethylene oxide to a C10 alcohol obtained by subjecting pentanol to the Guerbet reaction (trade name: Lutensol XA60, manufactured by BASF SE); a compound obtained by adding 5 molar equivalents, 7 molar equivalents, 9 molar equivalents, or 15 molar equivalents of ethylene oxide to a secondary alcohol having 12 to 14 carbon atoms (trade name: SOFTANOL 50, SOFTANOL 70, SOFTANOL 90, and SOFTANOL 150, manufactured by Nippon Shokubai Co., Ltd.); and a compound obtained by adding 15 molar equivalents of ethylene oxide to coconut fatty acid methyl (lauric acid/myristic acid =

8/2) using an alkoxylation catalyst (polyoxyethylene coconut fatty acid methyl ester (EO 15 mol adduct)).

[0048]

5 The (D) component may be used alone or two or more types may be used in combination.

In a case where the liquid detergent composition of the present invention contains the (D) component, the content of the (D) component is preferably 0.02% to 0.5% by mass, more preferably 0.04% to 0.3% by mass, and even more preferably 0.06% to 0.2% by mass with respect to the total mass of the liquid detergent composition.

10 When the content of the (D) component is within the above range, sufficient penetration detergency can be easily obtained only by contact with dirt for a short period of time.

[0049]

15 In a case where the liquid detergent composition of the present invention contains the (D) component, the mass ratio represented by the (D) component/the (B) component (hereinafter, also referred to as "D/B ratio") is preferably 3 to 105, more preferably 5.5 to 52, and even more preferably 9 to 34.

When the D/B ratio is within the above range, sufficient penetration detergency can be easily obtained only by contact with dirt for a short period of time.

20 In the liquid detergent composition of the present invention, the total of the (A) to (C) components does not exceed 100% by mass with respect to the total mass of the liquid detergent composition.

[0050]

<Other Components>

25 The liquid detergent composition of the present invention may contain optional

components other than the (A) to (D) components. The types and amounts of the optional components are not particularly limited as long as the components do not impair the gist of the present invention, and the mixing components in known liquid detergents can be applied. Examples of such optional components include a thickening polymer, a liquid stabilizer, a pH adjusting agent, and water.

[0051]

Examples of the thickening polymer include cellulose-based polymers, polycarboxylic acid-based polymers, polyacrylic acid-based polymers, polyamine-based polymers, polyalkyleneimine-based polymers, and starch-based polymers. Among these, from the viewpoint of usability, a cellulose-based polymer is preferable, and a carboxymethylcellulose-based polymer is more preferable.

[0052]

Examples of the liquid stabilizer include citric acid, ethylenediaminetetraacetic acid, nitrilotriacetic acid, gluconic acid, ascorbic acid, methylglycinediacetic acid, iminodisuccinic acid, and glutamic acid diacetic acid. The compound may be used in the form of salt, and in this case, the type of counter ion includes alkali metals such as sodium, alkaline earth metals such as magnesium, and transition metals such as zinc. Among these, citric acid or a salt thereof is preferable from the viewpoint of liquid stability, and in the case of the salt form, one in which the counter ion is sodium is more preferable.

[0053]

Examples of the pH adjusting agent include sodium hydroxide, hydrochloric acid, sulfuric acid, sodium hydroxide, potassium hydroxide, monoethanolamine, diethanolamine, triethanolamine, and ammonia.

[0054]

The content of water is preferably 50% to 95% by mass, more preferably 60% to 93% by mass, and even more preferably 70% to 90% by mass with respect to the total mass of the liquid detergent composition.

In the liquid detergent composition of the present invention, the total content of the (A) to (D) components, the thickening polymer, the liquid stabilizer, the pH adjusting agent, and the water does not exceed 100% by mass with respect to the total mass of the liquid detergent composition.

[0055]

The pH of the liquid detergent composition of the present invention at 25°C is preferably 6 or higher, more preferably 8 or higher, and even more preferably 10 or higher. When the pH is within the above range, the liquid stability is maintained and the penetration detergency against dirt is easily improved.

In addition, from the viewpoint of safety, the pH is preferably 12.5 or lower. Specifically, the pH of the liquid detergent composition of the present invention at 25°C is preferably 6 to 12.5, more preferably 8 to 12.5, and even more preferably 10 to 12.5.

In the present invention, the pH (25°C) of the liquid detergent composition indicates a value measured by a method according to the “methods for determination of pH” in JIS Z 8802:1984.

[0056]

The viscosity of the liquid detergent composition of the present invention is preferably 500 to 10000 mPa·s, and more preferably 1000 to 5000 mPa·s.

When the viscosity is within the above range, the liquid detergent composition is easily discharged using a discharge container, and the usability is easily improved.

The viscosity is a value obtained by measuring the liquid detergent composition at 25°C with a B-type viscometer. The conditions for measuring the viscosity are as

follows.

Measurement conditions:

[Rotor]

The rotor number and the number of rotation of the rotor corresponding to the
5 viscosity of an object to be measured are as follows.

· Viscosity is less than 500 mPa·s: rotor No. 2, number of rotation: 60 rpm.

· Viscosity is 500 mPa·s or more and less than 2000 mPa·s: rotor No. 3, number
of rotation: 60 rpm.

· Viscosity is 2000 mPa·s or more and less than 10000 mPa·s: rotor No. 4,
10 number of rotation: 60 rpm.

· Viscosity is 10000 mPa·s or more and less than 50000 mPa·s: rotor No. 4,
number of rotation: 12 rpm.

[Reading of Numeric Value]

60 seconds after the rotor starts to rotate.

15 [0057]

<<Production Method>>

A method of producing the liquid detergent composition of the present invention
is not particularly limited. For example, the liquid detergent composition is produced
by mixing the (A) to (C) components, water as a solvent, and the (D) component and an
20 optional component as necessary.

[0058]

<<Method of Use>>

As a method of using the liquid detergent composition of the present invention,
a method in which the liquid detergent composition or a diluted solution of the liquid
25 detergent composition is contained in a discharge container, and an appropriate amount

of the liquid detergent composition is attached to an object to be washed from the discharge container and then rinsed with water after leaving the composition to stand still for a certain period of time (washing without rubbing), a method in which the liquid detergent composition or a diluted solution of the liquid detergent composition is applied to a washing tool such as a sponge, and an object is rubbed with the washing tool and rinsed with water (washing with rubbing), and the like may be used. Particularly, the liquid detergent composition can be preferably used for washing without rubbing.

In a case of washing without rubbing, the time for leaving the liquid detergent composition of the present invention to stand still after attaching the liquid detergent composition of the present invention to an object to be washed is preferably 15 to 60 seconds, and more preferably 30 to 60 seconds. When the standing time is within the above range, the penetration detergency against dirt can be more easily improved.

The use of the liquid detergent composition of the present invention is not particularly limited. For example, the liquid detergent composition may be used for washing textiles, washing dishes, washing bathrooms, washing toilets, and the like. Among these, the liquid detergent composition is preferably used for washing dishes.

[0059]

<<Liquid Detergent Composition Product>>

A liquid detergent composition product according to the present invention has the liquid detergent composition of the present invention and a container, and the liquid detergent composition is contained in the container.

Fig. 1 is a front view showing an example of a liquid detergent composition product of the present invention. A liquid detergent composition product 1 in Fig. 1 is a trigger type spray container including a container body 100 that contains the liquid detergent composition 10, and a support body 110.

A pipe 108 extends from the support body 110 into the container body 100, and a tip end portion of the pipe 108 penetrates into the liquid detergent composition 10. An operating lever 120 is incorporated in the support body 110. A cap 120 that is openable and closable is provided at the tip end of the support body 110.

5 [0060]

For example, in a case where the liquid detergent composition product 1 is used for washing without rubbing, the cap 120 is opened and the tip end of the support body 110 is directed toward an object to be washed. When the operating lever 120 is pushed to the pipe 108 side, the liquid detergent composition 10 is sucked up through the pipe
10 108 and discharged from the tip end of the support body 110. The liquid detergent composition 10 to be discharged is attached to the object to be washed. The object to be washed to which the liquid detergent composition 10 is attached is left to stand still for a certain period of time and then rinsed with water, and thus washing can be performed without rubbing.

15 The liquid detergent composition 10 to be discharged is preferably foamy. The foamy liquid detergent composition is easily attached to dirt on the object to be washed, and thus the usability and penetration detergency are easily improved.

[0061]

The light transmittance of at least a part of the container body 100 is preferably
20 10% or more. Thus, the amount of the remaining liquid detergent composition 10 can be visually recognized from the outside. In the specification, the light transmittance is a value in a wavelength range of 200 to 700 nm, and the transmission spectrum and the transmittance can be measured using a U-3310 type spectrophotometer (a device with a 60 mm Φ integrating sphere) manufactured by Hitachi Ltd.

25 [0062]

The container body 100 is preferably a plastic container.

As the constituent material of the plastic container, polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polycyclohexylene dimethylene terephthalate (PCT), polyacetal (POM), polyethylene naphthalate (PEN), polystyrene (PS), acrylonitrile-butadiene-styrene resin (ABS), cellulose propionate (CP), polyarylate, polycarbonate, acrylonitrile-styrene copolymer resin (AS), and the like may be used.

[0063]

Fig. 2 is a front view showing another example of a liquid detergent composition product according to the present invention. A liquid detergent composition product 2 in Fig. 2 is a squeeze type spray container including a container body 100a that contains a liquid detergent composition 10a and a cap 140.

[0064]

For example, in a case where the liquid detergent composition product 2 is used for washing without rubbing, the cap 140 is removed and a tip end of the container body 100a is directed toward an object to be washed. A side surface of the container body 100a is pushed inward, and the liquid detergent composition 10a is discharged from the tip end of the container body 100a. The discharged liquid detergent composition 10a is attached to the object to be washed. The object to be washed to which the liquid detergent composition 10a is attached is left to stand still for a certain period of time and then rinsed with water, and thus washing can be performed without rubbing.

The liquid detergent composition 10a to be discharged is preferably foamy. The foamy liquid detergent composition is easily attached to dirt on the object to be washed, and thus the usability and penetration detergency are easily improved.

[0065]

The light transmittance of at least a part of the container body 100a is preferably 10% or more. Thus, the amount of the remaining liquid detergent composition 10a can be visually recognized from the outside.

The container body 100a is preferably a flexible container. The term “flexible” means that the container is flexibly deformed without being damaged when the pressure inside the container is changed.

As the flexible container, a plastic container is preferable.

Examples of the constituent material of the plastic container are the same as those described for the container body 100.

10 [Examples]

[0066]

Hereinafter, the present invention will be described in more detail with reference to examples, but the present invention is not limited to these examples.

[0067]

15 The unit of the mixing amount in the tables is “% by mass”, and the amount of each of all components represents the amount in terms of pure content.

The blank column in the tables indicates that the component is not mixed.

The term “balance” means that water is mixed such that the total mixing amount (% by mass) of all mixing components contained in the composition of each example is 20 100% by mass.

The components shown in the tables will be described below.

[0068]

<(A) Component>

· A-1: sodium linear alkylbenzene sulfonate (number of carbon atoms in the 25 alkyl group: 10 to 14, purity: 50%), a compound represented by Formula (A-II) in which

R⁵ represents an alkyl group having 10 to 14 carbon atoms, Y represents 1, and Z⁺ represents a sodium ion (LIPON LS-250, manufactured by Lion Specialty Chemicals Co., Ltd.).

· A-2: sodium lauryl sulfate (purity: 33%) (SANNOL LM-1130, manufactured by Lion Specialty Chemicals Co., Ltd.), a compound represented by Formula (A-I) in which R⁴ represents a dodecyl group, p represents 0, q represents 0, X represents 1, and M⁺ represents a sodium ion.

· A-3: sodium polyoxyethylene alkyl ether sulfate (number of carbon atoms in the alkyl group: 12 and 14 with a ratio: 12:14 = 75:25, derived from natural alcohol, average number of added moles of EO: 2, purity: 70%) (SINOLIN SPE-1250, manufactured by Shin Nippon Chemical Co., Ltd.), a compound represented by Formula (A-I) in which R⁴ represents an alkyl group having 12 to 14 carbon atoms, p represents 0, q represents 2, X represents 1, and M⁺ represents a sodium ion.

[0069]

<(B) Component>

· B-1: 2-isobutyl-2-methyl-1,3-dioxolane-4-methanol (Augeo Clean Plus, manufactured by Rhodia Poliamida e Especialidades Ltda, purity: 99.5%), a compound represented by Formula (B-I) in which R¹ represents a hydroxymethyl group, R² represents an isobutyl group, and R³ represents a methyl group.

· B-2: 2,2-dimethyl-1,3-dioxolane-4-methanol (Augeo Clean Multi, manufactured by Rhodia Poliamida e Especialidades Ltda, purity: 99.5%), a compound represented by Formula (B-I) in which R¹ represents a hydroxymethyl group, R² represents a methyl group, and R³ represents a methyl group.

· B-3: 1,3-dioxolane (manufactured by Kanto Chemical Co., Inc., purity: 98%), a compound represented by Formula (B-I) in which R¹ represents hydrogen, R²

represents hydrogen, and R^3 represents hydrogen.

· B-4: 2,2-dimethyl-1,3-dioxolane (manufactured by Kanto Kagaku Co., purity: 98%), a compound represented by Formula (B-I) in which R^1 represents hydrogen, R^2 represents a methyl group, and R^3 represents a methyl group.

5 [0070]

<(C) Component>

· C-1: coconut oil alkyl dimethyl amine oxide (CATINAL AOC, manufactured by Toho Chemical Industry, purity: 30%), a compound represented by Formula (C-II) in which R^6 represents an alkyl group having 12 to 16 carbon atoms, r represents 0, R^7 represents a methyl group, and R^8 represents a methyl group.

· C-2: lauryl dimethyl amine oxide (CADENAX DM12D-W(C), manufactured by Lion Specialty Chemicals Co., Ltd., purity: 33%), a compound represented by Formula (C-II) in which R^6 represents a dodecyl group, r represents 0, R^7 represents a methyl group, and R^8 represents a methyl group.

15 · C-3: coconut oil fatty acid amido propyl dimethyl amino acetic acid betaine (Tego Betain L7, manufactured by Evonic Industries AG, purity: 30%), a compound represented by Formula (C-I) in which R^2 represents an alkyl group having 11 to 15 carbon atoms, A represents $-C(=O)(-NH-X)-$, X represents $-(CH_2)_3-$, R^3 represents a methyl group, R^4 represents a methyl group, R^5 represents $-CH_2-$, and R^6 represents $-CO_2-$.

20 [0071]

<(D) Component>

· D-1: polyoxyethylene-polyoxypropylene copolymerized alkyl ether (number of carbon atoms in the alkyl group: 6 to 16, Ecosurf SA-7, manufactured by Dow Chemical Company, purity: 96%).

25 · D-2: alkyl polyglycoside (Glucopon 650 EC, manufactured by BASF SE,

number of carbon atoms in the alkyl group: 12 to 14, purity: 51.5%).

· D-3: coconut oil fatty acid diethanolamide (AMIZOL CDE-G, manufactured by Kawaken Fine Chemicals Co., Ltd.).

· D-4: 2-ethylhexyl glyceryl ether (NIKKOGUARD 88, manufactured by
5 Nippon Surfactant Industries Co., Ltd.).

· D-5: MGA, N-methyl coconut oil fatty acid glucamide (Glucopure DEG, manufactured by Clariant, purity: 63%).

[0072]

<Optional Components>

10 · Citrate: trisodium citrate dihydrate (manufactured by Wako Pure Chemical Industries, Ltd., purity: 99%).

· CMC: sodium carboxymethyl cellulose (CMC 1260 manufactured by Daicel Chemical Industries, Ltd., purity: 99.7%).

· pH adjusting agent: sodium hydroxide (sodium hydroxide, manufactured by
15 Kanto Chemical Co., Inc.), sulfuric acid (sulfuric acid, manufactured by Kanto Chemical Co., Ltd.).

[0073]

<Preparation of Liquid Detergent Composition>

20 1000 g of the liquid detergent composition having the composition shown in the table was prepared by the following procedure.

Into a 1 L beaker, the (A) component, the (B) component, and the (C) component, and the (D) component, and optional components as necessary were put, ion exchange water was added thereto such that the total amount was 95% by mass, and the mixture was stirred with a three-one motor (product name: FBL 600, manufactured by
25 Shinto Kagaku Co., Ltd.) until the mixture became uniform. After an appropriate

amount of a pH adjusting agent was added such that the pH at 25°C was 10.5, ion exchange water was added such that the total amount was 100% by mass, and the mixture was stirred until the mixture became uniform to obtain a liquid detergent composition.

5 The pH was obtained by adjusting the temperature to 25°C, and using a glass electrode type pH meter (product name: HM-30G, manufactured by DKK-TOA CORPORATION), measuring the pH shown after 1 minute passed from direct immersion of the glass electrode in the composition.

[0074]

10 [Penetration Detergency Evaluation Test Method 1]

In order to improve the visibility, a solution in which 0.1% by weight of Sudan IV was uniformly dissolved in to Nissin salad oil (a mixture of edible rapeseed oil and soybean oil, manufactured by The Nisshin Oil Group, Ltd.) was used as dirt for evaluation. 0.5 g of the prepared dirt was uniformly applied to a polyethylene lid

15 (LUSTROWARE NEO KEEPER 870 mL manufactured by Iwasaki Industry Inc.) having a groove with a width of 3 mm and a depth of 3 mm using a poly dropper while weighing with an electronic balance, and was left to stand still at room temperature of 25°C for 1 hour. 4 mL of a sample of each of Examples and Comparative Examples was uniformly applied to the above dirt attached groove using a pipettor, and left to stand still for 60
20 seconds. Thereafter, the groove was sufficiently rinsed thoroughly with running water at a flow rate of 6 L/min at 25°C, the remaining dirt was visually confirmed, and evaluation was performed based on the following evaluation criteria in 5 levels.

[Evaluation Criteria]

AA: There is no remaining dirt.

25 A: Almost no dirt remains.

B: The amount of dirt remaining is slight.

C: The amount of dirt remaining is slightly large.

D: The amount of dirt remaining is very large.

[0075]

5 [Penetration Detergency Evaluation Test Method 2]

In order to improve the visibility, a solution in which 0.1% by weight of Sudan IV was uniformly dissolved in to Nissin salad oil (a mixture of edible rapeseed oil and soybean oil, manufactured by The Nisshin OilliO Group, Ltd.) was used as dirt for evaluation. 0.5 g of the prepared dirt was uniformly applied to a polyethylene lid (LUSTROWARE NEO KEEPER 870 mL manufactured by Iwasaki Industry Inc.) having a groove with a width of 3 mm and a depth of 3 mm using a poly dropper while reducing weight with an electronic balance, and was left to stand still at room temperature of 25°C for 1 hour. 4 mL of a sample of each of Examples and Comparative Examples was uniformly applied to the above dirt attached groove using a pipettor, and left to stand still for 15 seconds. Thereafter, the groove was sufficiently rinsed thoroughly with running water at a flow rate of 6 L/min at 25°C, the remaining dirt was visually confirmed, and evaluation was performed based on the following evaluation criteria in 5 levels.

[Evaluation Criteria]

AA: There is no remaining dirt.

20 A: Almost no dirt remains.

B: The amount of dirt remaining is slight.

C: The amount of dirt remaining is slightly large.

D: The amount of dirt remaining is very large.

[0076]

25 [Comprehensive Evaluation]

Based on the evaluation results of [Penetration Detergency Evaluation Test Method 1] and [Penetration Detergency Evaluation Test Method 2], the following five evaluation criteria were used. AA, A, B, and C are considered as pass.

[Evaluation Criteria]

5 AA: The evaluation results of [Penetration Detergency Evaluation Test Method 1] and [Penetration Detergency Evaluation Test Method 2] are both AA.

A: The evaluation result of [Penetration Detergency Evaluation Test Method 1] is AA and the evaluation result of [Penetration Detergency Evaluation Test Method 2] is A, B or C.

10 B: The evaluation result of [Penetration Detergency Evaluation Test Method 1] is A.

C: The evaluation result of [Penetration Detergency Evaluation Test Method 1] is B.

15 D: The evaluation result of [Penetration Detergency Evaluation Test Method 1] is C or D.

[0077]

[Table 1]

		Example									
		1	2	3	4	5	6	7	8	9	10
Liquid detergent composition	(A) Component	A-1	6.4	6.2	5.8	5.0	3.5	1.9	6.5		
		A-2	1.9	1.8	1.7	1.5	1.0	0.6		6.5	
		A-3									6.5
	Total of (A) component		8.3	8.0	7.5	6.5	4.5	2.5	6.5	6.5	6.5
	(B) Component	B-1	0.2	0.5	1.0	2.0	4.0	6.0	2.0	2.0	2.0
		B-2									
		B-3									
		B-4									
	Total of (B) component		0.2	0.5	1.0	2.0	4.0	6.0	2.0	2.0	2.0
	(C) Component	C-1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		C-2									
		C-3									
	(D) Component	D-1									
		D-2									
		D-3									
		D-4									
		D-5									
	Total of (D) component										
	Optional component	Trisodium citrate	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		CMC	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		pH adjusting agent	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount
	Ion exchange water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
		Total	100	100	100	100	100	100	100	100	100
	pH		10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
	A/B ratio		41.50	16.00	7.50	3.25	1.13	0.42	3.25	3.25	3.25
	D/B ratio		-	-	-	-	-	-	-	-	-
Evaluation result	Penetration detergency 1 60 seconds		B	A	AA	AA	AA	A	AA	A	B
	Penetration detergency 2 15 seconds		D	C	C	B	C	C	B	C	D
	Comprehensive evaluation		C	B	A	A	A	B	A	B	C

[0078]

[Table 2]

		Example																			
		11	12	13	14	15	16	17	18	19	20										
Liquid detergent composition	(A) Component	A-1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
		A-2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
		A-3																			
	(B) Component	Total of (A) component	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
		B-1																			
		B-2	2.0																		
		B-3		2.0																	
	(C) Component	B-4			2.0																
		Total of (B) component	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
		C-1	0.3	0.3	0.3																
		C-2				0.3															
	(D) Component	C-3					0.3														
		D-1										0.1									
		D-2											0.1								
		D-3												0.1							
		D-4																			
		D-5																			
		Total of (D) component																			
		Trisodium citrate	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Optional component	CMC	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		pH adjusting agent	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount
		Ion exchange water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
Total		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
pH																					
A/B ratio			10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	
Evaluation result	D/B ratio		3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Penetration detergency 1 60 seconds	AA	B	A	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA
		Penetration detergency 2 15 seconds	B	D	C	B	B	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA
		Comprehensive evaluation	A	C	B	A	A	A	A	A	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	

[0079]

[Table 3]

			Example					
			21	22	23	24	25	26
Liquid detergent composition	(A) Component	A-1	5.0	5.0	5.0	5.0	5.0	5.0
		A-2	1.5	1.5	1.5	1.5	1.5	1.5
		A-3						
		Total of (A) component	6.5	6.5	6.5	6.5	6.5	6.5
	(B) Component	B-1	2.08	2.06	2.04	1.80	1.70	1.50
		B-2						
		B-3						
		B-4						
		Total of (B) component	2.08	2.06	2.04	1.80	1.70	1.50
	(C) Component	C-1	0.3	0.3	0.3	0.3	0.3	0.3
		C-2						
		C-3						
	(D) Component	D-1	0.02	0.04	0.06	0.20	0.30	0.50
		D-2						
		D-3						
		D-4						
		D-5						
		Total of (D) component	0.0	0.0	0.1	0.2	0.3	0.5
	Optional component	Trisodium citrate	1.0	1.0	1.0	1.0	1.0	1.0
		CMC	0.1	0.1	0.1	0.1	0.1	0.1
		pH adjusting agent	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount
	Ion exchange water		Balance	Balance	Balance	Balance	Balance	Balance
	Total		100	100	100	100	100	100
pH			10.5	10.5	10.5	10.5	10.5	10.5
A/B ratio			3.13	3.16	3.19	3.61	3.82	4.33
D/B ratio			104.00	51.50	34.00	9.00	5.67	3.00
Evaluation result		Penetration detergency 1 60 seconds	AA	AA	AA	AA	AA	AA
		Penetration detergency 2 15 seconds	B	A	AA	AA	A	B
		Comprehensive evaluation	A	A	AA	AA	A	A

[0080]

[Table 4]

			Comparative Example				
			1	2	3	4	5
Liquid detergent composition	(A) Component	A-1		5.0	5.0	6.4	0.2
		A-2		1.5	1.5	1.9	0.1
		A-3					
		Total of (A) component	0.0	6.5	6.5	8.4	0.3
	(B) Component	B-1	2.0		2.0	0.15	8.2
		B-2					
		B-3					
		B-4					
	(C) Component	C-1	0.3	0.3		0.3	0.3
		C-2					
		C-3					
	(D) Component	D-1					
	Optional component	Trisodium citrate	1.0	1.0	1.0	1.0	1.0
		CMC	0.1	0.1	0.1	0.1	0.1
		pH adjusting agent	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount	Appropriate amount
	Ion exchange water		Balance	Balance	Balance	Balance	Balance
	Total		100	100	100	100	100
pH			10.5	10.5	10.5	10.5	10.5
A/B ratio			0.00	-	3.25	55.67	0.04
Evaluation result		Penetration detergency 1 60 seconds	D	D	C	C	C
		Penetration detergency 2 15 seconds	D	D	D	D	D
		Comprehensive evaluation	D	D	D	D	D

[0081]

5 The liquid detergent compositions of Examples 1 to 26 to which the present invention was applied were excellent in penetration detergency against dirt.

Comparative Example 1 containing no (A) component was inferior in

penetration detergency against dirt.

Comparative Example 2 containing no (B) component was inferior in penetration detergency against dirt.

Comparative Example 3 containing no (C) component was inferior in the
5 penetration detergency against dirt.

Comparative Example 4 in which the A/B ratio was more than 45 was inferior in the penetration detergency against dirt.

Comparative Example 5 in which the A/B ratio was less than 0.06 was inferior in the penetration detergency against dirt.

10 [Industrial Applicability]

[0082]

The liquid detergent composition according to the present invention can exhibit high detergency without applying heat or physical force.

[Reference Signs List]

15 [0083]

1, 2 liquid detergent composition product

10, 10a liquid detergent composition

100, 100a container body

108 pipe

20 110 support body

120 operating lever

130, 140 cap

[CLAIMS]

[Claim 1]

A liquid detergent composition comprising:

(A) component;

5 (B) component; and

(C) component,

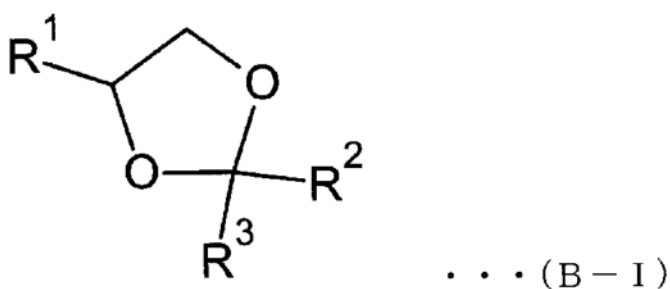
wherein the (A) component is an anionic surfactant,

the (B) component is a compound represented by Formula (B-I),

the (C) component is at least one selected from the group consisting of an

10 amphoteric surfactant and an amine oxide type surfactant, and

a mass ratio represented by the (A) component/the (B) component is 0.06 to 45,



in Formula (B-I), R¹ represents a linear alkyl group having 1 to 14 carbon atoms,

a branched alkyl group having 2 to 14 carbon atoms, a linear alkenyl group having 2 to

15 14 carbon atoms, a branched alkenyl group having 3 to 14 carbon atoms, a linear

hydroxyalkyl group having 1 to 14 carbon atoms, a branched hydroxyalkyl group having

2 to 14 carbon atoms, or hydrogen, and R² and R³ each independently represent a linear

alkyl group having 1 to 5 carbon atoms, a branched alkyl group having 2 to 5 carbon

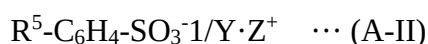
atoms, a linear alkenyl group having 3 to 5 carbon atoms, a branched alkenyl group

20 having 3 to 5 carbon atoms, or hydrogen.

[Claim 2]

The liquid detergent composition according to claim 1,

wherein the (A) component includes at least one selected from the group consisting of a compound (A1) represented by Formula (A-I) and a compound (A2) represented by Formula (A-II),



in Formula (A-I), R^4 represents a linear or branched alkyl group having 8 to 18 carbon atoms; PO represents an oxypropylene group; EO represents an oxyethylene group; p represents an average number of repetitions of PO and satisfies $0 \leq p \leq 1$, q represents an average number of repetitions of EO and satisfies $0 \leq q \leq 5$; regarding $[(PO)_p/(EO)_q]$, EO and PO may be added by random addition or block addition; M^+ represents a counter ion; and X represents a valence of M^+ ,

in Formula (A-II), R^5 represents a linear or branched alkyl group having 8 to 18 carbon atoms; Z^+ represents a counter ion; and Y represents a valence of Z^+ .

[Claim 3]

The liquid detergent composition according to claim 1 or 2,

wherein the (B) component contains a compound (B1) represented by Formula (B-I) in which R^1 represents a linear hydroxyalkyl group having 1 to 14 carbon atoms or a branched hydroxyalkyl group having 2 to 14 carbon atoms; and R^2 and R^3 each independently represent a linear alkyl group having 1 to 5 carbon atoms or a branched alkyl group having 2 to 5 carbon atoms.

[Claim 4]

The liquid detergent composition according to any one of claims 1 to 3, further comprising:

a nonionic surfactant (D).

5

[Claim 5]

The liquid detergent composition according to claim 4,

wherein the (D) component contains a compound (D1) represented by Formula (D-I),

10 $R^{11}-X-[(EO)_s/(PO)_t]-R^{12} \cdots (D-I)$

in Formula (D-I), R^{11} represents a hydrocarbon group having 6 to 22 carbon atoms; X represents a divalent linking group; R^{12} represents a hydrogen atom, an alkyl group having 1 to 6 carbon atoms, or an alkenyl group having 2 to 6 carbon atoms; EO represents an oxyethylene group, PO represents an oxypropylene group, s represents an average number of repetitions of EO and is 3 to 100, t represents an average number of repetitions of PO and is 0 to 6, and regarding $[(EO)_s/(PO)_t]$, EO and PO may be added by random addition or block addition.

15

[Claim 6]

20 The liquid detergent composition according to claim 4 or 5,

wherein a mass ratio represented by the (D) component/the (B) component is 3 to 100.

25

[Claim 7]

A liquid detergent composition product comprising:

the liquid detergent composition according to any one of claims 1 to 6; and

a container,

5

wherein the liquid detergent composition is contained in the container.