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(54) Title: COMPOSITION

(57) Abstract: Concentrated shampoo composition comprising from 25 to 70% by weight alkali metal alkylether sulphate and polypropylene glycol.



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## COMPOSITION

The present invention relates to a concentrated shampoo composition.

- 5 Despite the prior art there remains the need for improved concentrated shampoo compositions.

Accordingly, the present invention provides a concentrated shampoo composition comprising from 25 to 70% by weight alkali metal alkyl ether sulphate and  
10 polypropylene glycol.

Concentrated shampoo composition according to claim 1 wherein the polypropylene glycol is present at from 0.5% to 3% wt.

- 15 Concentrated shampoo composition according to claim 1 or 2 comprising an aminosilicone.

The polypropylene glycol helps control shampoo viscosity and reduces the drying out on exposure to air of a concentrated shampoo which naturally comprises less  
20 water than an ordinary shampoo.

Preferably the polypropylene glycol has a degree of polymerization,  $n$ , of from 3 to 100 and more preferably from 4 to 20.

- 25 Preferably, the polypropylene glycol is present at from 0.1 to 3% wt. of the composition, more preferably from 0.2 to 2.0% and most preferably from 0.4 to 1.5% wt. of the composition.

Preferably, the composition comprises an aminosilicone. The aminosilicone  
30 improves the rheology and product phase such that upon dilution the product does

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not go through the hexagonal liquid crystalline phase. Hexagonal phase in product makes it difficult to wash and dissolve in water in use.

Suitable aminosilicones include those obtainable commercially from Wacker as  
5 HL29 with amine number of 0.3 or SLM2901 which have an amine number of 0.12. Also suitable are amodimethicone emulsions such as DC2-8177 and DC939 (from Dow Corning) and SME253 (from GE Silicones). Optimum amine number is necessary to maintain product colour stability at such high concentration being referred to by the invention.

10

Preferably, the average particle size (D50) of the aminosilicone is from 1 to 100 micron, more preferably from 10 to 50 and most preferably from 15 to 25 micron as measured on a Malvern Mastersizer.

15 Preferably, the aminosilicone is present at from 0.01% to 2% wt. of the composition, more preferably at from 0.1 to 1.8%% and most preferably at from 0.2 to 1.4 wt. of the composition.

20 Preferably, the concentrated shampoo composition comprises electrolytes present at from 0.2% to 4.0%, more preferably from 0.5% to 2.5%. Electrolytes help in building the shampoo product viscosity. Thickness helps in controlled product dispensing in much lower quantity required on account of high concentration. Preferred electrolytes include potassium and sodium chloride. The most preferred electrolyte is sodium chloride.

25

With regard to the alkali metal alkylether sulphate, the alkyl groups preferably contain from 8 to 18, preferably from 10 to 16 carbon atoms and may be unsaturated though it is preferred that they are saturated. The alkyl ether sulphates thereof may contain from 1 to 20 ethylene oxide units per molecule, preferably from 1 to 3 and  
30 most preferably 1 ethylene oxide unit.

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The most preferred anionic cleansing surfactant is sodium lauryl ether sulphate (n)EO, (where n is from 1 to 3).

5 Mixtures of any of the foregoing anionic cleansing surfactants may also be suitable.

10 The total amount of anionic cleansing surfactant in compositions of the invention generally ranges from 20 to 70%, preferably from 30 to 60%, more preferably from 30 to 56% by total weight anionic cleansing surfactant based on the total weight of the composition.

Optionally, a composition of the invention may contain further ingredients as described below to enhance performance and/or consumer acceptability.

15 The composition can include co-surfactants, to help impart aesthetic, physical or cleansing properties to the composition.

20 An example of a co-surfactant is a nonionic surfactant, which can be included in an amount ranging from 0.5 to 20%, preferably from 0.7 to 6% by weight based on the total weight of the composition.

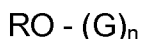
25 For example, representative nonionic surfactants that can be included in shampoo compositions of the invention include condensation products of aliphatic (C<sub>8</sub> - C<sub>18</sub>) primary or secondary linear or branched chain alcohols or phenols with alkylene oxides, usually ethylene oxide and generally having from 6 to 30 ethylene oxide groups.

Other representative nonionic surfactants include mono- or di-alkyl alkanolamides. Examples include coco mono- or di-ethanolamide and coco mono-

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isopropanolamide. A particularly preferred nonionic surfactant is coco mono-ethanolamide.

Further nonionic surfactants which can be included in shampoo compositions of the invention are the alkyl polyglycosides (APGs). Typically, the APG is one which comprises an alkyl group connected (optionally via a bridging group) to a block of one or more glycosyl groups. Preferred APGs are defined by the following formula:



10

wherein R is a branched or straight chain alkyl group which may be saturated or unsaturated and G is a saccharide group.

R may represent a mean alkyl chain length of from about C<sub>5</sub> to about C<sub>20</sub>.

15

Preferably R represents a mean alkyl chain length of from about C<sub>8</sub> to about C<sub>12</sub>.

Most preferably the value of R lies between about 9.5 and about 10.5. G may be selected from C<sub>5</sub> or C<sub>6</sub> monosaccharide residues, and is preferably a glucoside. G may be selected from the group comprising glucose, xylose, lactose, fructose, mannose and derivatives thereof. Preferably G is glucose.

20

The degree of polymerisation, n, may have a value of from about 1 to about 10 or more. Preferably, the value of n lies from about 1.1 to about 2. Most preferably the value of n lies from about 1.3 to about 1.5.

25

Suitable alkyl polyglycosides for use in the invention are commercially available and include for example those materials identified as: Oramix NS10 ex Seppic; Plantaren 1200 and Plantaren 2000 ex Henkel.

30

Other sugar-derived nonionic surfactants which can be included in compositions of the invention include the C<sub>10</sub>-C<sub>18</sub> N-alkyl (C<sub>1</sub>-C<sub>6</sub>) polyhydroxy fatty acid amides, such

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as the C<sub>12</sub>-C<sub>18</sub> N-methyl glucamides, as described for example in WO 92 06154 and US 5 194 639, and the N-alkoxy polyhydroxy fatty acid amides, such as C<sub>10</sub>-C<sub>18</sub> N-(3-methoxypropyl) glucamide.

- 5 A preferred example of a co-surfactant is an amphoteric or zwitterionic surfactant, which can be included in an amount ranging from 0.5 to about 10%, preferably from 1 to 6% by weight based on the total weight of the composition.

Examples of amphoteric or zwitterionic surfactants include alkyl amine oxides, alkyl  
10 betaines, alkyl amidopropyl betaines, alkyl sulphobetaines (sultaines), alkyl glycinates, alkyl carboxyglycinates, alkyl amphotacetates, alkyl amphopropionates, alkylamphoglycinates, alkyl amidopropyl hydroxysultaines, acyl taurates and acyl glutamates, wherein the alkyl and acyl groups have from 8 to 19 carbon atoms. Typical amphoteric and zwitterionic surfactants for use in shampoos of the invention  
15 include lauryl amine oxide, cocodimethyl sulphopropyl betaine, lauryl betaine, cocamidopropyl betaine and sodium cocoamphoacetate.

A particularly preferred amphoteric or zwitterionic surfactant is cocamidopropyl  
20 betaine.

Mixtures of any of the foregoing amphoteric or zwitterionic surfactants may also  
be suitable. Preferred mixtures are those of cocamidopropyl betaine with further  
amphoteric or zwitterionic surfactants as described above. A preferred further  
amphoteric or zwitterionic surfactant is sodium cocoamphoacetate.

25

### Water

Preferably, the hair care compositions of the invention are aqueous, i.e. they have  
water or an aqueous solution or a lyotropic liquid crystalline phase as their major  
30 component.

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Suitably, the composition will comprise from 10 to 98%, preferably from 30 to 95% water by weight based on the total weight of the composition.

### Silicone

5

The composition according to the invention preferably comprises an additional silicone.

10 Particularly preferred silicone conditioning agents are silicone emulsions such as those formed from silicones such as polydiorganosiloxanes, in particular polydimethylsiloxanes which have the CTFA designation dimethicone, polydimethyl siloxanes having hydroxyl end groups which have the CTFA designation dimethiconol, and the especially preferred amino-functional polydimethyl siloxanes which have the CTFA designation amodimethicone.

15

The emulsion droplets may typically have a Sauter mean droplet diameter ( $D_{3,2}$ ) in the composition of the invention ranging from 0.01 to 20 micrometer, more preferably from 0.2 to 10 micrometer.

20 A suitable method for measuring the Sauter mean droplet diameter ( $D_{3,2}$ ) is by laser light scattering using an instrument such as a Malvern Mastersizer.

25 Suitable silicone emulsions for use in compositions of the invention are available from suppliers of silicones such as Dow Corning and GE Silicones. The use of such pre-formed silicone emulsions is preferred for ease of processing and control of silicone particle size. Such pre-formed silicone emulsions will typically additionally comprise a suitable emulsifier such as an anionic or nonionic emulsifier, or mixture thereof, and may be prepared by a chemical emulsification process such as emulsion polymerisation, or by mechanical emulsification using a  
30 high shear mixer. Pre-formed silicone emulsions having a Sauter mean droplet

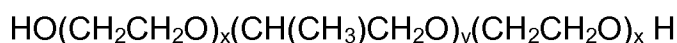
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diameter ( $D_{3,2}$ ) of less than 0.15 micrometers are generally termed microemulsions.

5 Examples of suitable pre-formed silicone emulsions include emulsions DC2-1766, DC2-1784, DC-1785, DC-1786, DC-1788 and microemulsions DC2-1865 and DC2-1870, all available from Dow Corning and HL999 or UL981 available from Wacker. These are all emulsions/microemulsions of dimethiconol. Also suitable are amodimethicone emulsions such as DC2-8177 and DC939 (from Dow Corning) and SME253 (from GE Silicones).

10

Also suitable are silicone emulsions in which certain types of surface active block copolymers of a high molecular weight have been blended with the silicone emulsion droplets, as described for example in WO03/094874. In such materials, the silicone emulsion droplets are preferably formed from polydiorganosiloxanes  
 15 such as those described above. One preferred form of the surface active block copolymer is according to the following formula:



20 wherein the mean value of x is 4 or more and the mean value of y is 25 or more.

Another preferred form of the surface active block copolymer is according to the following formula:

25  $(\text{HO}(\text{CH}_2\text{CH}_2\text{O})_a(\text{CH}(\text{CH}_3)\text{CH}_2\text{O})_b)_2\text{-N-CH}_2\text{-CH}_2\text{-N}((\text{OCH}_2\text{CH}(\text{CH}_3))_b(\text{OCH}_2\text{CH}_2)_a\text{OH})_2$

wherein the mean value of a is 2 or more and the mean value of b is 6 or more.

30 Mixtures of any of the above described silicone emulsions may also be used.

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The above described silicone emulsions will generally be present in a composition of the invention at levels of from 0.05 to 15%, preferably from 0.5 to 12% by total weight of silicone based on the total weight of the composition.

- 5 The silicone is preferably present at from 0.5 to 15% wt., more preferably 1 to 12% by weight.

#### Short chain diol

- 10 A further component that may be used in the composition comprises a short chain diol.

Preferably, the short chain diol has from 3 to 7 carbon atoms and more preferably 3 or 4 carbon atoms.

15

More preferably, the short chain diol is selected from 1, 2 butylene glycol, 1, 3 butylene glycol, 1,4 butylene glycol, 1, 2 propylene glycol, 1, 3 propylene glycol and mixtures thereof. Especially preferably, the short chain diol is selected from 1, 3 butylene glycol and 1, 2 propylene glycol.

20

In the most preferred embodiment the short chain diol is 1, 3 butylene glycol.

#### Cationic polymer

- 25 In a preferred embodiment the composition according to the invention comprises a cationic deposition polymer.

Suitable cationic deposition aid polymers may be homopolymers which are cationically substituted or may be formed from two or more types of monomers. The

- 30 weight average ( $M_w$ ) molecular weight of the polymers will generally be between

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100 000 and 2 million daltons. The polymers will have cationic nitrogen containing groups such as quaternary ammonium or protonated amino groups, or a mixture thereof. If the molecular weight of the polymer is too low, then the conditioning effect is poor. If too high, then there may be problems of high extensional viscosity leading  
5 to stringiness of the composition when it is poured.

The cationic nitrogen-containing group will generally be present as a substituent on a fraction of the total monomer units of the cationic polymer. Thus when the polymer is not a homopolymer it can contain spacer non-cationic monomer units. Such  
10 polymers are described in the CTFA Cosmetic Ingredient Directory, 3rd edition. The ratio of the cationic to non-cationic monomer units is selected to give polymers having a cationic charge density in the required range, which is generally from 0.2 to 3.0 meq/gm. The cationic charge density of the polymer is suitably determined via the Kjeldahl method as described in the US Pharmacopoeia under chemical tests  
15 for nitrogen determination.

Suitable cationic polymers include, for example, copolymers of vinyl monomers having cationic amine or quaternary ammonium functionalities with water soluble spacer monomers such as (meth)acrylamide, alkyl and dialkyl (meth)acrylamides,  
20 alkyl (meth)acrylate, vinyl caprolactone and vinyl pyrrolidone. The alkyl and dialkyl substituted monomers preferably have C1-C7 alkyl groups, more preferably C1-3 alkyl groups. Other suitable spacers include vinyl esters, vinyl alcohol, maleic anhydride, propylene glycol and ethylene glycol.

25 The cationic amines can be primary, secondary or tertiary amines, depending upon the particular species and the pH of the composition. In general secondary and tertiary amines, especially tertiary, are preferred.

Amine substituted vinyl monomers and amines can be polymerised in the amine  
30 form and then converted to ammonium by quaternization.

- 10 -

The cationic polymers can comprise mixtures of monomer units derived from amine- and/or quaternary ammonium-substituted monomer and/or compatible spacer monomers.

5 Suitable cationic polymers include, for example:

- cationic diallyl quaternary ammonium-containing polymers including, for example, dimethyldiallylammonium chloride homopolymer and copolymers of acrylamide and dimethyldiallylammonium chloride, referred to in the industry (CTFA) as Polyquaternium 6 and Polyquaternium 7, respectively;

10

- mineral acid salts of amino-alkyl esters of homo-and co-polymers of unsaturated carboxylic acids having from 3 to 5 carbon atoms, (as described in U.S. Patent 4,009,256);

15

- cationic polyacrylamides(as described in WO95/22311).

Other cationic polymers that can be used include cationic polysaccharide polymers, such as cationic cellulose derivatives, cationic starch derivatives, and cationic guar gum derivatives.

20

Cationic polysaccharide polymers suitable for use in compositions of the invention include monomers of the formula:



25

wherein: A is an anhydroglucose residual group, such as a starch or cellulose anhydroglucose residual. R is an alkylene, oxyalkylene, polyoxyalkylene, or hydroxyalkylene group, or combination thereof. R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> independently represent alkyl, aryl, alkylaryl, arylalkyl, alkoxyalkyl, or alkoxyaryl groups, each

30

group containing up to about 18 carbon atoms. The total number of carbon atoms

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for each cationic moiety (i.e., the sum of carbon atoms in R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup>) is preferably about 20 or less, and X is an anionic counterion.

5 Another type of cationic cellulose includes the polymeric quaternary ammonium salts of hydroxyethyl cellulose reacted with lauryl dimethyl ammonium-substituted epoxide, referred to in the industry (CTFA) as Polyquaternium 24. These materials are available from the Amerchol Corporation, for instance under the tradename Polymer LM-200.

10 Other suitable cationic polysaccharide polymers include quaternary nitrogen-containing cellulose ethers (e.g. as described in U.S. Patent 3,962,418), and copolymers of etherified cellulose and starch (e.g. as described in U.S. Patent 3,958,581).

A particularly suitable type of cationic polysaccharide polymer that can be used is a cationic guar gum derivative, such as guar hydroxypropyltrimethylammonium chloride (commercially available from Rhodia in their JAGUAR trademark series). Examples of such materials are JAGUAR C13S, JAGUAR C14, JAGUAR C15 and JAGUAR C17.

15

Mixtures of any of the above cationic polymers may be used.

Cationic polymer will generally be present in a shampoo composition of the invention at levels of from 0.01 to 5%, preferably from 0.05 to 2%, more preferably from 0.07  
20 to 1.2% by total weight of cationic polymer based on the total weight of the composition.

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### Suspending Agent

Preferably an aqueous shampoo composition of the invention may further comprise a suspending agent. Suitable suspending agents are selected from  
5 polyacrylic acids, cross-linked polymers of acrylic acid, copolymers of acrylic acid with a hydrophobic monomer, copolymers of carboxylic acid-containing monomers and acrylic esters, cross-linked copolymers of acrylic acid and acrylate esters, heteropolysaccharide gums and crystalline long chain acyl derivatives. The long chain acyl derivative is desirably selected from ethylene glycol stearate,  
10 alkanolamides of fatty acids having from 16 to 22 carbon atoms and mixtures thereof. Ethylene glycol distearate and polyethylene glycol 3 distearate are preferred long chain acyl derivatives, since these impart pearlescence to the composition. Polyacrylic acid is available commercially as Carbopol 420, Carbopol 488 or Carbopol 493. Polymers of acrylic acid cross-linked with a  
15 polyfunctional agent may also be used; they are available commercially as Carbopol 910, Carbopol 934, Carbopol 941 and Carbopol 980. An example of a suitable copolymer of a carboxylic acid containing monomer and acrylic acid esters is Carbopol 1342. All Carbopol (trademark) materials are available from Goodrich.

20

Suitable cross-linked polymers of acrylic acid and acrylate esters are Pemulen TR1 or Pemulen TR2. A suitable heteropolysaccharide gum is xanthan gum, for example that available as Kelzan mu.

25 Mixtures of any of the above suspending agents may be used. Preferred is a mixture of cross-linked polymer of acrylic acid and crystalline long chain acyl derivative.

Suspending agent will generally be present in a shampoo composition of the  
30 invention at levels of from 0.1 to 10%, preferably from 0.5 to 6%, more preferably

from 0.9 to 4% by total weight of suspending agent based on the total weight of the composition.

### Oils

5

A further component that may be used in compositions of the invention is a hydrocarbon oil or ester oil. Like silicone oils, these materials may enhance the conditioning benefits found with compositions of the invention.

- 10 Suitable hydrocarbon oils have at least 12 carbon atoms, and include paraffin oil, polyolefin oil, mineral oil, saturated and unsaturated dodecane, saturated and unsaturated tridecane, saturated and unsaturated tetradecane, saturated and unsaturated pentadecane, saturated and unsaturated hexadecane, and mixtures thereof. Branched-chain isomers of these compounds, as well as of higher chain
- 15 length hydrocarbons, can also be used. Also suitable are polymeric hydrocarbons of C<sub>2-6</sub> alkenyl monomers, such as polyisobutylene.

- Suitable ester oils have at least 10 carbon atoms, and include esters with hydrocarbyl chains derived from fatty acids or alcohols. Typical ester oils are
- 20 formula R'COOR in which R' and R independently denote alkyl or alkenyl radicals and the sum of carbon atoms in R' and R is at least 10, preferably at least 20. Di- and trialkyl and alkenyl esters of carboxylic acids can also be used.

- Preferred fatty oils are mono-, di- and triglycerides, more specifically the mono-, di-,
- 25 and tri-esters of glycerol with long chain carboxylic acids such as C<sub>1-22</sub> carboxylic acids. Examples of such materials include cocoa butter, palm stearin, sunflower oil, soyabean oil and coconut oil.

Mixtures of any of the above described hydrocarbon/ester oils also be used.

30

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The total combined amount of hydrocarbon oil and ester oil in compositions of the invention may suitably range from 0.05 to 10%, particularly from 0.2 to 5%, and especially from 0.5 to 3% by weight of the composition.

- 5 A composition of the invention may contain other ingredients for enhancing performance and/or consumer acceptability. Such ingredients include fragrance, dyes and pigments, pH adjusting agents, pearlescers or opacifiers, viscosity modifiers, and preservatives or antimicrobials. Each of these ingredients will be present in an amount effective to accomplish its purpose. Generally these  
10 optional ingredients are included individually at a level of up to 5% by weight of the total composition.

Preferably, the thick viscous concentrated shampoo is made under a vacuum. Preferably, the process is carried out under a vacuum of from 0.5 to 1.0 Bar, more  
15 preferably of from 0.8 to 1 Bar.

The invention will be further illustrated by the following, non-limiting Examples, in which all percentages quoted are by weight based on total weight unless  
20 otherwise stated.

### **EXAMPLE 1**

The following formulation is according to the invention. It is made by the following process.

- 15 -

Ingredient	Wt. %
SLES	51
CMEA	2
CAPB	2
Amino Silicone*	1.2
Dimethicone***	2.5
Polypropylene glycol**	2.0
Perfume	2.5
Colour	As required
pH adjuster	As required
Sodium chloride	2.0
Aqua	q.s.

\*Aminosilicone is aminofunctionalised PDMS methoxy terminated, SLM2901 ex Wacker.

5 \*\* PPG 425, ex Dow Corning.

\*\*\* HL 999 ex Wacker

## **EXAMPLE 2**

10 The following process was used to manufacture the composition according to example 1.

1. Prepare the mixture of EDTA2Na, L-Lysine and NaCl in hot water (70-75°C) at side pot. with ratio of Water : NaCl.at minimum 3:1.to dissolve Sodium chloride fully.

15

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2. Maintain the temperature at 70-75°C to melt the CMEA. Then charge the CMEA into side mixer. Mix all of them together at 70-75°C and transfer to main vessel in hot condition.
- 5 3. Separate the SLES1EO in 2 steps. The first phase use only 1% by weight, to form a creamy base with CMEA. A higher level of SLES1EO can lead to solidification of CMEA. The rest of SLES1EO will be charged through the high speed homogenizer. The vacuum is turned on from this step onwards. After it is homogenised, then the recirculation is turned off. Only agitator, and  
10 scrapper are required.
4. Charge the PPG 425, CAPB, dyestuff solution into main mixer. All of them will be charged separately, and it requires high speed of agitator and scrapper to ensure the good homogenous of product. The vacuum still turn on to eliminate  
15 the bubble. This step product is still creamy, and not dramatically viscous.
5. Charge the Silicone HL 29. In this step, the product becomes viscous, and forms the texture. At this stage high speed of agitator and scrapper are required. The vacuum is required at 0.80-1.0 Bar to eliminate the entrapped air  
20 bubble, and form airfree product.
6. Charge the dimethicone. In this step, maintain the same condition as the step 5.
- 25 7. Disperse the mixed Guar Gum in the perfume at the side pot. Then charge slowly into main mixer.

Product is dramatically viscous. Hence, high speed of agitator and scrapper are required. The vacuum is required at 0.80-1.0 Bar to eliminate the bubble, and form  
30 air-free product.

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## **CLAIMS**

1. Concentrated shampoo composition comprising from 25 to 70% by weight alkali metal alkylether sulphate and polypropylene glycol.  
5
2. Concentrated shampoo composition according to claim 1 wherein the polypropylene glycol is present at from 0.1% to 3% wt.
3. Concentrated shampoo composition according to claim 1 or 2 comprising  
10 an aminosilicone.
4. Concentrated shampoo composition according to any preceding claim comprising an electrolyte.