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(54) Title: HAIR CONDITIONING COMPOSITION BASED ON C16-C22 ANIONIC SURFACTANT, C16-C22 FATTY MATERIAL AND AN ANIONIC PROTEIN FRACTION

(57) Abstract: Hair care composition comprising an anionic protein fraction and an anionic surfactant with an alkyl groups with from 16-22 carbons, a fatty material having from 16-22 carbons and water, wherein the composition comprises less than 1% wt. anionic surfactant having an alkyl group with from 8-14 carbons and less than 0.5% wt. cationic surfactant.



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HAIR CONDITIONING COMPOSITION BASED ON C16-C22 ANIONIC SURFACTANT, C16-C22 FATTY MATERIAL AND AN ANIONIC PROTEIN FRACTION

The present invention relates to a hair conditioning composition comprising a quat-free conditioning gel.

5

Cationic conditioners containing quaternary ammonium based conditioning ingredients are unstable with anionic based protein fractions. Thus, there remains the need for dedicated and effective conditioning compositions which are stable with such ingredients.

10

Accordingly, the present invention relates to a hair care composition comprising an anionic protein fraction and anionic surfactant with an alkyl group having from 16-22 carbons, a fatty material having from 16-22 carbons and water, wherein the composition comprises less than 1% wt. anionic surfactant having an alkyl group with from 8-14 carbons and less than 0.5% wt. cationic surfactant.

15

Preferably, the composition comprises no anionic surfactant having an alkyl group with from 8 to 14 carbons.

20 Preferably, the composition comprises less than 0.2 wt % of cationic surfactant, more preferably less than 0.1 wt% of cationic surfactant, most preferably no cationic surfactant.

It is preferred if the fatty material is a fatty alcohol. Especially preferred is cetostearyl alcohol.

25

Preferably, the number of carbons of the anionic surfactant and the fatty material in the gel network are within 4, preferably 2 carbons of each other and most preferably have the same number of carbons. More preferably, the surfactant/fatty material comprise a single alkyl group of within 4 carbons, more preferably within

30

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2 carbons and most preferably are the same length. This assists in maintaining stability of the gel network.

The composition comprises an anionic protein fraction, preferably the protein
5 fraction is keratin based, the preferred keratin fraction is S-sulphonated, it is further preferred where the S-sulfonated keratin protein fraction is intact. "Intact" refers to proteins that have not been significantly hydrolysed. Of particular relevance for this invention are "intact" proteins described by Gillespie in Gillespie
(Biochemistry and physiology of the skin, vol. 1, Ed. Goldsmith Oxford University
10 Press, London, 1983, pp475-510). These are equivalent to the keratin proteins in their native form without the disulfide cross-links formed through the process of keratinisation.

A "keratin protein fraction" is a purified form of keratin that contains predominantly,
15 although not entirely, one distinct protein group.

S-Sulfonated keratins have cysteine/cystine present predominantly in the form S-sulfocysteine, commonly known as the Bunte salt.

20 Preferred keratin fractions are S-sulphonated keratin fractions containing S-sulphonated keratin high sulphur protein (SHSP). These proteins preferably have a molecular weight in the range 10-30 kD and a cysteine content determined through amino acid analysis of greater than 10%. This material may be prepared by a variety of methods including those described in WO2003011894 A1.

25

A preferred s-sulphonated protein fraction is Keratec HSP (ex Croda).

The level of keratin fraction in the composition is at least 0.2 wt% of the composition (composition 1), preferably greater than 0.5 wt%, more preferably

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greater than 1.5 wt%, most preferably from 1 to 7 wt%. Better stability of the product is found if the level of keratin fraction is below 5 wt%.

Preferably, the composition comprises vegetable oils. Preferred vegetable oils
5 include jojoba, soybean, sunflower seed oil, rice bran, avocado, almond, olive, sesame, castor, coconut, mink oils.

Preferably, the composition comprises anionic polymer. Examples of anionic polymer include alkyl vinyl ether-maleic acid copolymers (Trade name: Gantrez
10 S95), Xanthan Gum (Trade Name: Keltrol RD) and Dehydroxanthan gum (Trade Name: Amaze XT).

Preferably, the composition has a pH of from 2.5 to 8.

15 In a second aspect the present invention provides the use of a composition according to any preceding claim for conditioning the hair.

The composition according to the invention may contain any of a number of ingredients commonly found in conditioning compositions for example silicones,
20 fatty alcohols, fatty acids, fatty amides, colourants, dyes, pigments, pearlescers, thickeners, structurants, opacifiers, etc.

Silicone is a particularly preferred ingredient in hair treatment compositions of the invention. In particular conditioners of the invention will preferably also comprise
25 emulsified particles of silicone, for enhancing conditioning performance. The silicone is insoluble in the aqueous matrix of the composition and so is present in an emulsified form, with the silicone present as dispersed particles.

Suitable silicones include polydiorganosiloxanes, in particular
30 polydimethylsiloxanes which have the CTFA designation dimethicone. Also

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suitable for use compositions of the invention (particularly shampoos and conditioners) are polydimethyl siloxanes having hydroxyl end groups, which have the CTFA designation dimethiconol. Also suitable for use in compositions of the invention are silicone gums having a slight degree of cross-linking, as are
5 described for example in WO 96/31188. These materials can impart body, volume and stylability to hair, as well as good wet and dry conditioning.

The viscosity of the emulsified silicone itself (not the emulsion or the final hair conditioning composition) is typically at least 10,000 cst. In general we have
10 found that conditioning performance increases with increased viscosity. Accordingly, the viscosity of the silicone itself is preferably at least 60,000 cst, most preferably at least 500,000 cst, ideally at least 1,000,000 cst. Preferably the viscosity does not exceed 10^9 cst for ease of formulation.

15 Emulsified silicones for use in hair shampoos and conditioners of the invention will typically have an average silicone particle size in the composition of less than 30, preferably less than 20, more preferably less than 10 microns. We have found that reducing the particle size generally improves conditioning performance. Most preferably the average silicone particle size of the emulsified silicone in the
20 composition is less than 2 microns, ideally it ranges from 0.01 to 1 micron. Silicone emulsions having an average silicone particle size of ≤ 0.15 microns are generally termed microemulsions.

Particle size may be measured by means of a laser light scattering technique,
25 using a 2600D Particle Sizer from Malvern Instruments.

Suitable silicone emulsions for use in the invention are also commercially available in a pre-emulsified form.

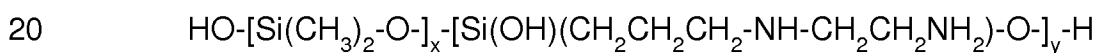
- 5 -

Examples of suitable pre-formed emulsions include emulsions DC2-1766, DC2-1784, and microemulsions DC2-1865 and DC2-1870, all available from Dow Corning. These are all emulsions/microemulsions of dimethiconol. Cross-linked silicone gums are also available in a pre-emulsified form, which is advantageous for ease of formulation. A preferred example is the material available from Dow Corning as DC X2-1787, which is an emulsion of cross-linked dimethiconol gum. A further preferred example is the material available from Dow Corning as DC X2-1391, which is a microemulsion of cross-linked dimethiconol gum.

A further preferred class of silicones for inclusion in shampoos and conditioners of the invention are amino functional silicones. By "amino functional silicone" is meant a silicone containing at least one primary, secondary or tertiary amine group, or a quaternary ammonium group.

Examples of suitable amino functional silicones include:

(i) polysiloxanes having the CTFA designation "amodimethicone", and the general formula:



in which x and y are numbers depending on the molecular weight of the polymer, generally such that the molecular weight is between about 5,000 and 500,000.

(ii) polysiloxanes having the general formula:



in which:

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G is selected from H, phenyl, OH or C₁₋₈ alkyl, e.g. methyl;

a is 0 or an integer from 1 to 3, preferably 0;

b is 0 or 1, preferably 1;

m and n are numbers such that (m + n) can range from 1 to 2000,

5 preferably from 50 to 150;

m is a number from 1 to 2000, preferably from 1 to 10;

n is a number from 0 to 1999, preferably from 49 to 149, and

R' is a monovalent radical of formula -C_qH_{2q}L in which q is a number from 2
10 to 8 and L is an aminofunctional group selected from the following:

-NR''-CH₂-CH₂-N(R'')₂

-N(R'')₂

-N⁺(R'')₃A⁻

15 -N⁺H(R'')₂A⁻

-N⁺H₂(R'')A⁻

-N(R'')-CH₂-CH₂-N⁺H₂(R'')A⁻

in which R'' is selected from H, phenyl, benzyl, or a saturated monovalent
20 hydrocarbon radical, e.g. C₁₋₂₀ alkyl, and;

A is a halide ion, e.g. chloride or bromide.

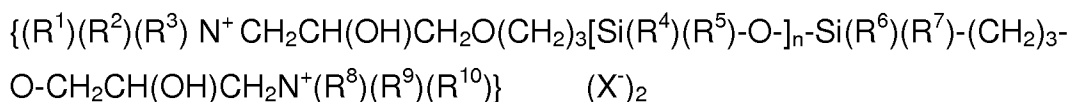
Suitable amino functional silicones corresponding to the above formula
25 include those polysiloxanes termed "trimethylsilylamodimethicone" as depicted below, and which are sufficiently water insoluble so as to be useful in compositions of the invention:

Si(CH₃)₃ - O - [Si(CH₃)₂ - O -]_x - [Si(CH₃)(R - NH - CH₂CH₂NH₂) - O -
30]_y - Si(CH₃)₃

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wherein $x + y$ is a number from about 50 to about 500, and wherein R is an alkylene group having from 2 to 5 carbon atoms. Preferably, the number $x + y$ is in the range of from about 100 to about 300.

- 5 (iii) quaternary silicone polymers having the general formula:



- 10 wherein R^1 and R^{10} may be the same or different and may be independently selected from H, saturated or unsaturated long or short chain alk(en)yl, branched chain alk(en)yl and C_5 - C_8 cyclic ring systems;

- 15 R^2 thru' R^9 may be the same or different and may be independently selected from H, straight or branched chain lower alk(en)yl, and C_5 - C_8 cyclic ring systems;

n is a number within the range of about 60 to about 120, preferably about 80, and

- 20 X^- is preferably acetate, but may instead be for example halide, organic carboxylate, organic sulphonate or the like.

- 25 Suitable quaternary silicone polymers of this class are described in EP-A-0 530 974.

- 30 Amino functional silicones suitable for use in shampoos and conditioners of the invention will typically have a mole % amine functionality in the range of from about 0.1 to about 8.0 mole %, preferably from about 0.1 to about 5.0 mole %, most preferably from about 0.1 to about 2.0 mole %. In general the amine

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concentration should not exceed about 8.0 mole % since we have found that too high an amine concentration can be detrimental to total silicone deposition and therefore conditioning performance.

- 5 The viscosity of the amino functional silicone is not particularly critical and can suitably range from about 100 to about 500,000 cst.

Specific examples of amino functional silicones suitable for use in the invention are the aminosilicone oils DC2-8220, DC2-8166, DC2-8466, and DC2-8950-114
10 (all ex Dow Corning), and GE 1149-75, (ex General Electric Silicones).

Also suitable are emulsions of amino functional silicone oils with non ionic and/or cationic surfactant.

- 15 Suitably such pre-formed emulsions will have an average amino functional silicone particle size in the shampoo composition of less than 30, preferably less than 20, more preferably less than 10 microns. Again, we have found that reducing the particle size generally improves conditioning performance. Most preferably the average amino functional silicone particle size in the composition is
20 less than 2 microns, ideally it ranges from 0.01 to 1 micron. Silicone emulsions having an average silicone particle size of ≤ 0.15 microns are generally termed microemulsions.

- Pre-formed emulsions of amino functional silicone are also available from
25 suppliers of silicone oils such as Dow Corning and General Electric. Specific examples include DC929 Cationic Emulsion, DC939 Cationic Emulsion, and the non-ionic emulsions DC2-7224, DC2-8467, DC2-8177 and DC2-8154 (all ex Dow Corning).

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An example of a quaternary silicone polymer useful in the present invention is the material K3474, ex Goldschmidt.

The total amount of silicone incorporated into compositions of the invention depends on the level of conditioning desired and the material used. A preferred amount is from 0.01 to about 10% by weight of the total composition although these limits are not absolute. The lower limit is determined by the minimum level to achieve conditioning and the upper limit by the maximum level to avoid making the hair and/or skin unacceptably greasy.

We have found that a total amount of silicone of from 0.3 to 5%, preferably 0.5 to 3%, by weight of the total composition is a suitable level.

The Examples will now be illustrated with reference to the following non-limiting Examples.

EXAMPLE 1

The following are conditioning compositions according to the invention:

Ingredient	1	2	3	4	5	6	7	8
Sodium Cetylstearyl sulphate	1	1	1.5	1.5	1	1.5	1.5	1
Cetostearyl Alcohol	4	3	6	6	3	6	6	4
NATROSOL® 250HHR ⁽¹⁾	-	1.5	-	-	1.5	-	-	-
POLYSURF® 67 ⁽²⁾	-	-	0.03	-	-	0.03	-	-
ESAFLOR® HM22 ⁽³⁾	-	-		0.4	-		0.4	-

[illegible][illegible]

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Ingredient	17	18	19	20	21	22
Sodium Cetylstearyl sulphate	1	1	1	1	1	1
Cetostearyl Alcohol	3	3	3	3	3	3
Keltrol RD	1.0	-	-	1.0	-	-
Amaze XT	-	1.0	-	-	1.0	-
Gantrez S 95	-	-	0.5	-	-	0.5
Silicone (60% active)	1.5	1.5	1.5	1.5	1.5	1.5
Keratec HSP (11.9%act)	33.6	33.6	33.6	16.8	16.8	16.8
DMDM Hydantoin and 3-iodo-2propynylbutyl carbamate (50%act)	0.1	0.1	0.1	0.1	0.1	0.1
Disodium EDTA	0.1	0.1	0.1	0.1	0.1	0.1
Methylisothiazolinone	0.04	0.04	0.04	0.04	0.04	0.04
Perfume	0.5	0.5	0.5	0.5	0.5	0.5
Water	to 100	to 100	to 100	to 100	to 100	to 100

On storage for 12 days at 45 °C the products remained stable.

- 5 The following is a process for making a conditioning composition.

Heat water to about 70 °C. To this, add the polymers (when present), fatty alcohol, anionic surfactant (Sodium Cetylstearyl sulphate), using high speed stirring. When uniform dispersion obtained, cool this mixture down to about 45 °C with the same speed stirring. Remaining components are then added to this with moderate speed stirring.

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Keratec and were needed natural oils can be added either at the early stage when heating water (before adding fatty alcohol) or at the late stage after the mixture cooled down to about 45 °C.

- 5 For better mixtures of different fatty amphiphiles, the different fatty materials can be co-melted together before adding into the heated water along with the anionic surfactant.

CLAIMS

1. Hair care composition comprising an anionic protein fraction and an anionic surfactant with an alkyl groups with from 16-22 carbons, a fatty material
5 having from 16-22 carbons and water, wherein the composition comprises less than 1% wt. anionic surfactant having an alkyl group with from 8-14 carbons and less than 0.5% wt. cationic surfactant.
2. Composition according to claim 1 in which the anionic protein fraction is a
10 keratin fraction.
3. Composition according to claim 1 or claim 2 in which the anionic protein fraction is S-sulphonated.
- 15 4. Composition according to any preceding claim in which the level of anionic protein fraction is from 1 to 7 wt% of the total formulation.
5. Composition according to any preceding claim which has a pH of from 2.5 to 8.
20
6. Use of a composition according to any preceding claim for conditioning the hair.

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2010/058695

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K8/64 A61Q1/00
ADD. A61K8/34 A61K8/46 A61Q5/12

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61Q A61K

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

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

EPO-Internal, BIOSIS, CHEM ABS Data, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5 885 561 A (FLEMMING ERNST [DE] ET AL) 23 March 1999 (1999-03-23) examples 11,31	1-6
Y	US 4 736 067 A (BUGAUT ANDREE [FR] ET AL) 5 April 1988 (1988-04-05) examples 2, 3, 6,16, 17, 22,26, 27	1-6
A	WO 2009/072027 A2 (PROCTER & GAMBLE [US]; JOHNSON ERIC SCOTT [US]; HEATH BENJAMIN PARKER) 11 June 2009 (2009-06-11) examples 6, 9-10, 12-14	1-6
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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