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(54) Title: COMPOSITION

(57) Abstract: Hair conditioning composition comprising hydrophobically modified anionic polymer and a fatty acid.

COMPOSITION

The invention relates to an improved conditioning composition.

Despite the prior art there remains a need for improved conditioning compositions.

Accordingly, there is provided a hair conditioning composition comprising hydrophobically modified anionic polymer.

The hydrophobically-modified anionic polymer provides better rinse-off properties. This is particularly so when the composition is a conditioning mask composition.

Preferably, the polymer is an acrylate or methacrylate polymer.

Preferably, the hydrophobic modification comprises alkylation.

Preferably, the alkyl group comprises from 6 to 30 carbons, more preferably from 16 to 28 and most preferably from 18 to 24 carbons.

A preferred polymer is sold by Rohm & Haas under the tradename Aculyn. The most preferred of which is Aculyn 28™.

The polymer is present at from 0.01 to 5% wt. and more preferably from 0.05 to 1% wt.

The composition according to the invention also comprises a fatty acid. Examples are branched chain fatty acids such as 18-methyleicosanoic acid and other homologues of this series, straight chain fatty acids such as stearic, myristic and palmitic acids, and unsaturated fatty acids such as oleic acid, linoleic acid, linolenic acid and arachidonic acid. A preferred fatty acid is stearic acid. The fatty acid may be added singly, as mixtures, or in the form of blends derived from extracts of, e.g. lanolin.

The fatty acid is present at from 0.01 to 5% wt. preferably from 0.05 to 1% wt.

Preferably, the composition according to any preceding claim comprising a structurant. The structurant improves the feel of the product in the hand of the user.

The structurant used for “structuring” the composition according to the invention may be a natural or synthetic crystalline wax. Mineral, animal or plant (vegetable) waxes are all described as natural waxes. Synthetic waxes are described as those waxes that have been synthetically polymerized from raw materials or chemically modified natural waxes.

Among the natural crystalline waxes which may be used are petroleum based waxes such as paraffins and microcrystalline wax. Chemically, both microcrystalline (MC) and paraffin waxes are very similar, consisting of long saturated hydrocarbon chains. Both types of waxes are separated from crude petroleum with the MC waxes typically having higher molecular weights. Paraffin wax is extracted from the high boiling fractions of crude petroleum during the refining process by cooling and filtering. Following a sweating process to remove remaining oil in the wax, the resulting paraffin wax typically has less than 0.5 % oil.

There are many different grades available mostly varying in melting point. Generally, paraffin waxes are colourless or white and transparent. Paraffin waxes consist mainly of straight chain molecules with a small amount of branched-chain molecules mostly having branching near the end of the chains. As a result of the long, straight chains, paraffin wax has large, well-formed crystals. Molecular weights of paraffin waxes generally range from 360 to 420 (26 to 30 carbon atoms), although versions with longer chains (molecular weights up to 600) are available. Typical melting points are 126-134°F (52-57°C), the high molecular weight versions have melting points near 170°F (77°C). Paraffin waxes are brittle and the addition of oil, weakens the structure (lowers the tensile strength).

Microcrystalline waxes (MC) differ from paraffin waxes in physical properties, chain structure and length, and in the process of manufacture. They are tougher, more flexible and have higher tensile strength and melting points than paraffin waxes. MC waxes have high affinity for oil which, when added, increases the wax plasticity. MC wax cannot be distilled without decomposition, and therefore is separated from the residual distillation fraction of crude petroleum by de-waxing processes involving recrystallization in organic solvents and centrifugation. Oil content varies with grade but is usually around 2 % to 12 %. MC waxes contain mostly branched-chain molecules located at random along the chain with some straight chains. Typical melting points are 145 to 195°F (63-91°C). A high penetration number indicates flexibility of the wax, but flexibility is not a function of melting point.

There are also other mineral waxes such as montan wax, lignite wax, osocerite, ceresin, utah wax and peat wax.

Animal waxes can be obtained from such things as bees, insects or whales. These waxes include but are not limited to beeswax, Chinese wax, shellac wax, spermaceti and wool wax. Beeswax, for example, classified as an animal wax, is secreted by the honey bee to construct the honeycomb. The wax is harvested by melting the honeycomb and filtering away the wax. Beeswax has melting points around 61-65°C, and is compatible with almost all waxes and oils.

Plant waxes can be derived from beans, leaves and berries. Plant or vegetable waxes can include bayberry, candelilla, carnauba, cotton, esparto, fir, Japan, ouricury, palm, rice-oil, sugar cane, ucuhuba and cocoa butter.

Among synthetic crystalline waxes which may be used are crystalline polymers such as polyethylene, polymethylene, chemically modified waxes, polymerized alpha olefins and synthetic animal waxes. For example, siliconyl beeswax may be used which is beeswax that has been chemically modified.

A sample of various waxes which may be used according to the subject invention and of their properties is set forth below in Table 1.

Table 1: Waxes and their Properties

Wax	Manufacturer	Classification*	Penetration No.** (25°C)	Melting Point (°C)
Ultraflex Amber	Bareco Products	MC	27	74.1
Victory Amber	Bareco Products	MC	28	79.1
White Petrolatum	Penreco	MC	-	54
Multiwax ML-445	Crompton Corp.	MC	30	79.4
Multiwax 180-M	Crompton Corp.	MC	18	85
Multiwax W-835	Crompton Corp.	MC	70	76.7
Multiwax X145A	Crompton Corp.	MC	40	74
Paraffin Wax 50/155	Frank B. Ross Co., Inc.	P	12	67
Siliconyl Beeswax	Koster Kuenen, Inc.	DN	N/A	70
Be Square 175 white	Bareco Products	MC	15	82.5
Be Square 175 black	Bareco Products	MC	18	82.3
Perrowax 2250F	The International Group	MC	N/A	40
Beeswax NF	Frank B. Ross Co., Inc.	N	18	62.5

*MC: microcrystalline; P: paraffin; N: natural/animal; dN: derivative of natural/animal wax

**Penetration No.: Penetration number values as reported by manufacturers using the standard test method for needle penetration of petroleum waxes of the American Society for Testing and Materials (ASTM D1321). The depth of penetration of needle in tenths of a millimeter (dmm) is measured with a penetrometer that applies a standard needle to the sample for 5 seconds under a load of 100 grams.

Another structuring material of the invention (e.g., used for structuring other benefit agents) is the microcrystalline wax petrolatum (also known as petrolatum or mineral jelly), which typically comprises about 90% by wt. of a natural mixture of microcrystalline waxes plus minor amounts of other impurities.

The composition according to the invention may comprise any of a number of ingredients which are common to conditioning compositions.

Compositions in accordance with the invention may also be formulated as conditioners for the treatment of hair (typically after shampooing) and subsequent rinsing.

Such a conditioner will comprise one or more conditioning surfactants which are cosmetically acceptable and suitable for topical application to the hair.

Suitable conditioning surfactants are selected from cationic surfactants, used singly or in admixture. Examples include quaternary ammonium hydroxides or salts thereof, e.g. chlorides.

Suitable cationic surfactants for use in hair conditioners of the invention include cetyltrimethylammonium chloride, behenyltrimethylammonium chloride, cetylpyridinium chloride, tetramethylammonium chloride, tetraethylammonium chloride, octyltrimethylammonium chloride, dodecyltrimethylammonium chloride, hexadecyltrimethylammonium chloride, octyldimethylbenzylammonium chloride, decyldimethylbenzylammonium chloride, stearyldimethylbenzylammonium chloride, didodecyldimethylammonium chloride, dioctadecyldimethylammonium chloride, tallowtrimethylammonium chloride, cocotrimethylammonium chloride, and the corresponding hydroxides thereof. Further suitable cationic surfactants include those materials having the CTFA designations Quaternium-5, Quaternium-31 and Quaternium-18. Mixtures of any of the foregoing materials may also be suitable. A particularly useful cationic surfactant for use in hair conditioners of the invention is cetyltrimethylammonium chloride, available commercially, for example as DEHYQUART, ex Henkel.

In conditioners of the invention, the level of cationic surfactant is preferably from 0.01 to 10%, more preferably 0.05 to 5%, most preferably 0.1 to 2% by weight of the composition.

Conditioners of the invention advantageously incorporate a fatty alcohol material. The combined use of fatty alcohol materials and cationic surfactants in conditioning compositions is believed to be especially advantageous, because this leads to the formation of a lamellar phase, in which the cationic surfactant is dispersed.

Representative fatty alcohols comprise from 8 to 22 carbon atoms, more preferably 16 to 20. Examples of suitable fatty alcohols include cetyl alcohol, stearyl alcohol and mixtures thereof. The use of these materials is also advantageous in that they contribute to the overall conditioning properties of compositions of the invention.

The level of fatty alcohol material in conditioners of the invention is conveniently from 0.01 to 10%, preferably from 0.1 to 5% by weight of the composition. The weight ratio of cationic surfactant to fatty alcohol is suitably from 10:1 to 1:10, preferably from 4:1 to 1:8, optimally from 1:1 to 1:4.

Silicone is a particularly preferred ingredient in hair treatment compositions of the invention. In particular, conditioners of the invention will preferably also comprise 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 polydimethylsiloxanes which have the CTFA designation dimethicone. Also suitable for use compositions of the invention 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 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 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.

Emulsified silicones for use in 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 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, 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.

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 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:

$$HO-[Si(CH_3)_2-O-]_x-[Si(OH)(CH_2CH_2CH_2-NH-CH_2CH_2NH_2)-O-]_y-H$$

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:

$$R'_aG_{3-a}\text{-Si}(\text{OSiG}_2)_n\text{-}(\text{OSiG}_bR'_{2-b})_m\text{-O-SiG}_{3-a}\text{-}R'_a$$

in which:

G is selected from H, phenyl, OH or C_{1-8} 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, 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 to 8 and L is an aminofunctional group selected from the following:

$-NR''-CH_2-CH_2-N(R'')_2$
$-N(R'')_2$
$-N^+(R'')_3A^-$
$-N^+H(R'')_2\ A^-$
$-N^+H_2(R'')\ A^-$
$-N(R'')-CH_2-CH_2-N^+H_2(R'')\ A^-$

in which R'' is selected from H, phenyl, benzyl, or a saturated monovalent hydrocarbon radical, e.g. C_{1-20} alkyl, and;

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

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

$Si(CH_3)_3 - O - [Si(CH_3)_2 - O -]_x - [Si (CH_3) (R - NH - CH_2CH_2 NH_2) - O -]_y - Si (CH_3)_3$

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.

(iii) quaternary silicone polymers having the general formula:

$\{(R^1)(R^2)(R^3)\ N^+\ CH_2CH(OH)CH_2O(CH_2)_3[Si(R^4)(R^5)-O-]_n-Si(R^6)(R^7)-(CH_2)_3-O-CH_2CH(OH)CH_2N^+(R^8)(R^9)(R^{10})\}\ (X^-)_2$

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;

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

X^- is preferably acetate, but may instead be for example halide, organic carboxylate, organic sulphonate or the like. Suitable quaternary silicone polymers of this class are described in EP-A-0 530 974.

Amino functional silicones suitable for use in 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 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.

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 (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.

Suitably such pre-formed emulsions will have an average amino functional silicone particle size in the 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 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 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).

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.

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 preferred level.

Other ingredients may include viscosity modifiers, preservatives, colouring agents, polyols such as glycerine and polypropylene glycol, chelating agents such as EDTA, antioxidants such as vitamin E acetate, fragrances, antimicrobials and sunscreens. Each of these ingredients will be present in an amount effective to accomplish its purpose. Generally these optional ingredients are included individually at a level of up to about 5% by weight of the total composition.

Preferably, compositions of this invention also contain adjuvants suitable for hair care. Generally such ingredients are included individually at a level of up to 2%, preferably up to 1%, by weight of the total composition.

Among suitable hair care adjuvants, are:

(i) natural hair root nutrients, such as amino acids and sugars. Examples of suitable amino acids include arginine, cysteine, glutamine, glutamic acid, isoleucine, leucine, methionine, serine and valine, and/or precursors and derivatives thereof. The amino acids may be added singly, in mixtures, or in the form of peptides, e.g. di- and tripeptides. The amino acids may also be added in the form of a protein hydrolysate, such as a keratin or collagen hydrolysate. Suitable sugars are glucose, dextrose and fructose. These may be added singly or in the form of, e.g. fruit extracts.

(ii) hair fibre benefit agents. Examples are:

- ceramides, for moisturising the fibre and maintaining cuticle integrity. Ceramides are available by extraction from natural sources, or as synthetic ceramides and pseudoceramides. A preferred ceramide is Ceramide II, ex Quest. Mixtures of ceramides may also be suitable, such as Ceramides LS, ex Laboratoires Serobiologiques.

Mixtures of any of the above active ingredients may also be used.

In a second aspect there is provided a method for the manufacture of a conditioning composition according to the first aspect. The method comprising forming a conditioning gel phase which comprises a cationic surfactant and a fatty material and, separately forming a solution of the hydrophobically modified polymer, optionally with a cationic surfactant, which, if present, is added to the water first.

The two mixtures are then added to one another before the remaining ingredients are added to form the conditioning composition.

Preferably, the extra ingredients include perfumes, thickeners, preservatives, colours and conditioning silicones.

EXAMPLE 1

Formulation according to the invention. It is made by heating approximately 35% wt. of the water to 65-70°C prior to addition of stearmidopropyl dimethylamine. Continue mixing until product completely dissolved.

Add Aculyn28 at high shear to aid dispersion.

Separately, melt together behenyltrimethyl ammonium chloride, cetearyl alcohol, stearic acid and paraffin wax and add this molten mixture to the main mixer with the Aculyn and stearamidopropyl dimethylamine.

Cool down to 40-45°C and then add conditioning silicones , fragrances and preservatives.

Ingredient	**% wt.**
Behenyltrimethyl ammonium chloride	1.05
Stearamidopropyl dimethyl amine	1.50
Cetearyl alcohol	6.00
Acrylates/beheneth-25 methacrylate	0.10
Stearic acid	0.10
Paraffin wax	1.00
Conditioning silicone	3.00
Fragrance	1.00
Disodium EDTA	0.10
Phenoxyethanol	0.40
Methylparaben	0.20
Water	To 100

EXAMPLE 2

Composition A is the composition according to example 1 while the comparative, composition B, is the same save for the lack of stearic acid.

Compositions A and B were compared in their ability to deposit silicone.

Composition A scored 2403 ppm while composition B scored only 1327 ppm.

CLAIMS

1. Hair conditioning composition comprising hydrophobically modified anionic polymer, a silicone and a fatty acid.

2. Composition according to claim 1 comprising a structurant.

3. Composition according to claim 1 or 2 wherein the polymer is an acrylate polymer.

4. Composition according to any preceding claim wherein the polymer is a methacrylate polymer.

5. Composition according to any preceding claim wherein the hydrophobic modification comprises alkylation.

6. Composition according to claim 5 wherein the alkyl group comprises from 6 to 30 carbons.

7. Composition according to any of claims 2-6 wherein the structurant is paraffin wax.

8. Composition according to any preceding claim comprising from 0.01 to 5% wt. polymer.

9. Composition according to any preceding claim wherein the fatty acid comprises from 8 to 28 carbons.

10. Composition according to any preceding claim wherein the fatty acid is straight chain.

11. Composition according to any preceding claim wherein the fatty acid is stearic acid.

AMENDED CLAIMS
received by the International Bureau on 25th November 2009 (25.11.2009)

CLAIMS

1. Hair conditioning composition comprising hydrophobically modified anionic polymer, a silicone, a fatty acid and a wax.

2. Composition according to claim 1 or 2 wherein the polymer is an acrylate polymer.

3. Composition according to any preceding claim wherein the polymer is a methacrylate polymer.

4. Composition according to any preceding claim wherein the hydrophobic modification comprises alkylation.

5. Composition according to claim 4 wherein the alkyl group comprises from 6 to 30 carbons.

6. Composition according to any preceding claim comprising from 0.01 to 5% wt. polymer.

7. Composition according to any preceding claim wherein the wax is paraffin wax.

8. Composition according to any preceding claim wherein the fatty acid comprises from 8 to 28 carbons.

9. Composition according to any preceding claim wherein the fatty acid is straight chain.

10. Composition according to any preceding claim wherein the fatty acid is stearic acid.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/057515

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K8/81 A61Q5/02 A61Q5/12 A61K8/89 A61K8/36

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)
A61K A61Q

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 656 257 A (FEALY BARBARA J [US] ET AL) 12 August 1997 (1997-08-12) examples 10-30 -----	1-11
X	US 2007/225196 A1 (KUHLMAN DENNIS EUGENE [US] ET AL) 27 September 2007 (2007-09-27) example 13 -----	1-11
X	US 2006/193789 A1 (TAMARKIN DOV [IL] ET AL) 31 August 2006 (2006-08-31) example 3 -----	1-11
X	DE 10 2005 022021 A1 (BASF AG [DE]) 16 November 2006 (2006-11-16) example 10 ----- -/--	1-11

☒ 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

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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Date of the actual completion of the international search 22 September 2009	Date of mailing of the international search report 01/10/2009
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Miller, Bernhard

INTERNATIONAL SEARCH REPORT

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C(Continuation). 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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