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HAIR RINSE COMPOSITION

The present invention relates to a hair rinse composition and particularly a hair rinse composition comprising a quaternary ammonium salt, a silicone derivative and a polyethylene glycol.

BACKGROUNDS OF THE INVENTION

There have been used hair rinse compositions containing a quaternary ammonium salt such as distearyldimethyl ammonium chloride as an effective component to eliminate various inconveniences after shampooing.

Hair rinse compositions are intended to give hair softness, smoothness and antistatic property. However, it is impossible to obtain adequate effectiveness for the softness and smoothness with use of such a quaternary ammonium salt. Accordingly, it has been a common practice to incorporate in the conventional hair rinse compositions fat and oil such as a higher alcohol, a glyceride and liquid paraffin in order to improve the above mentioned deficiency.

Namely, it has been believed that an emulsified dispersion system consisting of an appropriate fat and oil, and a quaternary ammonium salt is most preferable. However, the quaternary ammonium salt does not have an ability to

emulsify and disperse a fat and oil in a sufficient amount to produce the effectiveness and in a stabilized condition. Accordingly, there have been attempted to incorporate a non-ionic surface active agent having a higher hydrophilic property thereby to maintain the emulsified dispersion system in a stabilized condition. However, such a non-ionic surface active agent having a higher hydrophilic property has a function to considerably reduce the rinsing effect. Accordingly a hair rinse composition containing such a non-ionic surface active agent having a higher hydrophilic property does not provide a sufficient rinsing effect when a quaternary ammonium salt and fat and oil are incorporated thereto.

On the other hand, the conventional hair rinse compositions do not have adequate rinsing effectiveness i.e. effectiveness to impart softness, smoothness and antistatic property to hair. The development of an improved hair rinse composition has therefore been desired.

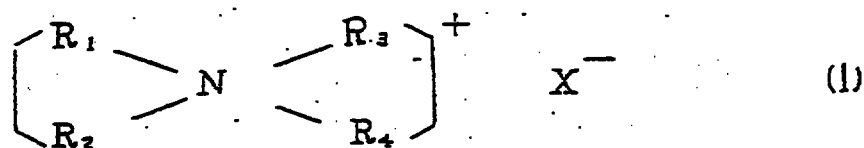
~~SUMMARY OF THE INVENTION~~

Under these circumstances, the present inventors have conducted an extensive research to eliminate the deficiencies of the conventional hair rinse compositions and to obtain a hair rinse composition having a superior rinsing

effect, and as a result have found that it is possible to overcome the above mentioned deficiencies and to obtain a hair rinse composition having a superior rinsing effect by incorporating a combination of a quaternary ammonium salt with a silicone derivative and a polyethylene glycol to a hair rinse composition. Thus, the present invention has been accomplished.

Namely, the present invention provides a hair rinse composition comprising the following three components.

(A) 0.1 to 20% by weight of one or more quaternary ammonium salts represented by the general formula (I)



where one or two of R_1 , R_2 , R_3 and R_4 are each an alkyl group having 8 to 20 carbon atoms or a hydroxyalkyl group having 8 to 20 carbon atoms and the rest

are each an alkyl group having 1 to 3 carbon atoms, a hydroxyalkyl group having 1 to 3 carbon atoms, a benzyl group or a polyoxyethylene group consisting of a total of not more than 10 molar monomer units; and X is a halogen atom or an alkylsulfuric group having 1 or 2 carbon atoms

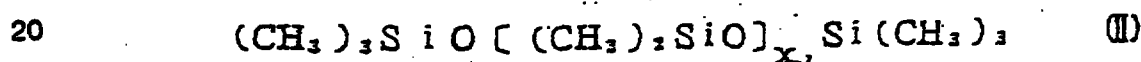
- (B) 0.1 to 20% by weight of a silicone derivative, and
- (C) 0.1 to 30% by weight of a polyethylene glycol having an average molecular weight of 200 to 100,000.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 The quaternary ammonium salts of component (A) of the present invention may preferably be, e.g., distearyl-dimethyl ammonium chloride, stearyltrimethyl ammonium methosulfate, N-stearyl-N,N,N-tri(polyoxyethylene)ammonium chloride (a total of 3 molar monomer units), cetyltriethyl
 10 ammonium bromide, and stearyltrimethyl ammonium chloride.

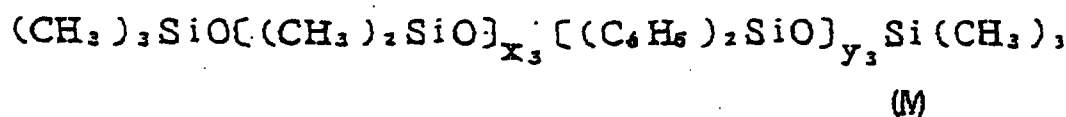
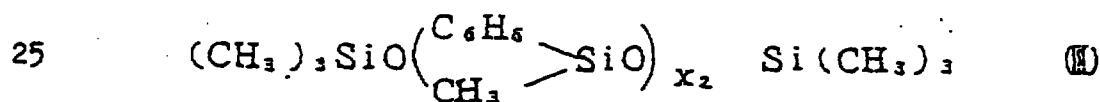
 The silicone derivative of component (B) may, for example, be selected from dimethyl polysiloxane, methylphenyl polysiloxane, a polyether modified silicone oil, an epoxy modified silicone oil, a fluorine modified silicone oil,
 15 an alcohol modified silicone oil and an alkyl modified silicone oil.

 In particular said component (B) may be
 (1) a dimethylpolysiloxane represented by the following formula (II),



(where, x_1 is an integer of 3 to 650),

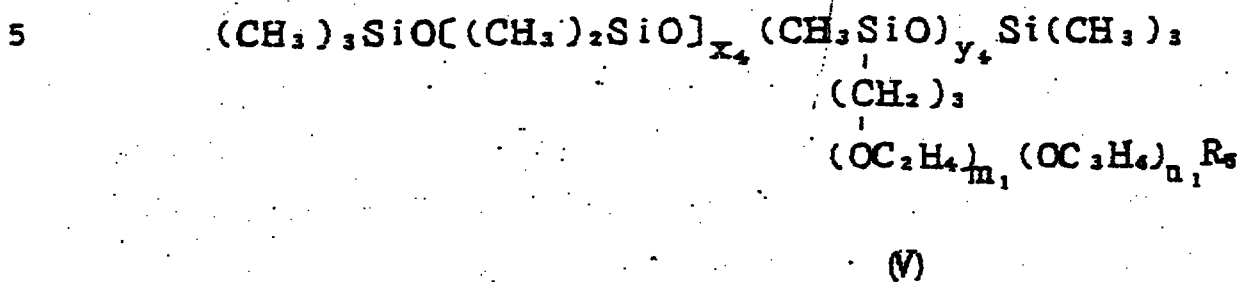
(2) a methylphenyl polysiloxane represented by either formula (III) or formula (IV),



(b)

(where x_2 is an integer of 1 to 500, and the total of x_3 and y_3 is an integer of 1 to 500),

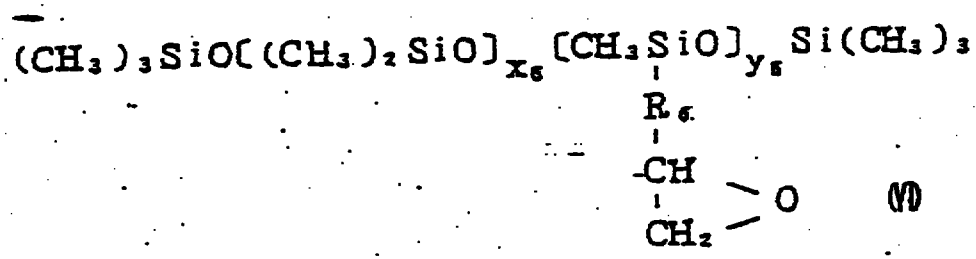
(3) a polyether modified silicone oil represented by the following formula (V),



(where R_5 is an alkyl group having 1 to 12 carbon atoms, an alkoxy group having 1 to 6 carbon atoms or a hydroxyl group, x_4 is an integer of 1 to 100, preferably 20 to 30, y_4 is an integer of 1 to 20, preferably 2 to 10, and n_1 is an integer of 0 to 50, preferably 20 to 30),

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(4) an epoxy modified silicone oil represented by the following formula (VI),

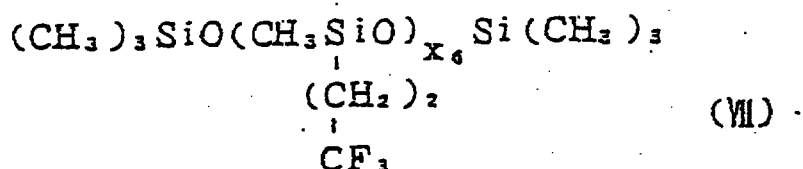


(where R_6 is an alkylene group having 1 to 3 carbon atoms, x_5 is an integer of 1 to 500, preferably 1 to 250, and y_5 is an integer of 1 to 50, preferably 1 to 30),

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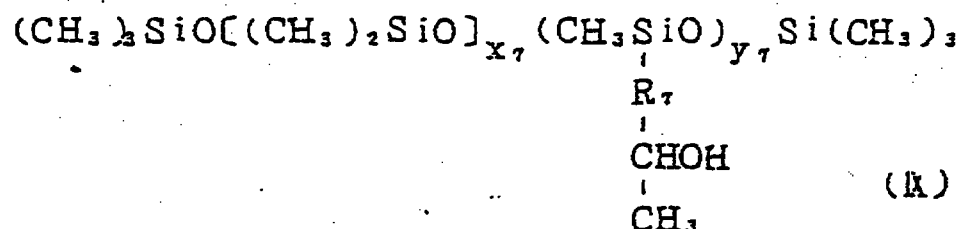
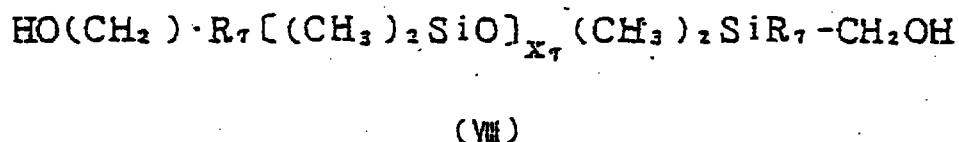
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(5) a fluorine modified silicone oil represented by the following formula (VII),



(where x_6 is an integer of 1 to 400, preferably 1 to 250),

5 (6) an alcohol modified silicone oil represented by the following formula (VIII) or (IX),

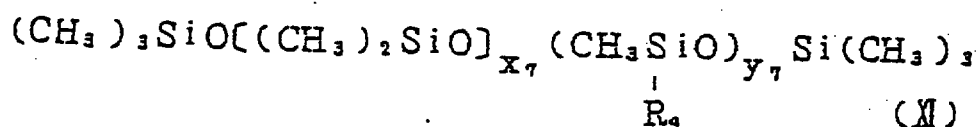
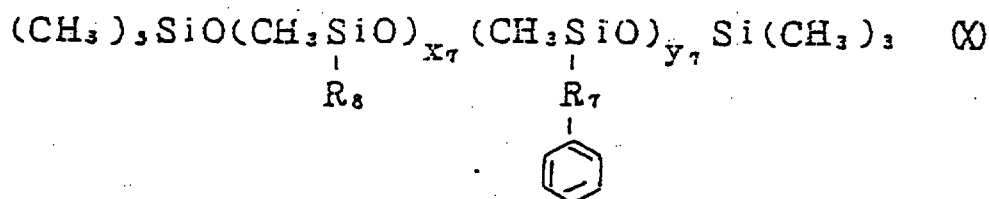


(where R_7 is a direct bond or an alkylene group having 1 to 4 carbon atoms, each of x_7 and y_7 is an integer of 1 to 500, preferably 1 to 200), or

10 (7) an alkyl modified silicone oil represented by the following formula (X) or (XI),

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(where R_8 is an alkyl group having 2 to 18 carbon atoms, R_9 is an alkyl group having 10 to 16 carbon atoms, and R_7 , x_7 and y_7 have the above mentioned meanings).

These silicone derivatives (1) to (7) may be used alone or in combination as a mixture of two or more. Among these, polyether modified silicone oil, dimethylpolysiloxane and methylphenyl polysiloxane are preferred as they give good feeling to the hair after rinsing. Especially, dimethyl polysiloxane is most preferred.

The polyethylene glycol used as component (C) is the one having an average molecular weight of 200 to 100,000, preferably 600 to 50,000. Especially, the one having an average molecular weight of 6,000 to 20,000 is most preferred. If the average molecular weight of the polyethylene glycol is less than 200, no adequate effectiveness is expected, and if the average molecular weight is more than 100,000, the viscosity of the composition tends to become too high or it is impossible to obtain a

homogeneous composition. In either case, the results will be undesirable to the invention.

The above mentioned components (A), (B) and (C) are combined in the following proportions relative to the total weight of the hair rinse composition. Namely, the quaternary ammonium salt of component (A) is 0.1 to 20% by weight (hereinafter simply indicated by %), preferably 0.5 to 5%. The silicone derivative of component (B) is 0.1 to 20%, preferably 0.5 to 5%. If the silicone derivative is less than 0.1%, no adequate effect is obtainable and if it is more than 20%, it becomes difficult to maintain the composition in a stabilized condition. The polyethylene glycol of component (C) is 0.1 to 30%, preferably 0.5 to 5.0%. If the amount is less than 0.1%, no adequate effect is obtainable and if it exceeds 30%, it is likely to cause gelation, and thus in either case the result is not desirable to the invention.

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The hair rinse composition of the present invention is prepared by dissolving these components in water or, if necessary, in an appropriate solvent such as an alcohol, propylene glycol, glycerine, etc. Further, it is desirable to adjust the pH of the solution with use of an organic acid such as citric acid or lactic acid, or an inorganic acid such as phosphoric acid or hydrochloric acid, or an inorganic alkali such as sodium hydroxide, or an organic alkali such as triethanolamine, so that the 5% solution has a pH of 3 to 8 like an ordinary hair rinse composition.

Further, it is possible to add, as the case requires, fat and oil such as a fatty acid higher alcohol, wool fat and wax, an ester, liquid paraffin, or a higher fatty acid, or an germicide, a perfume, etc., to the hair rinse composition of the present invention.

Now, the invention will be described with reference to working examples. However, it should be understood that the invention is not restricted to these examples. The following percentages are by weight.

EXAMPLE 1

The effectiveness of the silicone derivative and polyethylene glycol combined with the hair rinse composition containing the quaternary ammonium salt, was assessed by measuring the combining force required for combining wet and dry hairs. The results are shown in Table 1.

Hair rinse composition:

1.0% of distearyldimethyl ammonium chloride,
2.0% of a silicone derivative,
2.0% of a polyethylene glycol, and
95% of water.

Measurement of the combining force:

20 g of hair of a Japanese woman having had no hair treatment such as cold permanent-wave set treatment or bleaching treatment, were tied up in a bundle. The hair bundle was immersed at 40°C in 500 ml of water with 10 g of the hair rinse composition dissolved therein, for 30 seconds, then rinsed with running water for 30 seconds and dried by towelling. The combining loads were measured at 20°C by strain gauge with respect to both the half-dried hair bundle after the towel drying (wet condition: it contains a moisture of about 0.7-g-per gram of hair) and the hair bundle after drying for about 5 minutes with use of a hair drier (dried condition: it contains a moisture of about 0.1 g per gram of hair). The measurement was repeated 20 times, and an average of the measured values was regarded as the combining force.

Table 1

(Unit: g)

Conditions of hair at the time of measurement	Wet condition			Dried condition		
	PEG	PEG		PEG	PEG	
		Molecular weight 6,000	Molecular weight 20,000		Molecular weight 6,000	Molecular weight 20,000
Polyethylene glycol silicone derivative	Nil			Nil		
Nil	423	323	248	321	254	236
Dimethyl polysiloxane	350	296	240	191	177	153
Fluorine modified silicone oil	310	249	221	170	142	113
Polyether modified silicone oil	345	267	233	223	198	170
Epoxy modified silicone oil	307	277	201	163	133	115
Alcohol modified silicone oil	313	251	222	177	151	145
Alkyl modified silicone oil	325	277	236	199	188	172

In Table 1, the silicone derivatives are as follows:

Dimethyl polysiloxane

Viscosity: 100,000 centi-stokes.

Fluorine modified silicone oil

5 In the formula (VII), x_6 is 200.

Polyether modified silicone oil

In the formula (V), x_4 is 50, y_4 is 10, and m_1 and n_1 are each 20.

Epoxy modified silicone oil

10 In the formula (VI), x_5 is 100, y_5 is 10 and R_6 is methylene.

Alcohol modified silicone oil

In the formula (VIII), x_7 is 100.

Alkyl modified silicone oil

15 In the formula (XI), x_7 is 100 and y_7 is 50.

Example 2

10 -10 g of each of the hair rinse compositions A (control) and B (product of the present invention) presented below, were dissolved in 500 ml of water, and in the solution thus obtained, 2 bundles of hair (length of 20 cm, weight of 20 g; hereinafter referred to as tress) treated with a shampoo available on the market, were immersed for 30 seconds, and then rinsed for 30 seconds with running water. The tress was towelled. The following evaluations were
25 made with respect to the tress which was still wet and the

tress which was dried by being left at room temperature for a half day. The results are shown in Table 2.

Preparation of the hair rinse compositions:

	A	B
Distearyldimethyl ammonium/chloride	2.0(%)	2.0(%)
5 Monostearyltrimethyl ammonium/chloride	0.5	0.5
Oil component (liquid paraffin)	1.5	-
Polyethylene glycol (Molecular weight of 6,000)	-	0.5
Silicone derivative*	-	1.0
Water	96	96
10 pH (5% aqueous solution)	5.0	5.0

* The silicone derivative used was the same as used in Example 1.

Method of evaluation:

A panel of 10 women evaluated the feeling by touching the tresses treated with compositions A and B, and an average of the evaluations of the 10 women was regarded as the feeling evaluation.

Rating:

	Softness and flexibility	Stickiness and non-smoothness
20	very soft and flexible	very sticky (non-smooth)
10		
9		
8	Fairly soft and flexible	Fairly sticky and non-smooth

275

14

5

7

6

Moderately soft
and flexible

Moderately sticky
and non-smooth

5

4

Slightly soft
and flexible

Slightly sticky
and non-smooth

3

2

Little soft
and flexible

Little sticky
and non-smooth

1

0

Absolutely no
softness and
flexibility

Absolutely no
stickiness (non-
smoothness)

Table 2

		Softness and flexibility	Stickiness and non-smoothness
Products of the present invention (Composition B)	Dimethyl polysiloxane	7.9	2.1
	Polyether modified silicone oil	8.4	1.3
	Alkyl modified silicone oil	6.4	1.2
Comparative product (Composition A)		2.7	8.9

Example 3

The following hair rinse compositions were prepared in accordance with the conventional method.

(1) Cream type hair rinse composition

5	Dimethyl polysiloxane (Viscosity: 500 centi-stokes)	2.5%
	Polyethylene glycol (Molecular weight of 20,000)	2.0
	Distearyldimethyl ammonium chloride	0.5
	Stearyltrimethyl ammonium chloride	0.5
	Stearyl alcohol	3.0
10	Glycerine	5.0
	Butyl paraben	0.05
	Perfume	0.3
	Colouring agent	trace
	Ion-exchanged water	balance

15 (2) Clear type hair rinse composition

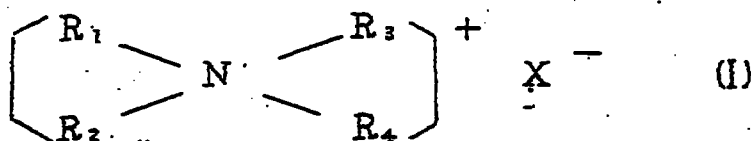
	Polyether modified silicone oil (Molecular weight of 7,000; 50% modified substance)	1.0%
	Polyethylene glycol (Molecular weight of 10,000)	3.0
	Stearyltrimethyl ammonium chloride	1.0
	Ethylene glycol	7.0
20	Methyl paraben	0.05
	Perfume	0.25
	Colouring agent	trace
	Ion-exchanged water	balance

Each of the above hair rinse compositions exhibited an excellent hair rinse effectiveness.

CLAIMS:-

1. A hair rinse composition comprising the following three components (A), (B) and (C):

(A) 0.1 to 20% by weight of one or more quaternary ammonium salts represented by the general formula (I),



where one or two of R_1 , R_2 , R_3 , and R_4 are each an alkyl group having 8 to 20 carbon atoms or a hydroxyalkyl group having 8 to 20 carbon atoms, and the rest

are each an alkyl group having 1 to 3 carbon atoms, a hydroxyalkyl group having 1 to 3 carbon atoms, a benzyl group or a polyoxyethylene group consisting of a total of not more than 10 molar monomer units; and X is a halogen atom or an alkylsulfuric group having 1 or 2 carbon atoms.

(B) 0.1 to 20% by weight of a silicone derivative, and

(C) 0.1 to 30% by weight of a polyethylene glycol having an average molecular weight of 200 to 100,000.

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1 2. The hair rinse composition as claimed in claim 1,
2 wherein said silicone derivative is selected from
3 dimethyl polysiloxane, methylphenyl poly-
4 siloxane, a polyether modified silicone oil, an epoxy
5 modified silicone oil, a fluorine modified silicone oil,
6 an alcohol modified silicone oil and an alkyl modified
7 silicone oil

1 3. The hair rinse composition as claimed in claim 2,
2 wherein said silicone derivative is selected from
3 a polyether modified silicone oil, dimethyl-
4 polysiloxane and methylphenyl polysiloxane.

1 4. The hair rinse composition as claimed in any one
2 of the preceding claims, wherein the molecular weight of
3 said polyethylene glycol is 6,000 to 20,000.

1 5. A hair rinse composition as claimed in claim 1
2 and substantially as described in anyone of the specific
3 examples herein before set forth.

1 6. A method of treating the hair which comprises administering
2 thereto a composition as claimed in any one of claims 1 to 5.

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