



## (51) International Patent Classification:

*A61K 8/891* (2006.01) *A61Q 5/12* (2006.01)  
*A61K 8/898* (2006.01)

## (21) International Application Number:

PCT/EP2012/058305

## (22) International Filing Date:

4 May 2012 (04.05.2012)

## (25) Filing Language:

English

## (26) Publication Language:

English

## (30) Priority Data:

11165887.8 12 May 2011 (12.05.2011) EP

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(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— without international search report and to be republished upon receipt of that report (Rule 48.2(g))

## (54) Title: HAIR TREATMENT COMPOSITIONS

(57) **Abstract:** A hair treatment composition comprising a mixture of at least two silicone emulsions: i) the first emulsion comprising a pre-formed emulsion of a amino-functionalised silicone, ii) the second emulsion comprising a pre-formed silicone blend comprising a) from 50 to 95% by weight of the silicone blend of a first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C, and b) from 5 to 50% by weight of the silicone blend of a second silicone which is functionalised.



## **HAIR TREATMENT COMPOSITIONS**

The current invention relates to hair treatment compositions which can provide  
5 conditioning benefits, in particular selective conditioning benefits to the hair.

### **BACKGROUND AND PRIOR ART**

10 WO02/096375 (Unilever) discloses a blend of silicones comprising a combination of a first silicone having a viscosity of at least 100,000 m<sup>2</sup>/sec and a second amino functionalised silicone provides excellent conditioning benefits.

WO99/44565 and WO99/44567 (Unilever) disclose shampoo compositions  
15 containing a combination of an amino-functionalised silicone and an insoluble non-amino functional insoluble silicone.

WO99/49836 (Unilever) discloses rinse-off conditioner formulations containing an amino-functional silicone corresponding to a defined general formula and having a  
20 mole percent amino functionality of at least 1 mole %. The formulations may further comprise emulsified particles of a non-amino functionalised silicone.

WO99/53889 (Unilever) discloses shampoo compositions containing emulsified particles of a first insoluble silicone having a particle size of from 0.15 to  
25 30 microns and a second insoluble silicone having a particles size less than 0.10 microns. The silicones are incorporated into the shampoo as preformed aqueous emulsions.

WO98/43599 (Unilever) discloses a hair treatment composition, such as a  
30 shampoo or conditioner, comprising a silicone component comprising (i) 0.01 to 50% by weight of a silicone gum having a viscosity greater than 1 McSt, (ii) 30 to

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95% by weight of a silicone fluid having a viscosity of less than 100 cSt, and (iii) 0.1 to 10% by weight of an amino functionalised silicone.

We have surprisingly found that by selecting the physical form and silicone  
5 emulsion types of the silicones in a hair treatment composition, the composition can selectively deposit the silicone mixtures onto the hair such that their deposition is enhanced on areas where the hair is damaged.

## 10 **SUMMARY OF THE INVENTION**

In a first aspect, this invention provides a hair treatment composition comprising a mixture of at least two silicone emulsions

- 15 i) a first emulsion comprising an amino- functionalised silicone;
  - ii) a second silicone blend emulsion comprising a silicone droplet phase comprising:
    - 20 a) a first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C
    - and
    - b) a second silicone which is functionalised;
- 25 in which the first and second silicones are evenly distributed within a silicone droplet phase.

In a second aspect the invention relates to the use of the above mentioned  
30 composition for selectively depositing silicone onto damaged hair

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In a further aspect the present invention relates to a method of treating hair with the above mentioned composition.

The invention further relates to A process for preparing a composition comprising  
5 the steps of preparing the following emulsions::

i) a first emulsion comprising an amino- functionalised silicone;

10 ii) a second silicone blend emulsion comprising a silicone droplet phase comprising

a) a first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C

and

15

b) a second silicone which is functionalised;

in which the first and second silicones are in intimate contact and evenly distributed within the silicone droplet phase; and mixing the emulsions with  
20 an aqueous base composition.

### **DETAILED DESCRIPTION OF THE INVENTION**

25 Unless specified otherwise, all wt% values quoted hereinafter are percentages by weight based on total weight of the hair treatment composition.

The amine number is the weight in milligrams of KOH equivalent to the total amine hydrogen content in one gram of amino functionalized silicone. The amine number  
30 is determined by titration of the amine acetate ion by a dilute, typically 1N HCl

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solution. For pure material, the amine number can be calculated using the molecular weights of the pure compound and KOH (56.1 g/mol).

Unless stated otherwise the viscosity of silicones can be measured by means of a  
5 glass capillary viscometer as set out further in Dow Corning Corporate Test  
Method CTM004, July 20 1970.

Silicone particle size may be measured by means of a laser light scattering  
technique, for example using a 2600D Particle Sizer from Malvern Instruments.  
10 In the context of the present invention amino-functionalised and amino-silicone  
are used interchangeably.

Damaged hair is hair fibre damage that has occurred by mechanical or chemical  
means or a combination of both. It can include cuticle loss and/or erosion,  
15 longitudinal rupturing, and fibril disintegration.

### **Silicone Component**

The total silicone content of the total composition of the invention is suitably in the  
20 region of from 0.1 to 20%, preferably from 1 to 10 wt%.

Preferably, the  $D_{3,2}$  average particle size of the silicone droplets in the emulsion  
and also in the final composition is less than 100  $\mu\text{m}$ , more preferably less than  
20  $\mu\text{m}$ , and yet more preferably less than 10  $\mu\text{m}$ . Preferably, the average particle  
25 size of the silicone droplets in the emulsion and also in the final composition is  
greater than 0.1  $\mu\text{m}$ . A smaller silicone particle size enables a more uniform  
distribution of silicone on the hair for the same amount of silicone in the  
composition.

- 5 -

The silicone component comprises at least two emulsions, the first comprising an amino-functionalised silicone and the second comprising a silicone blend.

5 The weight ratio of the first silicone emulsion to the second silicone emulsion is preferably from 3:1 to 1:3, more preferably from 1:2 to 2:1, most preferably it is 1:1.

### First Silicone Emulsion

10 The composition of the invention comprises an emulsified amino functionalised silicone in the first silicone emulsion.

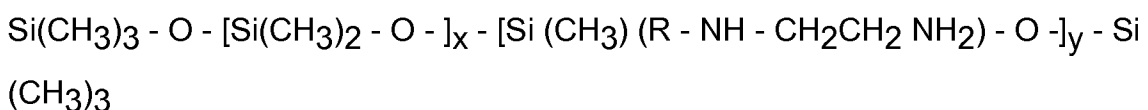
The amino functionalised silicone of the first emulsion is emulsified prior to addition of the second emulsion of the invention.

15

The amino functionalised silicone emulsion preferably has a viscosity of less than 500,000 mm<sup>2</sup>/sec at 25°C, more preferably less than 400,000 mm<sup>2</sup>/sec at 25°C, most preferably less than 200,000 mm<sup>2</sup>/sec at 25°C.

20 Suitably, the amino functionalised silicone has a molecular weight less than 200,000 Dalton, preferably less than 100,000 Dalton, more preferably in the range from 1 to 80,000 Dalton.

25 Suitable amino functionalised silicones are described in EP 455,185 (Helene Curtis) and include trimethylsilylamodimethicone as depicted below, and are sufficiently water insoluble so as to be useful in compositions of the invention:



- 6 -

wherein  $x + y$  is a number from about 50 to about 500, and the mole % amine functionality is in the range of from about 0.3 to about 8%, 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, and the mole % amine functionality is in the range of from about 1.5 to about 6%.

Examples of amino-functionalised silicones useful in the silicone component of the composition of the invention are Q2-8220 and Q2-8466 fluids, available from Dow Corning, and also SF-1708-D1, available from General Electric Silicones.

Examples of amino-functionalised silicones useful in the silicone component of the composition of the invention include ADM22 ex Wacker.

The amino-functionalised silicone preferably has an amine number from 0.1 to 0.7, more preferably from 0.2 to 0.5, most preferably from 0.30 to 0.45.

Preferably the first emulsion comprises 90 wt% of amino-silicone of its total silicone content, more preferably 95 wt%, most preferably 99wt%.

## **Second Silicone Blend Emulsion**

In the context of the present invention a silicone blend emulsion is defined as a mixture of silicones that are mixed prior to emulsification. This product emulsion type means that each silicone droplet in the emulsion will have essentially the same composition and will comprise a mixture (typically a solution) of the two types of silicone which together make up the silicone component of the composition, i.e. first silicone and second silicone.

Preferably the second emulsion comprises a pre-formed silicone blend comprising:

- 7 -

- a) from 50 to 95% by weight of the silicone blend of the first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C, and
- b) from 5 to 50% by weight of the silicone blend of the second silicone which is functionalised.

Suitably, the weight ratio of the first silicone to the second silicone in the silicone component is in the range from 15:1 to 1:1, preferably from 10:1 to 1:1, more preferably from 8:1 to 1:1, and yet more preferably from 6:1 to 2:1. A particularly preferred ratio is 3:1.

Preferably the silicone blend emulsion is an aqueous emulsion, more preferably the aqueous emulsion is mechanically-formed. In such emulsions, it is preferable that the emulsion additionally includes at least one emulsifier in order to stabilise the silicone emulsion.

Suitable emulsifiers are well known in the art and include anionic and nonionic surfactants. Examples of anionic surfactants used as emulsifiers for the silicone particles are alkylarylsulphonates, e.g., sodium dodecylbenzene sulphonate, alkyl sulphates e.g., sodium lauryl sulphate, alkyl ether sulphates, e.g., sodium lauryl ether sulphate nEO, where n is from 1 to 20 alkylphenol ether sulphates, e.g., octylphenol ether sulphate nEO where n is from 1 to 20, and sulphosuccinates, e.g., sodium dioctylsulphosuccinate.

Examples of nonionic surfactants used as emulsifiers for the silicone particles are alkylphenol ethoxylates, e.g., nonylphenol ethoxylate nEO, where n is from 1 to 50, alcohol ethoxylates, e.g., lauryl alcohol nEO, where n is from 1 to 50, ester ethoxylates, e.g., polyoxyethylene monostearate where the number of oxyethylene units is from 1 to 30.



**First Silicone of blend emulsion**

The first silicone is present at a level of at least 50 wt%, preferably at least 60 wt% based on the total weight of the silicone component.

5

The first silicone has a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C, preferably at least 200,000 mm<sup>2</sup>/sec at 25°C, more preferably at least 400,000 mm<sup>2</sup>/sec at 25°C.

- 10 In a preferred embodiment, the first silicone is a silicone gum and has a viscosity of at least 500,000 mm<sup>2</sup>/sec at 25°C, more preferably at least 600,000 mm<sup>2</sup>/sec at 25°C, and yet more preferably at least 1,000,000 mm<sup>2</sup>/sec at 25°C.

- 15 Suitably, the first silicone has a molecular weight of at least 100,000 Dalton, and preferably at least 200,000 Dalton. When the first silicone is gum, the molecular weight is suitably at least 400,000 Dalton, preferably at least 500,000 Dalton, and more preferably at least 550,000 Dalton.

- 20 Suitable as the first silicone are polydiorganosiloxanes, preferably derived from suitable combinations of R<sub>3</sub>SiO<sub>0.5</sub> and R<sub>2</sub>SiO units, where each R independently represents an alkyl, alkenyl (e.g. vinyl), alkaryl, aralkyl or aryl (e.g. phenyl) group. R is most preferably methyl. Thus, preferred first silicones for use in the silicone component of compositions of the invention are polydimethylsiloxanes (which have the CTFA designation dimethicone), optionally having end groups such as
- 25 hydroxyl. Good results have been obtained with dimethicone.

Suitable materials include DC-200 (ex Dow corning). Suitable silicone gums include SE30, SE54 and SE76 (ex General Electric Silicones).

- 30 The first silicone is not functionalised.

## Second Silicone of blend emulsion

The second silicone is present at a level of at least 5 wt%, preferably at least 10 wt%, and more preferably at least 15 wt% based on the total weight of the  
5 silicone component.

Suitably, the second silicone has a viscosity of less than 500,000 mm<sup>2</sup>/sec at 25°C, preferably less than 400,000 mm<sup>2</sup>/sec at 25°C, more preferably less than 200,000 mm<sup>2</sup>/sec at 25°C.

10

Suitably, the second silicone has a molecular weight less than 200,000 Dalton, preferably less than 100,000 Dalton, more preferably in the range from 1 to 80,000 Dalton.

15 The second component of the silicone blend is a functionalised silicone. Suitable functionalised silicones include, for example, amino-, carboxy-, betaine-, quaternary ammonium-, carbohydrate-, hydroxy- and alkoxy-substituted silicones.

Preferably, the functionalised silicone contains multiple substitutions.

20

For the avoidance of doubt, as regards hydroxyl-substituted silicones, a polydimethylsiloxane merely having hydroxyl end groups (which have the CTFA designation dimethiconol) is not considered a functionalised silicone within the present invention. However, a polydimethylsiloxane have hydroxyl substitutions  
25 along the polymer chain is considered a functionalised silicone.

Preferred functionalised silicones are amino-functionalised silicones. Suitable amino functionalised silicones are described in EP 455,185 (Helene Curtis) and include trimethylsilylamodimethicone as depicted below, and are sufficiently water  
30 insoluble so as to be useful in compositions of the invention:  $\text{Si}(\text{CH}_3)_3 - \text{O} - [\text{Si}(\text{CH}_3)_2 - \text{O} - ]_x - [\text{Si}(\text{CH}_3)(\text{R} - \text{NH} - \text{CH}_2\text{CH}_2\text{NH}_2) - \text{O} - ]_y - \text{Si}(\text{CH}_3)_3$

- 10 -

wherein  $x + y$  is a number from about 50 to about 500, and the mole % amine functionality is in the range of from about 0.3 to about 8%, 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, and the mole % amine functionality is in the range of from about 1.5 to about 6%.

Examples of amino-functionalised silicones useful in the silicone component of the composition of the invention are Q2-8220 and Q2-8466 fluids, available from Dow Corning, and also SF-1708-D1, available from General Electric Silicones.

Suitably, the amino-functionalised silicones have an amine number of 0.1 to 0.7, more preferably from 0.2 to 0.7

As described above, the silicone components of the composition is provided as a single blend which is added to the composition during manufacture.

A particularly suitable emulsion for use as the silicone component of the composition of the invention is a pre-formed emulsion containing a first silicone, especially a silicone gum and a second silicone, especially an amino-functionalised silicone, in a nonionic surfactant base, of average silicone particle size from 0.1 to 0.5  $\mu\text{m}$ , particularly 3  $\mu\text{m}$ .

WO02/096375 (Unilever) describes examples of suitable silicone blend emulsions and their method of manufacture.

An example of a commercial silicone blend emulsion is X-52-2328 available from Shin-Etsu. This blend comprises a low viscosity dimethicone with an amino-modified highly polymerized dimethicone.

A further example of a commercial silicone blend emulsion is DC-7134. This blend comprises a silicone gum with a low viscosity amino-functionalised silicone.

### Conditioners

A particularly preferred form of hair treatment composition is a conditioning composition.

5

### Conditioning Surfactant

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

10

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

### 15 **Conditioning Surfactant**

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

20 Suitable conditioning surfactants are selected from cationic surfactants, used singly or in admixture.

Cationic surfactants useful in compositions of the invention contain amino or quaternary ammonium hydrophilic moieties which are positively charged when  
25 dissolved in the aqueous composition of the present invention.

Examples of suitable cationic surfactants are those corresponding to the general formula:

30  $[N(R_1)(R_2)(R_3)(R_4)]^+ (X)^-$

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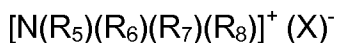
in which R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> are independently selected from (a) an aliphatic group of from 1 to 22 carbon atoms, or (b) an aromatic, alkoxy, polyoxyalkylene, alkylamido, hydroxyalkyl, aryl or alkylaryl group having up to 22 carbon atoms; and X is a salt-forming anion such as those selected from halogen, (e.g. chloride, bromide),  
5 acetate, citrate, lactate, glycolate, phosphate nitrate, sulphate, and alkylsulphate radicals.

The aliphatic groups can contain, in addition to carbon and hydrogen atoms, ether linkages, and other groups such as amino groups. The longer chain aliphatic groups,  
10 e.g., those of about 12 carbons, or higher, can be saturated or unsaturated.

The most preferred cationic surfactants for conditioner compositions of the present invention are monoalkyl quaternary ammonium compounds in which the alkyl chain length is C8 to C14.

15

Suitable examples of such materials correspond to the general formula:



20 in which R<sub>5</sub> is a hydrocarbyl chain having 8 to 14 carbon atoms or a functionalised hydrocarbyl chain with 8 to 14 carbon atoms and containing ether, ester, amido or amino moieties present as substituents or as linkages in the radical chain, and R<sub>6</sub>, R<sub>7</sub> and R<sub>8</sub> are independently selected from (a) hydrocarbyl chains of from 1 to about 4 carbon atoms, or (b) functionalised hydrocarbyl chains having from 1 to about 4  
25 carbon atoms and containing one or more aromatic, ether, ester, amido or amino moieties present as substituents or as linkages in the radical chain, and X is a salt-forming anion such as those selected from halogen, (e.g. chloride, bromide), acetate, citrate, lactate, glycolate, phosphate nitrate, sulphate, and alkylsulphate radicals.

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The functionalised hydrocarbyl chains (b) may suitably contain one or more hydrophilic moieties selected from alkoxy (preferably C<sub>1</sub> - C<sub>3</sub> alkoxy), polyoxyalkylene (preferably C<sub>1</sub> - C<sub>3</sub> polyoxyalkylene), alkylamido, hydroxyalkyl, alkylester, and combinations thereof.

5

Preferably the hydrocarbyl chains R<sub>1</sub> have 12 to 14 carbon atoms, most preferably 12 carbon atoms. They may be derived from source oils which contain substantial amounts of fatty acids having the desired hydrocarbyl chain length. For example, the fatty acids from palm kernel oil or coconut oil can be used as a source of C<sub>8</sub> to C<sub>12</sub> hydrocarbyl chains.

10

Typical monoalkyl quaternary ammonium compounds of the above general formula for use in shampoo compositions of the invention include:

- 15 (i) lauryl trimethylammonium chloride (available commercially as Arquad C35 ex-Akzo); cocodimethyl benzyl ammonium chloride (available commercially as Arquad DMCB-80 ex-Akzo)

- (ii) compounds of the general formula:

20



in which:

x + y is an integer from 2 to 20;

25

R<sub>1</sub> is a hydrocarbyl chain having 8 to 14, preferably 12 to 14, most preferably 12 carbon atoms or a functionalised hydrocarbyl chain with 8 to 14, preferably 12 to 14, most preferably 12 carbon atoms and containing ether, ester, amido or amino moieties present as substituents or as linkages in the radical chain;

30

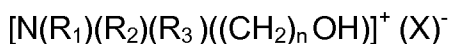
R<sub>2</sub> is a C<sub>1</sub> - C<sub>3</sub> alkyl group or benzyl group, preferably methyl, and

- 14 -

X is a salt-forming anion such as those selected from halogen, (e.g. chloride, bromide), acetate, citrate, lactate, glycolate, phosphate nitrate, sulphate, methosulphate and alkylsulphate radicals.

- 5 Suitable examples are PEG-n lauryl ammonium chlorides (where n is the PEG chain length), such as PEG-2 cocomonium chloride (available commercially as Ethoquad C12 ex-Akzo Nobel); PEG-2 cocobenzyl ammonium chloride (available commercially as Ethoquad CB/12 ex-Akzo Nobel); PEG-5 cocomonium methosulphate (available commercially as Rewoquat CPEM ex-Rewo); PEG-15  
10 cocomonium chloride (available commercially as Ethoquad C/25 ex-Akzo)

(iii) compounds of the general formula:



15

in which:

n is an integer from 1 to 4, preferably 2;

- 20  $R_1$  is a hydrocarbyl chain having 8 to 14, preferably 12 to 14, most preferably 12 carbon atoms;

$R_2$  and  $R_3$  are independently selected from  $C_1 - C_3$  alkyl groups, and are preferably methyl, and

25

X is a salt-forming anion such as those selected from halogen, (e.g. chloride, bromide), acetate, citrate, lactate, glycolate, phosphate nitrate, sulphate, and alkylsulphate radicals.

- 30 Suitable examples are lauryldimethylhydroxyethylammonium chloride (available commercially as Prapagen HY ex-Clariant).

- 15 -

Mixtures of any of the foregoing cationic surfactants compounds may also be suitable.

Examples of suitable cationic surfactants include:

5

quaternary ammonium chlorides, e.g. alkyltrimethylammonium chlorides wherein the alkyl group has from about 8 to 22 carbon atoms, for example

octyltrimethylammonium chloride, dodecyltrimethylammonium chloride,

hexadecyltrimethyl-ammonium chloride, cetyltrimethylammonium chloride,

10 octyldimethylbenzylammonium chloride, decyldimethylbenzyl-ammonium chloride,

stearyldi-methylbenzylammonium chloride, didodecyldimethylammonium chloride,

dioctadecyldimethylammonium chloride, tallow trimethylammonium chloride,

cocotrimethylammonium chloride, and the corresponding salts thereof, e.g.,

bromides, hydroxides. Cetylpyridinium chloride or salts thereof, e.g., chloride

15

Quaternium -5

Quaternium -31

Quaternium -18

and mixtures thereof.

20

In the 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 wt% of the total composition.

### Fatty Alcohol

25

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.



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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.

5 The level of fatty alcohol material in conditioners of the invention is conveniently from 0.01 to 10, preferably from 0.1 to 5 wt% by weight of the total 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.

## 10 Mousses

Hair treatment compositions in accordance with the invention may also take the form of aerosol foams (mousses) in which case a propellant must be included in the composition. This agent is responsible for expelling the other materials from  
15 the container and forming the hair mousse character.

The propellant gas can be any liquefiable gas conventionally used for aerosol containers. Examples of suitable propellants include dimethyl ether, propane, n-butane and isobutane, used singly or in admixture.

20

The amount of the propellant gases is governed by normal factors well known in the aerosol art. For hair mousses, the level of propellant is generally from 3 to 30, preferably from 5 to 15 wt% of the total composition.

25 Small quantities of surfactant ranging anywhere from 0.1 to 10, preferably from 0.1 to about 1 wt%, for example 0.3 wt% may be present in the hair mousse compositions of the invention. The surfactant may be an anionic, nonionic or cationic emulsifier. Particularly preferred are nonionic emulsifiers which are formed from alkoxylation of hydrophobes such as fatty alcohols, fatty acids and  
30 phenols.

Optional Ingredients

Compositions of this invention may contain any other ingredient normally used in hair treatment formulations. These other ingredients may include viscosity  
5 modifiers, preservatives, colouring agents, polyols such as glycerine and polypropylene glycol, chelating agents such as EDTA, antioxidants, 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 5 wt% of the total composition.

10

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 wt%, preferably up to 1 wt% of the total composition.

15 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  
20 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. A particularly  
25 preferred combination of natural hair root nutrients for inclusion in compositions of the invention is isoleucine and glucose. A particularly preferred amino acid nutrient is arginine.

(ii) hair fibre benefit agents. Examples are:

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- 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.

- 5 Mixtures of ceramides may also be suitable, such as Ceramides LS, ex Laboratoires Serobiologiques.

#### Mode of Use

- 10 The compositions of the invention are primarily intended for topical application to the hair and/or scalp of a human subject to improve hair fibre surface properties such as smoothness, softness, manageability, cuticle integrity, and shine.

The invention will now be further illustrated by the following, non-limiting

- 15 Examples:

**EXAMPLES****Table 1**

| <b>Chemical name</b>             | <b>Tradename</b>              | <b>% of Material in the formulation</b> |
|----------------------------------|-------------------------------|-----------------------------------------|
| Lactic Acid                      | Purac HS88                    | 0.38                                    |
| Methyl-p-hydroxy benzoate        | Nipagin M                     | 0.20                                    |
| Stearyl Alcohol                  | Lanette S3                    | 5.00                                    |
| Behentrimonium Chloride          | Genamin BTLF                  | 1.24                                    |
| Stearylamidopropyl dimethylamine | Lexamine S13                  | 1.25                                    |
| Silicone                         | Example A and 1 (1:1 Mixture) | 2.50                                    |
| Water                            | Water                         | To 100                                  |

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**Table 2**

| <b>Example</b> | <b>Silicone Mixtures</b> | <b>Amine number</b> | <b>Relative Selectivity (%)</b> | <b>Relative Deposition to DC-7134 on Bleached Hair (%)</b> |
|----------------|--------------------------|---------------------|---------------------------------|------------------------------------------------------------|
| A              | DC-7134*                 | 0.63                | 100                             | 100                                                        |
| 1              | DC-7134:ADM22            | 0.32                | 440                             | 521                                                        |

10 \* Amine number of the amino-functionalised silicone component of the blend

ADM22 is an amino functionalised silicone fluid at the amine number indicated.

15 The selectivity is the ratio of silicon ppm on the 1 times bleached hair samples to silicon ppm on virgin hair samples. The relative selectivity, expressed as a percentage, is obtained by ratio-ing the selectivity for each example to the selectivity for example A. The relative deposition, expressed as a percentage is obtained by ratio-ing the deposition for each example to the deposition for the example A as specified on bleached hair.

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## **CLAIMS**

1. A hair treatment composition comprising a mixture of at least two silicone emulsions

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- i) a first silicone emulsion comprising an amino- functionalised silicone;
- ii) a second silicone blend emulsion comprising a silicone droplet phase comprising

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- a) a first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C and

- b) a second silicone which is functionalised and different to the first silicone A

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in which the first and second silicones are evenly distributed within a silicone droplet phase.

- 20 2. A hair treatment composition according to claim 1 in which the second silicone blend emulsion comprises a pre-formed silicone blend comprising

- a) from 50 to 95% by weight of the silicone blend of the first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C, and

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- b) from 5 to 50% by weight of the silicone blend of the second silicone which is functionalised.

- 30 3. A hair treatment composition according to any preceding claim in which the amino-functionalised silicone of the first emulsion i) has an amine number from 0.1 to 0.7.

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4. A hair treatment composition according to any preceding claim in which the amino-functionalised silicone of the first emulsion i) has an amine number from 0.2 to 0.5.
- 5 5. A composition according to any preceding claim, in which the second silicone b) of the second silicone blend emulsion ii) is an amino-functionalised silicone.
6. A composition according to claim 5 in which the amino-functionalised  
10 silicone of the second silicone blend emulsion ii) has an amine number from 0.2 to 0.7.
7. A composition according to any preceding claim, in which the second  
15 silicone b) of the second silicone blend emulsion ii) has a viscosity of less than 500,000 mm<sup>2</sup>/sec at 25°C.
8. A composition according to any preceding claim, in which the second  
silicone b) of the second silicone blend emulsion ii) has a molecular weight  
of less than 200,000 Daltons.  
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9. A composition according to any preceding claim in which the first silicone  
a) of the second silicone blend emulsion ii) is a gum and has a viscosity of at  
least 500,000 mm<sup>2</sup>/sec at 25°C.
- 25 10. A composition according to any preceding claim, in which the first silicone  
a) of the second blend silicone emulsion ii) has a molecular weight of at least  
200,000 Daltons.
11. A composition according to any preceding claim, in which the first silicone  
30 a) of the second silicone blend emulsion ii) is a polydimethylsiloxane.

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12. A composition according to any preceding claim, in which the silicone particulate phase of the second silicone blend/ emulsion ii) has an average  $D_{3,2}$  particle size in the range from 0.01 to 100  $\mu\text{m}$ .

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13. A composition according to any preceding claim, in which the silicone content in the total hair treatment composition is in the range of from 0.1 to 20 wt%.

10 14. A composition according to any preceding claim, in which the weight ratio of the first silicone to the second silicone in the second silicone blend emulsion ii) is in the range from 15:1 to 1:1.

15 15. A composition according to any preceding claim, in which the silicone component is in the form of a mechanical emulsion.

16. A composition according to any preceding claim, which is a conditioner composition comprising at least one conditioning surfactant and a fatty alcohol and/or an alkoxylated fatty alcohol.

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17. Use of at least two silicone emulsions for selectively depositing silicone onto damaged hair, in which the two emulsions comprise:

i) a first emulsion comprising an amino- functionalised silicone;

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ii) a second silicone blend emulsion comprising a silicone droplet phase comprising

a) a first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C and

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- b) a second silicone which is functionalised;

in which the first and second silicones are in intimate contact and evenly distributed within the silicone droplet phase.

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18. A method of treating hair comprising the step of adding to the hair a hair treatment composition comprising at least two silicone emulsions:

- i) a first emulsion comprising an amino- functionalised silicone;

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- ii) a second silicone blend emulsion comprising a silicone droplet phase comprising

- a) a first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C and

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- b) a second silicone which is functionalised;

in which the first and second silicones are in evenly distributed within the silicone droplet phase.

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19. A process for preparing a composition comprising the steps of preparing the following emulsions:

- i) a first emulsion comprising an amino- functionalised silicone;

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- ii) a second silicone blend emulsion comprising a silicone droplet phase comprising

- a) a first silicone having a viscosity of at least 100,000 mm<sup>2</sup>/sec at 25°C and

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b) a second silicone which is functionalised;

in which the first and second silicones are in intimate contact and evenly distributed within the silicone droplet phase;

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and mixing the emulsions with an aqueous base composition.