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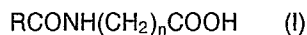
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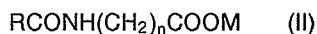
(54) **Detergent composition.**

(57) The liquid detergent composition of the present invention contains 5 to 60% by weight of a potassium or alkanolamine salt of a secondary amide-type N-acylamino acid represented by the following general formula (I):



wherein R represents a straight-chain saturated hydrocarbon acyl group having 10 to 14 carbon atoms; and n is a number of 2.

Further, the detergent composition of the present invention comprises an N-acyl compound (A) represented by the following general formula (II) and surfactant(s) [other than the component (A)] (B) at a weight ratio of (A)/(B) of from 99/1 to 1/1;



wherein RCO represents a straight-chain acyl group having 8 to 22 carbon atoms; n is an integer of from 1 to 11; and

M represents an alkali metal or an inorganic or organic ammonium.

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BACKGROUND OF THE INVENTION

[Field of the Invention]

- 5 This invention relates to a detergent composition. More particularly, it relates to a detergent composition which is suitable for washing the body including the hair and the skin and comfortable in its use.

[Description of the Prior Art]

- 10 Body detergent compositions usually comprise common anionic surfactants. Namely, soaps, i.e., higher fatty acid salts are mainly used for cleansing the skin while alkyl sulfates or sulfonates are mainly used for shampooing the hair.

- The soaps used for cleansing the skin are disadvantageous in that the soap scum (calcium salts of higher fatty acids) formed during rinsing would adhere to the skin, which seriously deteriorates the lubricity of the surface of the skin and causes coarseness or tension. In order to improve this disadvantage, attempts have been made to develop composite type detergents by blending an oily component such as a higher alcohol or a humectant such as propylene glycol with the aforesaid soaps or by using an anionic surfactant which never forms any scum.

- However the addition of such an oily component in a small amount cannot give the desired effect. On the other hand, the addition of a large amount thereof might cause another problem that the foaming properties are substantially deteriorated. When such an anionic surfactant forming no scum is used, the coarseness would decrease with an increase in said component. When it is used in such an amount as to give a satisfactory effect, however, the foam breaking is retarded and the detergent composition becomes slimy.

- On the other hand, the aforesaid alkyl sulfates and sulfonates used in shampoos form no scum and thus never give such coarseness or tension as those observed when a soap is used. However a detergent composition containing such components is poor in foam breaking and cannot impart a lubricity to the hair. In order to improve these disadvantages, there has been attempted to add oily components such as higher alcohols, hydrocarbons or silicone. In this case, however, the addition of these oily components in a small amount cannot give the desired effect and the addition of a large amount thereof would substantially deteriorate the foaming properties of the detergent composition.

- There have been known detergents comprising N-alkylacylamino acid surfactants. For example, Japanese Patent Laid-Open No. 150701/1975 and Japanese Patent Laid-Open No. 2962/1988 disclose each a liquid detergent composition comprising an N-(long-chain acyl)amino acid surfactant, which is a less irritative surfactant, as a base. Further, Japanese Patent Laid-Open No. 132007/1978 discloses an improved solid detergent comprising an N-(long-chain acyl)neutral amino acid.

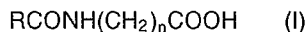
- Although the tertiary amide-type N-alkyl-N-acylamino acid salts employed in the detergent compositions described in these references are highly soluble in water, they are poor in foam breaking and the comfort in its use, namely, they are somewhat slimy. Japanese Patent Laid-Open No. 2962/1988 further shows N-lauroyl- β -alanine sodium salt which is a secondary amide type N-acylamino acid salt (refer to Example 5). However this compound has a low solubility in water, which makes it unsuitable for a liquid detergent composition. Furthermore, the addition of this compound at a concentration of 1% (as specified in Table 1 in the aforesaid reference) cannot achieve a desirable comfort in its use.

45 SUMMARY OF THE INVENTION

- It is an object of the present invention to provide a detergent composition which is highly soluble in water has good foaming properties during cleansing, shows a rapid foam breaking during rinsing, gives no sliminess, imparts a high lubricity to the surface of the material to be cleansed from the rinsing step to after the drying, is less irritative, causes neither coarseness nor tension after the completion of the use and is excellent in the comfort in its use.

The present inventors have conducted extensive studies and thus found out that the aforesaid objects can be achieved by using a specific N-acyl compound as the main base of a detergent composition.

- Accordingly, the present invention, which has been completed based on the above finding, provides a liquid detergent composition containing 5 to 60% by weight of a potassium or alkanolamine salt of a secondary amide-type N-acylamino acid represented by the following general formula (I), which will be referred to as the first invention hereinafter.

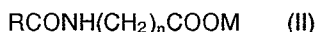


wherein R represents a straight-chain saturated hydrocarbon acyl group having 10 to 14 carbon atoms; and

5 n is a number of 2.

The present inventors have conducted further studies and thus found out that the above objects can be achieved by using a specific N-acyl compound as the main base of a detergent composition and combining said compound with other surfactant(s) at a specific ratio.

The present invention, which has been completed based on the above finding, provides a detergent
10 composition comprising an N-acyl compound (A) represented by the following general formula (II) and surfactant(s) [other than the component (A)] (B) at a weight ratio of (A)/(B) of from 99/1 to 1/1, which will be referred to as the second invention hereinafter.



15

wherein RCO represents a straight-chain acyl group having 8 to 22 carbon atoms;

n is an integer of from 1 to 11; and

M represents an alkali metal or an inorganic or organic ammonium.

Each of the liquid detergent composition and detergent composition of the present invention is highly
20 soluble in water, has good foaming properties during cleansing, shows a rapid foam breaking during rinsing, gives no sliminess, imparts a high lubricity to the surface of the material to be cleansed from the rinsing step to after the drying, is less irritative, causes neither coarseness nor tension after the completion of the use and is excellent in the comfort in its use. Thus it is particularly suitable for cleansing the skin (body and face) or shampooing the hair.

25

DETAILED DESCRIPTION OF THE INVENTION

Now the liquid detergent composition of the first invention will be described in detail.

The potassium or alkanolamine salt of the N-acylamino acid represented by the above general formula
30 (I) (hereinafter also called the N-acyl compound), which is one of the components of the detergent composition of the first invention, would react with calcium in tap water to form highly lubricant platy crystals.

It is preferable that RCO in the above general formula (I) of the aforesaid N-acyl compound is a straight-chain saturated hydrocarbon acyl group having 10 to 14 carbon atoms, in particular, a lauroyl group having
35 12 carbon atoms. When the carbon atom number thereof exceeds 14, the lubricity of the formed platy crystals and the foaming properties of the composition are deteriorated. When the carbon atom number thereof is less than 10, on the other hand, the foaming properties are deteriorated. Thus both of these cases are undesirable.

The lubricity of the platy crystals formed by the reaction between the aforesaid N-acyl compound and
40 calcium may be determined by, for example, measuring the coefficient of static friction of the platy crystals on dried pigskin (ALLOASK; a product of Kotai Kasei Kogyo K.K.) which has been reconstituted with physiological saline. Namely, platy crystals showing a coefficient of static friction lower than that of the blank lot throughout the moisture-containing point to after the completion of the drying are rated high.

It is very important that the aforesaid N-acyl compound has a secondary amide-type structure wherein
45 the N-acyl group consists of the above-mentioned straight-chain acyl. When the acyl group constituting the N-acyl group is branched or the amide has a tertiary amide type structure, the formation of the platy crystals is suppressed or the formed crystals are poor in lubricity and thus sticky. In these cases, therefore, a desirable texture can be hardly obtained.

The aforesaid N-acyl compound is a potassium (hereinafter sometimes abbreviated as K) or an
50 alkanolamine salt such as monoethanolamine, diethanolamine or triethanolamine (hereinafter sometimes abbreviated as TEA) salt of an N-acylamino acid represented by the above general formula (I). It is undesirable to use a sodium (hereinafter sometimes abbreviated as Na) of the N-acylamino acid since it has a high Krafft point and a low solubility in water and is therefore unsuitable for a liquid detergent.

The content of the aforesaid N-acyl compound may range from 5 to 60% by weight, preferably from 20
55 to 50% by weight, based on the composition of the first invention. When the content thereof is less than 5% by weight, the state of feeling refreshed and comfort in its use due to the platy crystals formed during rinsing cannot be obtained. When it exceeds 60% by weight, on the other hand, the liquid composition would set to gel and thus a good liquid detergent composition cannot be obtained.

The aforesaid N-acyl compound (secondary amide-type N-acylamino acid salt) may be produced by, for example, the following method. An amino acid is acylated by commonly known Schotten-Baumann reaction wherein an alkali aqueous solution of the amino acid and sodium hydroxide is reacted with a fatty acid chloride. Then the reaction mixture is acidified by adding hydrochloric acid to thereby give an N-acylamino acid (acid type). The obtained product is filtered, dried and then neutralized with potassium hydroxide or an alkanolamine. Thus the secondary amide-type N-acylamino acid to be used in the first invention can be obtained.

The liquid detergent composition of the first invention may be formulated into a paste or a gel by adding a thickener or a binder, if required.

The liquid detergent composition of the first invention may further contain components commonly employed in detergent compositions, for example, humectants, touch improvers, viscosity modifiers, bactericides, perfumes or colorants, so long as the formation of the highly lubricant platy crystals during the rinsing step is not inhibited thereby.

The pH value of the liquid detergent composition of the first invention may be 6 or above and preferably range from 7 to 10.

The liquid detergent composition of the first invention, which has been described in detail above, is suitable for cleansing the body including the skin and the hair. It is particularly suitable for cleansing the skin.

Now the detergent composition of the second invention will be described in detail.

The N-acyl compound represented by the above general formula (II), which is the component (A) of the detergent composition of the second invention, would react with calcium in tap water to form highly lubricant platy crystals, similar to the above-mentioned N-acyl compound in the first invention.

It is preferable that RCO in the above general formula (II) of the aforesaid N-acyl compound is a straight-chain acyl group having 8 to 22 carbon atoms, in particular, a straight-chain acyl group having 10 to 14 carbon atoms such as a caprinoyl, lauroyl or myristoyl group. When the carbon atom number thereof exceeds 22, the lubricity of the formed platy crystals is deteriorated. When the carbon atom number thereof is less than 8, on the other hand, the foaming properties are deteriorated. Thus both of these cases are undesirable. Further, a is an integer of from 1 to 11, preferably from 1 to 5 and still preferably 1 or 2, from the viewpoint of the lubricity of the platy crystals.

The lubricity of the platy crystals formed by the reaction between the aforesaid N-acyl compound and calcium may be determined and evaluated by the same method as the above-mentioned one employed in the case of the N-acyl compound of the first invention.

It is very important that the aforesaid N-acyl compound has a secondary amide-type structure wherein the N-acyl group consists of the above-mentioned straight-chain acyl. When the acyl group constituting the N-acyl group is branched or the amide has a tertiary amide type structure, the formation of the platy crystals is suppressed or the formed crystals are poor in lubricity and thus sticky. In these cases, therefore, a desirable texture can be hardly obtained.

As M constituting a counter ion in the above general formula (II) of the aforesaid N-acyl compound, alkali metals such as sodium (hereinafter sometimes abbreviated as Na) and potassium (hereinafter sometimes abbreviated as K) and inorganic or organic ammonium may be cited. The organic ammonium includes acid salts of organic amine compounds such as alkanolamines such as monoethanolamine, diethanolamine and triethanolamine (hereinafter sometimes abbreviated as TEA), alkylamines and basic amino acids.

The content of the aforesaid N-acyl compound may be 5% by weight or above, preferably from 20 to 80% by weight, based on the composition of the second invention. When the content thereof is less than 5% by weight, the state of feeling refreshed and comfort in its use due to the platy crystals formed during rinsing cannot be obtained.

As the surfactant which is the component (B) of the detergent composition of the second invention, various surfactants including the following ones may be used.

Examples of anionic surfactants include sulfate and sulfonate surfactants such as alkyl sulfates and polyoxyethylene alkyl sulfates and sulfosuccinic acid, taurate, isethionate and α -olefinsulfonate surfactants; carboxylate surfactants such as fatty acid soaps, fatty acid salts, ether carboxylic acid surfactants and acylated amino acid surfactants; and phosphate ones such as alkyl phosphate surfactants. Among these surfactants, fatty acid, phosphate and isethionate surfactants are particularly preferable from the viewpoint of foaming properties.

Examples of ampholytic surfactants include carbobetaine, sulfobetaine and imidazoliniumbetaine surfactants. It is preferable to use hydroxypropylsulfobetaine and desalted secondary imidazoliniumbetaine.

Examples of nonionic surfactants include polyhydric alcohols such as polyoxyalkylene addition type,

polyoxypropylene/polyoxyethylene addition type, amine oxide and mono- or diethanolamide as well as sorbitan fatty acid esters, glycerol fatty acid esters, sucrose fatty acid esters and alkyl saccharide and N-poylhydroxyalkyl fatty acid amide surfactants. It is particularly preferable to use amine oxide, diethanolamide and alkyl saccharide surfactants.

5 Examples of cationic surfactants include mono- or dialkyl-addition type quaternary ammonium salts having a straight-chain or branched alkyl group and those obtained by adding an alkylene oxide to the alkyl group thereof. It is particularly preferable to use straight-chain monoalkyl quaternary ammonium salts having 12 to 16 carbon atoms and quaternary ammonium salts having a branched alkyl group having 20 to 28 carbon atoms.

10 Either one of these surfactants or a mixture thereof may be used depending on the performance of the target product.

The content of the surfactant(s) may preferably range from 0.1 to 45% by weight based on the composition of the second invention.

15 The detergent composition of the second invention may comprise the aforesaid N-acyl compound, i.e., the component (A) and the aforesaid surfactant, i.e., the component (B) at a weight ratio of (A)/(B) of from 99/1 to 1/1 (preferably from 95/5 to 60/40). When the weight ratio does not fall within the range as specified above, a comfort in its use due to the formed lubricant platy crystals can be hardly obtained.

The detergent composition of the second invention may be formulated into any form, for example, liquid, paste, solid or powder, without restriction.

20 The detergent composition of the second invention may further contain various foaming aids and foam improvers to improve the foaming and foam qualities, so long as the formation of the highly lubricant platy crystals during the rinsing step is not inhibited thereby.

The detergent composition of the second invention may further contain components commonly employed in detergent compositions, for example, humectants, touch improvers, viscosity modifiers, 25 perfumes or colorants, so long as the effects of the present invention are not deteriorated thereby.

It is needless to say that the amounts of the aforesaid foaming aids, foam improvers and common additives may be appropriately varied depending on the form of the detergent composition.

The pH value of the detergent composition of the second invention may be 6 or above and preferably range from 7 to 10.

30 The detergent composition of the second invention, which has been described in detail above, is suitable for cleansing the body including the skin and the hair, though the application range thereof is not particularly limited.

To further illustrate the present invention, and not by way of limitation, the following Examples will be given. Examples 1 to 4 show each an embodiment of the first invention, whereas Examples 5 to 7 show 35 each an embodiment of the second invention.

Example 1

40 Each liquid detergent composition of the formulation as specified in Table 1 was prepared and the solubility, foaming properties, precipitation of platy crystals and comfort in the use thereof were evaluated in accordance with the criteria as specified below. Table 1 summarizes the results.

Evaluation of solubility

45 The appearance of each liquid detergent composition at 10°C was evaluated with the naked eye in accordance with the criteria as specified below.

Criteria:

50 O: transparent.
X: turbid or a precipitate is observed due to the formation of crystals.

Evaluation of foaming properties

55 The foam volume was measured by the following method and thus the foaming properties were evaluated in accordance with the criteria as specified below. Each liquid detergent composition was diluted 10-fold with water. 100 ml of the aqueous solution (liquid temperature: 20°C) thus obtained was poured into a volumetric cylinder. Next, stirring blades were placed in the solution and the volume (ml) of the foam

formed 30 seconds after the initiation of stirring was measured. The value thus determined was referred to as the foam volume. The stirring blades were rotated at 1,000 rpm and the rotation was reversed every 5 seconds.

5 Criteria:

- ⊙: foam volume is 200 ml or above.
- : foam volume ranges from 150 to 200 ml.
- X: foam volume is less than 150 ml.

10

Evaluation of the precipitation of lubricant platy crystals

Each liquid detergent composition was diluted 10-fold with ion-exchanged water. 1 ml of the obtained aqueous solution was poured into 50 ml of 4° DH hard water at 20° C. After 10 seconds, the formation of
15 crystals was observed with the naked eye and thus evaluated in accordance with the criteria as specified below.

Criteria:

- 20 ⊙: crystals are formed and the solution becomes cloudy.
- Δ: crystals are formed and the solution becomes slightly cloudy.
- X: no crystal is formed and the solution remains transparent.

Evaluation of comfort in the use

25

Ten male panelists and 10 female ones washed their bodies with each liquid detergent composition for a week and the comfort in the use of the product was organoleptically evaluated. The results given in Table 1 were the averages of the data obtained in accordance with the criteria as specified below.

30 Criteria:

(1) Foam breaking during rinsing:

- 5: good.
- 4: somewhat good.
- 35 3: moderate.
- 2: somewhat poor.
- 1: poor.

(2) Slippage during rinsing;

(3) Slippage after rinsing; and

40 (4) Slippage after drying:

- 5: good.
- 4: somewhat good.
- 3: moderate.
- 2: somewhat poor.
- 45 1: poor.

50

55

Table 1
(formulation : % by wt.)

	Invention				Comparative				
	1	2	3	4	1	2	3	4	5
N-lauroyl- β -alanine K salt	30	20	40	30	—	—	—	3	65
N-lauroyl- β -alanine TEA salt	—	—	—	—	—	—	—	—	—
N-myristoyl- β -alanine TEA salt	—	—	—	—	20	—	—	—	—
N-lauroyl- β -alanine Na salt	—	—	—	—	—	40	—	—	—
N-stearoyl- β -alanine K salt	—	—	—	—	—	—	30	—	—
N-lauroyl-N-methyl- β -alanine Na salt	b	b	b	b	b	b	b	b	b
purified water	—	—	—	—	—	—	—	—	—
Evaluation of solubility	○	○	○	○	×	×	○	○	×
Evaluation of foaming properties (20°C)	◎	◎	◎	○	×	×	○	×	◎
Evaluation of formation of lubricant platy crystals (20°C)	◎	◎	◎	◎	×	×	×	△	◎
Comfort in the use	(1)foam breaking during rinsing	4.5	4.5	4.7	4.4	*	1.6	4.5	*
	(2)slippage during rinsing	4.6	4.5	4.7	4.4	*	1.4	2.7	*
	(3)slippage after rinsing	4.2	4.2	4.3	4.1	*	1.8	2.5	*
	(4)slippage after drying	4.0	4.1	4.2	4.0	*	1.9	2.3	*

Note : * means that no liquid detergent composition could be obtained because of the precipitation of crystals at room temperature and thus the evaluation was impossible.
b means the balance.

Example 2

Regarding the secondary amide-type N-acylamino acid salts (K salts and TEA salts) to be used in the liquid detergent compositions of the first invention, the solubility, formation of lubricant platy crystals and comfort in the use were evaluated in accordance with the criteria as specified below. For comparison, secondary amide-type N-acylamino acid Na salts and tertiary amide-type N-alkyl-N-acylamino acid salts were evaluated in the same manner. Table 2 shows the results and the Krafft points of these amino acid salts.

Evaluation of solubility

A 5% by weight aqueous solution of each amino acid salt was prepared and the solubility of the

solution thus obtained at 10 °C was evaluated in accordance with the criteria as specified below.

Criteria:

- 5 O: soluble.
 X: insoluble (precipitation of crystals).

Evaluation of the formation of lubricant platy crystals

- 10 A 5% by weight aqueous solution of each amino acid salt was prepared and 1 ml of the obtained solution was poured into 50 ml of 4° DH hard water at 20 °C. After 10 seconds, the formation of crystals was determined and evaluated in accordance with the criteria as specified below.

Criteria:

- 15 O: crystals are formed.
 X: no crystal is formed.

Evaluation of comfort in the use

- 20 A 5% by weight aqueous solution of each amino acid salt was prepared and a subject washed the body with the obtained solution. Then the slippage from the rinsing step to after drying was evaluated in accordance with the criteria as specified below.

25 Criteria:

- ⊙: very good.
 O: good.
 X: poor.

30

Table 2

35			Kraft point	Solubility	Crystal formation	Comfort in the use
40	caprinoyl-β-alanine	K salt	< 0°C	○	○	○
		TEA salt	< 0°C	○	○	○
		Na salt	20°C	x	—	—
45	lauroyl-β-alanine	K salt	< 0°C	○	○	●
		TEA salt	< 0°C	○	○	●
		Na salt	35°C	x	—	—
50	myristoyl-β-alanine	K salt	< 0°C	○	○	○
		TEA salt	< 0°C	○	○	○
		Na salt	45°C	x	—	—
55	lauroyl-N-methyl-β-alanine	K salt	< 0°C	○	x	x
		TEA salt	< 0°C	○	x	x
		Na salt	< 0°C	○	x	x

Example 3

	[Formulation]	(% by weight)
5	(1) N-lauroyl- β -alanine K salt	28
	(2) dibutylhydroxytoluene	0.2
10	(3) perfume	0.5
	(4) ethanol	3
	(5) purified water	the balance

15

In accordance with the above formulation, the component (1) was dissolved in hot water. After cooling, the components (2) to (4) were added thereto. Thus a transparent liquid detergent composition was prepared.

20 When the skin and the hair were washed with the liquid detergent composition obtained above, the product showed good foaming properties, good foam breaking, good slippage from the rinsing step to after drying and an excellent comfort in the use.

Example 4

	[Formulation]	(% by weight)
25	(1) N-lauroyl- β -alanine	18
	(2) triethanolamine	17
30	(3) dibutylhydroxytoluene	0.2
	(4) perfume	0.5
35	(5) ethanol	3
	(6) purified water	the balance

40

In accordance with the above formulation, the component (2) was added to hot water followed by the addition of the component (1), and the components were neutralized and dissolved. After cooling, the components (3) to (5) were added thereto. Thus a transparent liquid detergent composition was prepared.

45 When the skin and the hair were washed with the liquid detergent composition obtained above, the product showed good foaming properties, good foam breaking, good slippage from the rinsing step to after drying and an excellent comfort in the use.

Example 5

50

Detergent compositions of the formulations as specified in Table 3 were prepared. The foam volume of each detergent composition was determined by the following method. Further, the formation of lubricant platy crystals and the comfort in the use thereof were evaluated in accordance with the criteria as specified below. Tables 3 and 4 show the results. The detergent compositions No. 27 to No. 33 are comparative products.

55

Determination of foam volume

Each detergent composition was diluted 20-fold with water. 100 ml of the aqueous solution (liquid temperature: 40 °C) thus obtained was poured into a volumetric cylinder. Next, stirring blades were placed in the solution and the volume (ml) of the foam formed 30 seconds after the initiation of stirring was measured. The value thus determined was referred to as the foam volume. The stirring blades were rotated at 1,000 rpm and the rotation was reversed every 5 seconds.

Evaluation of the precipitation of lubricant platy crystals

Each liquid detergent composition was diluted 20-fold with ion-exchanged water. 1 ml of the obtained aqueous solution was poured into 40 ml of 4 ° DH hard water at 40 °C. After 10 seconds, the formation of crystals was observed with the naked eye aid thus observed in accordance with the criteria as specified below.

Criteria:

- O: crystals are formed and the solution becomes cloudy.
- Δ: crystals are formed and the solution becomes slightly cloudy.
- X: no crystal is formed and the solution remains transparent.

Evaluation of comfort in the use

Ten male panelists and 10 female ones washed their skins with all of the aforesaid detergent compositions and their hairs with some of the detergent compositions and the comfort in the use of each product was organoleptically evaluated. The averages of the data obtained in accordance with the criteria as specified below were calculated and referred to as very good (⊙; ≥ 4.5), good (○; from 3.5 to 4-4), moderate (Δ; from 2.5 to 3.4) and poor (X; ≤ 2.4).

Criteria:

- (1) Foam breaking during rinsing:
 - 5: good.
 - 4: somewhat good.
 - 3: moderate.
 - 2: somewhat poor.
 - 1: poor.
- (2) Slippage during rinsing;
- (3) Slippage after rinsing; and
- (4) Slippage after drying:
 - 5: good.
 - 4: somewhat good.
 - 3: moderate.
 - 2: somewhat poor.
 - 1: poor.

T a b l e 3 --(a)
(formulation : % by wt.)

	1	2	3	4	5	6	7	8	9
lauroylglycine TEA salt	25	28	28	—	—	—	—	—	—
lauroylglycine Na salt	—	—	—	—	—	—	—	—	—
lauroyl- β -alanine TEA salt	—	—	—	25	20	18	25	25	28
lauroyl- β -alanine K salt	—	—	—	—	—	—	—	—	—
myristoyl β -alanine TEA salt	—	—	—	—	—	—	—	—	—
lauroyl- α -alanine TEA salt	—	—	—	—	—	—	—	—	—
isostearyl- β -alanine TEA salt	—	—	—	—	—	—	—	—	—
lauroyl-N-methyl- β -alanine Na salt	—	—	—	—	—	—	—	—	—
TEA laurate	—	—	—	—	—	—	5	5	—
TEA lauryl phosphate	—	—	—	—	—	—	—	—	—
Na cocoylisethionate	5	—	—	5	10	12	—	—	—
lauryldimethylamino-2-hydroxypropylsulfobetaine	—	2	—	—	—	—	—	—	2
lauryldimethylaminoacetate betaine	—	—	—	—	—	—	—	—	—
lauryldimethylamine oxide	—	—	2	—	—	—	—	—	—
diethanolamide of lauric acid	—	—	—	—	—	—	—	—	—
alkyl polyglucoside (C ₁₂ :C ₁₄)	—	—	—	—	—	—	—	—	—
cetyltrimethylammonium chloride	—	—	—	—	—	—	—	—	—
purified water	b	b	b	b	b	b	b	b	b
Foam volume (ml)	230	235	235	220	225	230	225	240	230
Precipitation of lubricant platy crystals	○	○	○	○	○	○	○	○	○
Comfort in	◎	◎	◎	◎	○	○	◎	◎	◎
the use	◎	◎	◎	◎	◎	◎	◎	◎	◎
(skin	○	○	○	○	○	○	○	○	○
cleansing)	○	○	○	○	○	○	○	○	○

Note : b means the balance.

Table 3--(b)

(formulation : % by wt.)									
	10	11	12	13	14	15	16	17	18
lauroylglycine TEA salt	—	—	—	25	28	—	—	—	—
lauroylglycine Na salt	25	22	28	—	—	28	28	25	28
lauroyl- β -alanine TEA salt	—	—	—	—	—	—	—	—	—
lauroyl- β -alanine K salt	—	—	—	—	—	—	—	—	—
myristoyl- β -alanine TEA salt	—	—	—	—	—	—	—	—	—
lauroyl- α -alanine TEA salt	—	—	—	—	—	—	—	—	—
isostearyl- β -alanine TEA salt	—	—	—	—	—	—	—	—	—
lauroyl-N-methyl- β -alanine Na salt	—	—	—	—	—	—	—	—	—
TEA laurate	—	—	—	—	—	—	—	—	—
TEA lauryl phosphate	—	—	—	—	—	—	—	—	—
Na cocoylisethionate	—	—	—	5	2	—	—	—	—
lauryldimethylamino-2-hydroxypropylsulfobetaine	5	8	—	—	—	—	—	—	—
lauryldimethylaminoacetate betaine	—	—	—	—	—	2	2	5	2
lauryldimethylamine oxide	—	—	—	—	—	—	—	—	—
diethanolamide of lauric acid	—	—	—	—	—	—	—	—	—
alkyl polyglucoside (C ₁₂ :C ₁₄)	—	—	—	—	—	—	—	—	—
cetyltrimethylammonium chloride	—	—	—	—	—	—	—	—	—
purified water	b	b	b	b	b	b	b	b	b
Foam volume (ml)	235	240	215	215	220	225	230	235	235
Precipitation of lubricant platy crystals	○	○	○	○	○	○	○	○	○
Comfort in	○	○	⊙	○	○	○	⊙	○	⊙
the use	⊙	○	⊙	○	○	○	⊙	⊙	⊙
(skin	○	○	○	○	○	○	○	○	○
cleansing)	○	○	○	○	○	○	○	○	○

Note : b means the balance.

Table 3--(c)
(formulation : % by wt.)

	19	20	21	22	23	24	25	26
lauroylglycine TEA salt	—	—	—	—	—	—	—	—
lauroylglycine Na salt	—	—	—	—	—	—	—	—
lauroyl- β -alanine TEA salt	25	28	—	—	—	—	—	—
lauroyl- β -alanine K salt	—	—	25	28	28	25	28	28
myristoyl- β -alanine TEA salt	—	—	—	—	—	—	—	—
lauroyl- α -alanine TEA salt	—	—	—	—	—	—	—	—
isostearyl- β -alanine TEA salt	—	—	—	—	—	—	—	—
lauroyl-N-methyl- β -alanine Na salt	—	—	—	—	—	—	—	—
TEA laurate	—	—	—	—	—	—	—	—
TEA lauryl phosphate	—	—	—	—	—	—	—	—
Na cocoylisethionate	—	—	5	—	—	5	—	—
lauryldimethylamino-2-hydroxypropylsulfobetaine	—	—	—	2	—	—	2	—
lauryldimethylaminoacetate betaine	—	—	—	—	2	—	—	2
lauryldimethylamine oxide	—	—	—	—	—	—	—	—
diethanolamide of lauric acid	—	—	—	—	—	—	—	—
alkyl polyglucoside (C ₁₂ :C ₁₄)	5	—	—	—	—	—	—	—
cetyltrimethylammonium chloride	—	2	—	—	—	—	—	—
purified water	b	b	b	b	b	b	b	b
Foam volume (ml)	220	210	230	235	235	220	215	215
Precipitation of lubricant platy crystals	○	○	○	○	○	○	○	○
Comfort in	◎	○	◎	◎	◎	◎	◎	◎
the use	◎	○	◎	◎	◎	○	○	○
(skin	○	○	○	○	○	○	○	○
cleansing)	○	○	○	○	○	○	○	○
(1)foam breaking during rinsing	◎	○	◎	◎	◎	◎	◎	◎
(2)slippage during rinsing	◎	○	◎	◎	◎	○	○	○
(3)slippage after rinsing	○	○	○	○	○	○	○	○
(4)slippage after drying	○	○	○	○	○	○	○	○

Note : b means the balance.

Table 3-(d)

(formulation : % by wt.)									
	27	28	29	30	31	32	33		
lauroylglycine TEA salt	-	-	-	30	-	-	-		
lauroylglycine Na salt	-	-	-	-	-	-	-		
lauroyl- β -alanine TEA salt	-	-	-	-	30	10	-		
lauroyl- β -alanine K salt	-	-	-	-	-	-	-		
myristoyl- β -alanine TEA salt	-	-	-	-	-	-	-		
lauroyl- α -alanine TEA salt	28	-	-	-	-	-	-		
isostearyl- β -alanine TEA salt	-	28	-	-	-	-	-		
lauroyl-N-methyl- β -alanine Na salt	-	-	28	-	-	-	30		
TEA laurate	-	-	-	-	-	-	-		
TEA lauryl phosphate	-	-	-	-	-	-	-		
Na cocoylisethionate	-	-	-	-	-	20	-		
lauryldimethylamino-2-hydroxypropylsulfobetaine	-	-	-	-	-	-	-		
lauryldimethylaminoacetate betaine	-	2	-	-	-	-	-		
lauryldimethylamine oxide	2	-	-	-	-	-	-		
diethanolamide of lauric acid	-	-	-	-	-	-	-		
alkyl polyglucoside (C ₁₂ :C ₁₄)	-	-	-	-	-	-	-		
cetyltrimethylammonium chloride	-	-	-	-	-	-	-		
purified water	b	b	b	b	b	b	b		
Foam volume (ml)	160	100	170	170	180	220	165		
Precipitation of lubricant platy crystals	X	X	X	O	O	Δ	X		
Comfort in	X	X	X	$\odot$	$\odot$	Δ	X		
the use	Δ	Δ	Δ	$\odot$	$\odot$	Δ	Δ		
(skin	X	X	X	O	O	Δ	X		
cleansing)	Δ	Δ	Δ	O	O	Δ	X		

Note : b means the balance.

Table 4

(formulation : % by wt.)

	4	9	1 2	1 8	2 7	2 9	3 2
lauroylglycine TEA salt	—	—	—	—	—	—	—
lauroylglycine Na salt	—	—	—	—	—	—	—
lauroyl- β -alanine TEA salt	25	28	28	28	—	—	10
lauroyl- β -alanine K salt	—	—	—	—	—	—	—
myristoyl- β -alanine TEA salt	—	—	—	—	28	—	—
lauroyl- α -alanine TEA salt	—	—	—	—	—	—	—
isostearyl- β -alanine TEA salt	—	—	—	—	—	—	—
lauroyl-N-methyl- β -alanine Na salt	—	—	—	—	—	28	—
TEA laurate	—	—	—	—	—	—	—
TEA lauryl phosphate	—	—	—	—	—	—	—
Na cocoylisethionate	5	—	—	—	—	—	20
lauryldimethylamino-2-hydroxypropylsulfobetaine	—	2	—	—	—	—	—
lauryldimethylaminoacetate betaine	—	—	2	—	—	—	—
lauryldimethylamine oxide	—	—	—	2	2	2	—
diethanolamide of lauric acid	—	—	—	—	—	—	—
alkyl polyglucoside (C ₁₂ :C ₁₄)	—	—	—	—	—	—	—
cetyltrimethylammonium chloride	—	—	—	—	—	—	—
purified water	b	b	b	b	b	b	b
Comfort in	⊙	⊙	⊙	⊙	×	×	Δ
(1)foam breaking during rinsing							
the use	○	○	○	○	Δ	Δ	Δ
(2)slippage during rinsing							
(skin	○	○	○	○	Δ	Δ	Δ
(3)slippage after rinsing							
(4)slippage after drying	○	○	○	○	Δ	Δ	Δ
cleansing)							

Note : b means the balance.

Example 6

	[Formulation]	(% by weight)
	(1) lauroyl- β -alanine TEA salt	30
5	(2) alkyl polyglucoside (C ₁₂ , G _{1.4})	5
	(3) diethanolamide of lauric acid	2
10	(4) perfume	0.5
	(5) ethanol	3
	(6) water	the balance

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In accordance with the above formulation, the components (1) to (3) were dissolved in hot water. After cooling, the components (4) and (5) were added thereto. Thus a liquid detergent composition was prepared.

When the skin and the hair were washed with the liquid detergent composition obtained above, the product showed good foaming properties, good foam breaking, good slippage from the rinsing step to after drying and an excellent comfort in the use.

Example 7

25	[Formulation]	(% by weight)
	(1) lauroyl- β -alanine TEA salt	30
30	(2) TEA laurate	5
	(3) lauryldimethylamine oxide	2
	(4) perfume	0.5
35	(5) dibutylhydroxytoluene	0.2
	(6) ethanol	3
40	(7) water	the balance

45 In accordance with the above formulation, the components (1) to (3) were dissolved in hot water. After cooling, the components (4) to (6) were added thereto. Thus a liquid detergent composition was prepared.

When the skin and the hair were washed with the liquid detergent composition obtained above, the product showed good foaming properties, good foam breaking, good slippage from the rinsing step to after drying and an excellent comfort in the use.

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Example 8

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	(1) lauroyl- β -alanine Na salt	70
5	(2) diethanolamide of lauric acid	7
	(3) stearic acid	10
	(4) perfume	1
10	(5) water	the balance

15 In accordance with the above formation, the components (1) to (5) were mixed uniformly at 60° C. After cooling, the obtained mixture was subjected to kneading, extrusion and stamping in the conventional manner. Thus a solid detergent composition was prepared.

When the skin and the hair were washed with the solid detergent composition obtained above, the product showed good foaming properties, good foam breaking, good slippage from the rinsing step to after drying and an excellent comfort in the use.

20 Test Example 1

5 ml of each sample in Table 5 contained in a glass of 3 cm in diameter was applied to the forearms of 10 subjects for 30 minutes and after the treatment the test parts were rinsed with tap water and wiped with a towel. This procedure was conducted twice a day for 4 days (i.e., 8 times in total). On the fifth day, the rash conditions (erythema and desquamation) of the test parts were evaluated with the naked eye in accordance with the criteria as specified below by skilled persons. Table 5 shows the results on average.

Criteria:

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(1) Erythema

- 0: nonobservable.
- 0.5: slightly observed.
- 1: somewhat observed.
- 35 2: observed.
- 3: extremely observed.

(2) Desquamation

- 0: nonobservable.
- 0.5: slightly observed
- 40 1: somewhat observed.
- 2: observed.
- 3: extremely observed.

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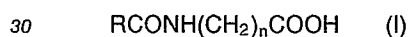
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Table 5

No.	Sample	Rash	
		erythema	desquamation
1	5% aq. lauroyl- β -alanine TEA salt soln.	0	0
2	10% aq. lauroyl- β -alanine TEA salt soln.	0.05	0.25
3	5% aq. TEA lauryl phosphate soln.	0.65	0.8
4	10% aq. TEA lauryl phosphate soln.	0.7	0.7
5	5% aq. soap soln.	2.8	2.5
6	water	0.05	0.05

Claims

1. A liquid detergent composition containing 5 to 60% by weight of a potassium or alkanolamine salt of a secondary amide-type N-acylamino acid represented by the following general formula (I):



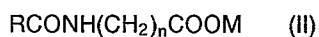
wherein R represents a straight-chain saturated hydrocarbon acyl group having 10 to 14 carbon atoms; and

n is a number of 2.

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2. A liquid detergent composition as claimed in Claim 1, wherein RCO in the general formula (I) is a lauroyl group.
3. A detergent composition comprising an N-acyl compound (A) represented by the following general formula (II) and surfactant(s) [other than the component (A)] (B) at a weight ratio of (A)/(B) of from 99/1 to 1/1;

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wherein RCO represents a straight-chain acyl group having 8 to 22 carbon atoms;

n is an integer of from 1 to 11; and

M represents an alkali metal or an inorganic or organic ammonium.

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4. A detergent composition as claimed in Claim 3, wherein the content of said N-acyl compound in the composition is 5% by weight or more and the content of said surfactant(s) (B) in the composition is from 0.1 to 45% by weight.
5. A detergent composition as claimed in Claim 3, wherein the weight ratio of the component (A)/the component (B) ranges from 95/5 to 60/40.
6. A detergent composition as claimed in Claim 3, wherein RCO in the general formula (II) is a straight-chain acyl group having 10 to 14 carbon atoms.

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7. A detergent composition as claimed in Claim 3, wherein n in the general formula (II) is an integer of from 1 to 5.

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