

Description**Field of the Invention:**

5 This invention relates to a detergent composition which can favorably be used as a shampoo, skin cleanser, and more particularly, to a detergent composition which can produce fine, slippery, creamy foam. It imparts the least irritation to the skin and hair, and, at the same time, a tense, slippery feeling to the hair, and a light, smooth feeling to the skin.

Description of the Background Art:

Conventional detergents such as shampoos contain anionic surface active agents, e.g. alkyl sulfate, polyoxyethylene alkyl sulfate, as their major components. Such anionic surface active agents, however, are known to give damages to the skin and the hair, since the hair and horny layers to be washed are made up of keratinous protein which are liable to be denatured by anionic surface active agents.

EP-A-0 337 354 describes a detergent composition comprising alkyl-saccharide surface active agents and cationic polymers.

Nonionic type shampoos have been introduced as products which cause less damages to the hair (Japanese Patent Application Laid-open No. 13609/1978). Polyoxyethylene sorbitan ester (TWEEN) and alkyl glycoside are proposed as nonionic surface active agents used in the shampoo. Foam produced by nonionic surface active agents, however, is not necessarily sufficient in terms of both the amount and the quality. That is to say, the foam is coarse and less slippery. Alkylsaccharides are known as nonionic surfactants having better foaming capability. The foam, however, does not satisfy the basic quality requirements, imparting a creaky feeling upon use. Alkylsaccharides thus are not necessarily satisfactory surface active agents for shampoos and body shampoos.

The purpose of the present invention is to provide, with due consideration to the drawbacks of such conventional shampoos, a detergent composition which imparts the least damages to the skin and produces fine, smooth, slippery foam.

SUMMARY OF THE INVENTION

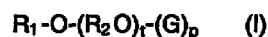
Extensive studies undertaken by the present inventors in order to accomplish the above purpose revealed that the combined use of an alkylsaccharide surface active agent which is a nonionic surface active agent and a silicone derivative produced an improved detergent composition which can produce favorable fine foam, imparts the least irritation to the skin and the hair, and gives a light, tense, slippery feeling to the skin and the hair without a creaky feeling.

Accordingly, an object of this invention is to provide a detergent composition as defined in claim 1 comprising an alkylsaccharide surface active agent and a silicone derivative.

Other and further objects, features, and advantages of the invention will appear more fully from the following description.

DETAILED DESCRIPTION OF THE INVENTION AND PREFERRED EMBODIMENTS

A typical alkylsaccharide surface active agent which can be used in the present invention is that represented by following formula (I),



wherein R_1 is a linear or branched alkyl, alkenyl, or alkylphenyl group having 6-18 carbon atoms, R_2 is an alkylene group having 2-4 carbon atoms, G is a reduced saccharide residue having 5-6 carbon atoms, t is a value of 0-10, and p is a value of 1-10.

Among alkylsaccharides represented by formula (I), those having an alkyl group of C_6-18 , especially of C_8-12 , for R_1 , such as octyl, decyl, lauryl, or the like, are preferable. t in formula (I), which indicates the condensation degree of alkyleneoxide, is a value of 0-10, preferably 0-4, and most preferably 0. G in formula (I), which is the basic unit of the hydrophilic portion of the alkylsaccharide, is a reduced saccharide residue having 5-6 carbon atoms. Glucose, galactose, and fructose are preferable reduced saccharide residues. The average polymerization degree of saccharide indicated by p in formula (I) is 1-10, and preferably 1-4. It is desirable to determine the polymerization degree considering the characteristics derived

from the hydrophobic group R_1 . For example, when R_1 is a hydrophobic group having an average carbon atom content of 8-11, a preferable value of p is 1-1.4, while for R_1 with an average carbon atom content of 12-14, the p value of 1.5-4.0 is preferable. Such a polymerization degree of saccharide can be determined by the proton NMR method.

5 There is no specific restrictions as to the amount of alkylsaccharides to be incorporated into the composition of the present invention, although a preferable amount is 1-50%, with the especially preferable amount being 5-30%.

Following compounds are given as examples of silicone derivatives which can be used in conjunction with the alkylsaccharide in this invention.

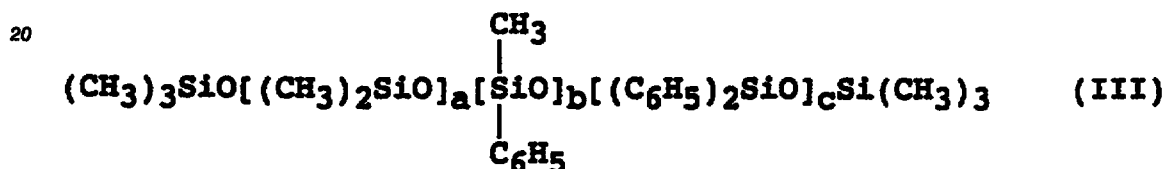
10 (1) Dimethylpolysiloxanes represented by formula (II)



wherein $n1$ is an integer of 3 or more.

15 Dimethylpolysiloxane commercially available under the trademark of KF96 (product of Shin-etsu Chemical Co., Ltd.) is given as a typical example of the compound of formula (II).

(2) Methylphenylpolysiloxane represented by formula (III)

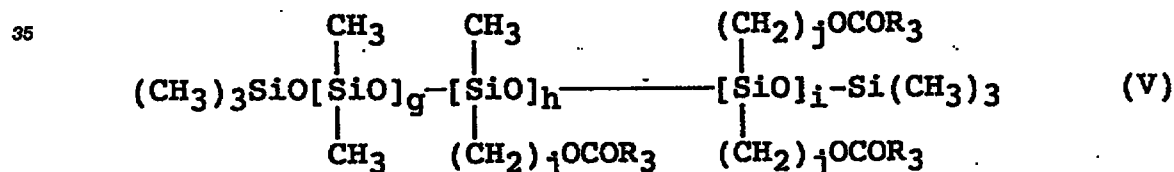


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wherein a , b , and c are numbers of which the sum is 1-550, provided that when b is 0, c is other than 0, and when c is 0, b is other than 0.

30 Methylphenylpolysiloxanes of formula (III) are widely known compounds, and are commercially available in the market, for example under the trademark of KF50 (product of Shin-etsu Chemical Co., Ltd.).

(4) Fatty acid-modified silicone represented by formula (V)



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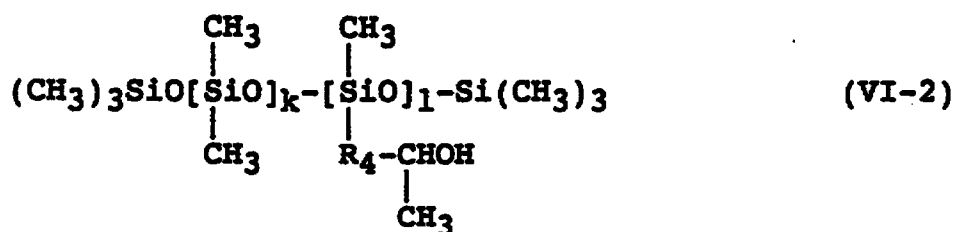
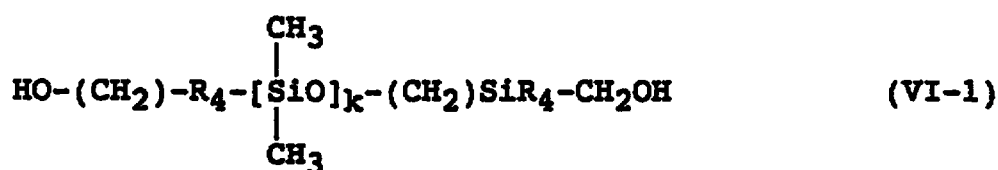
wherein g , h , and i are individually a number of 1-350, j is a number of 0-10, and R_3 is an alkyl group having carbon atoms of 9-21.

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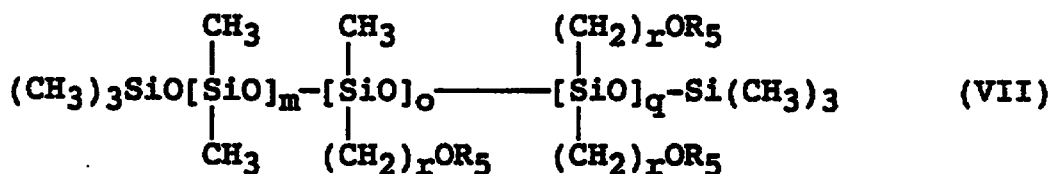
(5) Alcohol-modified silicone represented by formula (VI-1) or (VI-2)



wherein k and l individually indicates a number of 1-500, preferably of 1-200, and R₄ represents a group C_{n4}H_{2n4}, wherein n₄ is a number of 0-4.

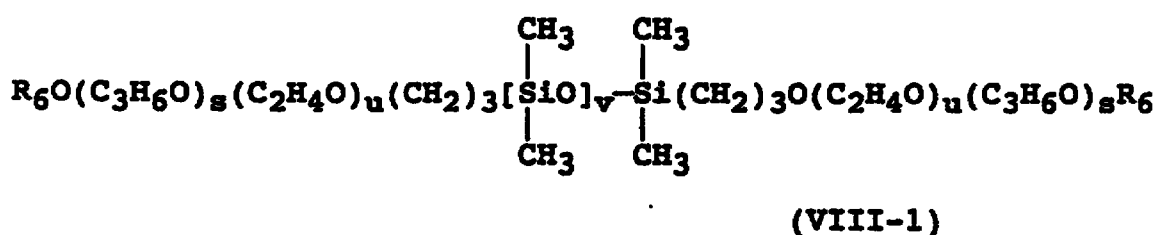
(6) Fatty acid alcohol-modified silicone represented by formula

(VII)

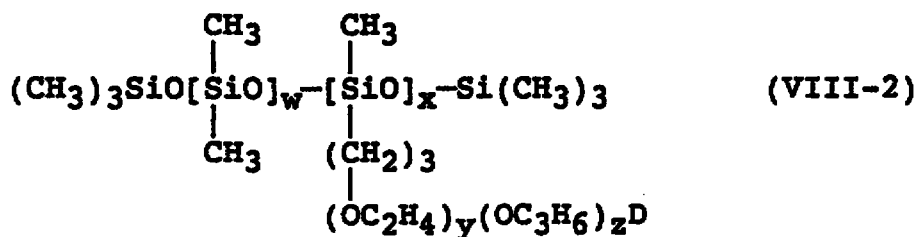


wherein m, o, and q are numbers of which the sum is 1-300, provided that r is 0-5, and R₅ represents a group C_{n5}H_{2n5+1}, wherein n₅ is a number of 4-22.

(7) Polyether-modified silicone represented by formula (VIII-1) or (VIII-2)



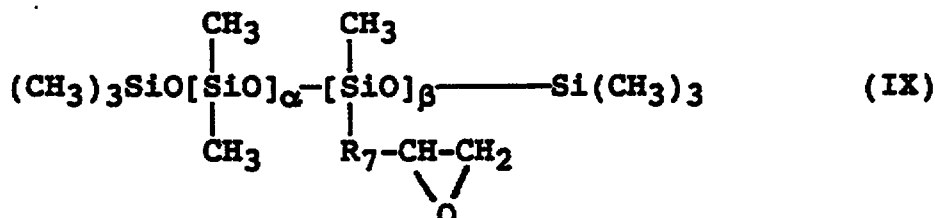
wherein s is a number of 0-35, u is a number of 1-45, v is a number of 0-400, and R₆ represents a group C_{n6}H_{2n6+1}, wherein n₆ is a number of 1-4.



wherein w is a number of 2-110, and preferably of 20-80; x is a number of 1-50, and preferably of 3-30; y is a number of 0-50, and preferably of 5-30; z is a number of 0-50, and preferably of 0-35; and D represents an alkyl group having 1-12 carbon atom or a group $OC_{n7}H_{2n7+1}$, wherein $n7$ is a number of 0-6.

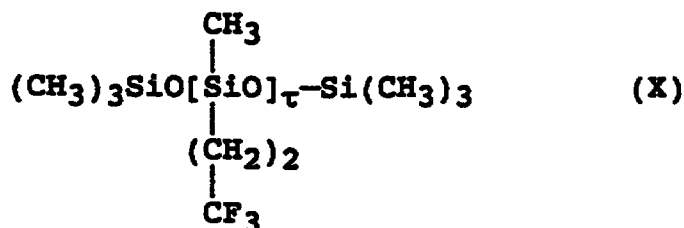
Silicone ether copolymers represented by formula (VIII-1) and (VIII-2) are well known and commercially available under the trademarks of KF351, KF352 (both manufactured by Shin-etsu Chemical Co., Ltd.), and the like. They are suitable for use in the present invention.

(8) Epoxy-modified silicone represented by formula (IX)



wherein α is a number of 1-500, and preferably of 1-250; β is a number of 1-50, and preferably of 1-30; and R_7 represents an alkylene group having 1-3 carbon atoms.

(9) Fluorine-modified silicone represented by formula (X)

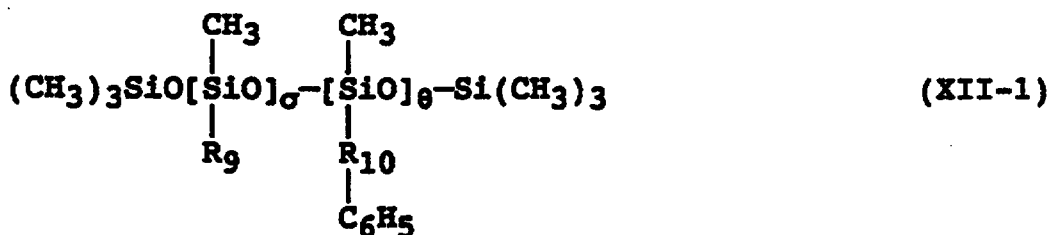


wherein τ is a number of 1-400, and preferably of 1-250. (10) Cyclic silicone represented by formula (XI)

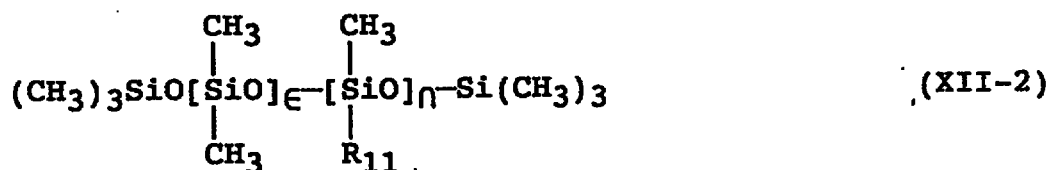


wherein δ is a number of 3-8 and R_8 represents an alkyl group having 1-3 carbon atoms.

(11) Alkyl-modified silicone represented by formula (XII-1) or (XII-2)



wherein σ and θ are individually a number of 1-500, and preferably of 1-200, R_9 represents an alkyl group having 2-18 carbon atoms, and R_{10} represents a group $\text{C}_{n8}\text{H}_{2n8}$, wherein $n8$ is a number of 0-4.



wherein ϵ and η are individually a number of 1-500, and preferably of 1-200, R_{11} is an alkyl group having 10-16 carbon atoms.

In preparing the detergent composition of the present invention using these silicone derivatives together with alkylsaccharide surface active agents, a suitable silicone derivative can be selected depending on the feeling which the composition intends to give to its users, such as soft finish upon use. More specifically, favorable slippery foam and excellent finish can be obtained when (1) dimethylpolysiloxane, (2) dimethylphenylpolysiloxane, (7) polyether-modified silicone, or (10) cyclic silicone is used as a silicone derivative. Especially good results are obtained when a silicone derivative (1), (7), or (10) is used. When the composition is to be used with the skin or the hair, (1) methylpolysiloxane, (7) polyether-modified silicone, or (10) cyclic silicone will give superior tensity to the hair and a superb light feeling to the skin. In this respect, most preferable silicone-derivatives are (1), and (7).

Regarding to (1) methylpolysiloxane compounds, n_1 in formula (II) can be selected from the range of 0 to 9,000 depending on the required feeling of finish. If light finish is desired, n_1 may be between 100 and 1,000. If, on the other hand, a light feeling to the skin and a tense, fast feeling to the hair are intended, n_1 greater than 2,000, preferably greater than 4,000, is desired.

The amount of silicone derivatives to be incorporated into the detergent composition of the present invention is 0.1-10% by weight, with the especially preferable amount being 0.1-5% by weight.

The detergent composition of the present invention can be prepared by mixing an alkylsaccharide surface active agent and a silicone derivative by a conventional method. Besides these two essential components, optional components which are appropriate to the types and intended use of the product can be added. Such optional components include, for example, anionic surface active agents of sulfonate-, sulfate-, carboxylate-, and phosphate type; nonionic surface active agents, and amphoteric surface active agents. In addition, such components as viscosity adjustment agents, UV absorbers, preservatives, antiseptics, antidandruffs, perfumes, coloring agents, can be added depending on the intended use of the composition. Furthermore, in order to promote a stable incorporation of silicone derivatives into the composition, solubilizing adjuvants such as ethanol, isopropanol, or polymer-type viscosity increasing agents such as cationized guar-gum can be added.

The combined use of the alkylsaccharide surface active agent and the silicone derivative in the present invention provides a detergent composition which can produce fine creamy foam, imparts the least irritation to the skin and the hair, and gives a tense, slippery feeling to the hair and a light slippery feeling without a creaky feeling to the skin.

Other features of the invention will become apparent in the course of the following description of the exemplary embodiments which are given for illustration of the invention and are not intended to be limiting thereof.

EXAMPLES

Sensory evaluations of the compositions prepared in the following examples were carried out according to the following manner.

(Feeling of foam)

Sample compositions, each 1 g, were applied to a bundle of hair (weight: 20 g, length: 20 cm) of a Japanese. Feeling of the foam through washing and rinsing were evaluated by 8 expert panelists according to the following standard.

- AAA: Foam was fine and creamy.
- BBB: Foam was fine but not felt creamy.
- CCC: Foam was coarse and not creamy.

(Feeling to the touch of the hair and the skin)

The same bundle of hair as above was washed with 1 g of liquid detergent compositions and dried, and subjected to the sensory evaluation by 8 expert panelists. Feeling to the touch of the skin was evaluated by
5 foaming 1 g of the sample detergent composition with wet hands and drying the hands with towel.

AAA: Hair felt slippery and tense. The skin felt light and refreshing.

BBB: Hair felt slightly slippery and tense. The skin felt slightly light and refreshing.

CCC: Hair was creaky and the skin felt sticky.

10 Example 1

Detergent compositions were prepared according to the formulations listed in Table 1, and feelings of the foam and feelings to the touch of the skin and hair were evaluated. The results are given in the same table.

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TABLE 1

	Invention Composition									Comparative Composition	
	1	2	3	5	6	7	9	1	2		
Decylpolyglucoside C ₁₀ -Glc _{1.3} * 1	25%	25%	25%	-	-	-	25%	25%	-		
Laurylpolyglucoside C ₁₂ -Glc _{2.5} * 2	-	-	-	25%	25%	25%	-	-	25%		
Dimethylpolysiloxane * 3	2%	-	-	2%	-	-	-	-	-		
Methylphenylpoly- siloxane * 4	-	2%	-	-	2%	-	-	-	-		
Polyether-modified siloxane * 5	-	-	2%	-	-	2%	-	-	-		
Cyclic silicone * 7	-	-	-	-	-	-	2%	-	-		
Refined water	73%	73%	73%	73%	73%	73%	73%	73%	73%		
Feeling of foam	AAA	AAA	AAA	AAA	AAA	AAA	AAA	AAA	CCC		BBB
Feeling to the touch to the skin and hair	AAA	AAA	AAA	AAA	AAA	AAA	AAA	AAA	BBB		BBB

- * 1 C₁₀: Decyl group, Glc: Glucose residue
- * 2 C₁₂: Lauryl group, Glc: Glucose residue
- * 3 Silicone KF96 (30,000 cs); product of Shin-etsu Chemical Co.
- * 4 Silicone KF56; product of Shin-etsu Chemical Co.
- * 5 Silicone KF351A; product of Shin-etsu Chemical Co.
- * 7 Silicone KF9956; product of Shin-etsu Chemical Co.

Example 2

Shampoo Composition

(Formulation)

(1) Laurylpolyglucoside C ₁₂ -O-Glc _{2,3}	20% (by weight)
(2) DiMethylpolysiloxane * 3	3%
(3) Laurylamine oxide * 9	1%
(4) Cationized cellulose * 12	0.5%
(5) Monoalkylphosphate triethanolamine salt	2%
(6) Ethyleneglycol distearate	2%
(7) Octopyrrox	0.2%
(8) Butylhydroxytoluene	0.2%
(9) Coloring agent	Small amount
(10) Perfume	Small amount
(11) Refined water	Balance

* 3 Silicone KF96 (30,000 cs); product of Shin-etsu Chemical Co.

* 9 Anhitol 20N, product of Kao Corp.

* 12 Polymer LR 30M, product of Union Carbide Corp.

(Method of Preparation)

Components (1)-(8) were homogeneously dispersed into refined water (11). After cooling, components (9) and (10) were added to the dispersion to produce a shampoo composition.

The shampoo composition produced fine creamy foam and gave a tense, glossy finish after washing.

Example 3

Body Shampoo Composition

5 (Formulation)

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(1) Decylpolyglucoside C ₁₀ -O-Glc _{1,3}	20% (by weight)
(2) DiMethylpolysiloxane * 3	3%
(3) Triethanolamine myristate	5%
(4) Glycerol	5%
(5) Ethyleneglycol distearate	3%
(6) Zinc stearate	0.2%
(7) Butylhydroxytoluene	0.2%
(8) Ethylhexyl p-dimethylaminobenzoate * 13	0.5%
(9) Coloring agent	Small amount
(10) Perfume	Small amount
(11) Refined water	Balance

* 3 Silicone KF96 (30,000 cs); product of Shin-etsu Chemical Co.

* 13 Escarol 507, product of Bandike Co.

25 (Method of Preparation)

Components (1)-(8) were homogeneously dispersed into refined water (11) at 70°C. After cooling, components (9) and (10) were added to the dispersion to produce a body shampoo composition.

The body shampoo composition produced fine creamy foam and gave a light, refreshing finish after washing.

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Example 4

Shampoo Composition

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(Formulation)

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(1) Polyoxyethylene (2EO) dodecyl- β -glucoside	15% (by weight)
(2) Polyether-modified silicone (Silicone KF351A)	3%
(3) Lauryldimethylamine oxide	1%
(4) Coconut oil diethanolamide	1%
(5) Perfume	0.3%
(6) Refined water	Balance

(Method of Preparation)

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Components (1)-(4) were dissolved into refined water at 60°C. After cooling, component (5) was added to the solution to produce a body shampoo composition.

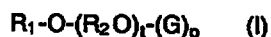
The shampoo composition produced fine foam and gave a refreshing feeling after washing.

Claims

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1. A detergent composition comprising:

(a) an alkylsaccharide surface active agent represented by following formula (I),





Example 3

Body Shampoo Composition

5 (Formulation)

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(1) Decylpolyglucoside C ₁₀ -O-Glc _{1,3}	20% (by weight)
(2) DiMethylpolysiloxane * 3	3%
(3) Triethanolamine myristate	5%
(4) Glycerol	5%
(5) Ethyleneglycol distearate	3%
(6) Zinc stearate	0.2%
(7) Butylhydroxytoluene	0.2%
(8) Ethylhexyl p-dimethylaminobenzoate * 13	0.5%
(9) Coloring agent	Small amount
(10) Perfume	Small amount
(11) Refined water	Balance

* 3 Silicone KF96 (30,000 cs); product of Shin-etsu Chemical Co.

* 13 Escarol 507, product of Bandike Co.

25 (Method of Preparation)

Components (1)-(8) were homogeneously dispersed into refined water (11) at 70°C. After cooling, components (9) and (10) were added to the dispersion to produce a body shampoo composition.

The body shampoo composition produced fine creamy foam and gave a light, refreshing finish after washing.

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Example 4

Shampoo Composition

35 (Formulation)

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(1) Polyoxyethylene (2EO) dodecyl-β-glucoside	15% (by weight)
(2) Polyether-modified silicone (Silicone KF351A)	3%
(3) Lauryldimethylamine oxide	1%
(4) Coconut oil diethanolamide	1%
(5) Perfume	0.3%
(6) Refined water	Balance

(Method of Preparation)

Components (1)-(4) were dissolved into refined water at 60°C. After cooling, component (5) was added to the solution to produce a body shampoo composition.

The shampoo composition produced fine foam and gave a refreshing feeling after washing.

Claims

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1. A detergent composition comprising:
(a) an alkylsaccharide surface active agent represented by following formula (I),





wherein R_1 is a linear or branched alkyl, alkenyl, or alkylphenyl group having 6-18 carbon atoms, wherein R_2 is an alkylene group having 2-4 carbon atoms, G is a reduced saccharide residue having 5-6 carbon atoms, t is a value of 0-10, and p is a value of 1-10, and

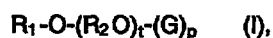
(b) a silicone derivative selected from the group consisting of dimethylpolysiloxanes, methylphenylpolysiloxanes, fatty acid-modified silicones, alcohol-modified silicones, fatty acid alcohol-modified silicones, polyether-modified silicones, epoxy-modified silicones, fluorine-modified silicones, cyclic silicone, and alkyl-modified silicones.

2. A detergent composition according to Claim 1, wherein said silicone derivative is a compound selected from the group consisting of dimethylpolysiloxanes and polyether-modified silicones.

Patentansprüche

1. Reinigungszusammensetzung mit:

(a) einem oberflächenaktiven Stoff aus Alkylsaccharid, wie durch die folgende Formel (I) repräsentiert:



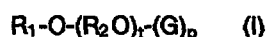
wobei R_1 eine gestreckte oder verzweigte Alkyl-, Alkenyl- oder Alkylphenyl-Gruppe mit 6-18 Kohlenstoffatomen ist, R_2 eine Alkylengruppe mit 2-4 Kohlenstoffatomen ist, G ein reduzierter Saccharidrest mit 5-6 Kohlenstoffatomen ist, t ein Wert von 0-10 ist und p ein Wert von 1-10 ist; und (b) einem Siliconderivat, das aus der Gruppe ausgewählt ist, die aus folgendem besteht: Dimethylpolysiloxanen, Methylphenylpolysiloxanen, fettsäuremodifizierten Siliconen, alkoholmodifizierten Siliconen, mit Fettsäure und Alkohol modifizierten Siliconen, polyethermodifizierten Siliconen, epoxymodifizierten Siliconen, fluormodifizierten Siliconen, cyclischen Siliconen und alkylmodifizierten Siliconen.

2. Reinigungszusammensetzung nach Anspruch 1, bei der das Siliconderivat eine Verbindung ist, die aus der aus Dimethylpolysiloxanen und polyethermodifizierten Siliconen bestehenden Gruppe ausgewählt ist.

Revendications

1. Composition détergente, comprenant:

(a) un agent tensioactif alkylsaccharide, représenté par la formule (I) ci-dessous:



où R_1 est un radical alkyle, alcényle ou alkylphényle, linéaire ou ramifié, ayant 6-18 atomes de carbone, tandis que R_2 est un radical alkylène ayant 2-4 atomes de carbone, G est un résidu de saccharide réduit ayant 5-6 atomes de carbone, t vaut 0-10 et p vaut 1-10, et

(b) un dérivé de silicone choisi dans le groupe constitué des diméthylpolysiloxanes, des méthylphénylpolysiloxanes, des silicones modifiés par acide gras, des silicones modifiés par alcool, des silicones modifiés par alcool d'acide gras, des silicones modifiés par polyéther, des silicones modifiés par époxy, des silicones modifiés par fluor, des silicones cycliques, et des silicones modifiés par alkyle.

2. Composition détergente selon la revendication 1, dans laquelle ledit dérivé de silicone est un composé choisi dans le groupe constitué des diméthylpolysiloxanes et des silicones modifiés par polyéther.