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(54) Title: HAIR TREATMENT COMPOSITIONS

(57) Abstract

Hair treatment compositions containing a particular combination of silicone and hydrocarbon materials can impart surprisingly improved fullness, body and volume to the hair, when compared with compositions utilising either of these materials alone. A particularly preferred combination is cross-linked silicone gum and polyisobutylene resin.

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HAIR TREATMENT COMPOSITIONS

Field of Invention

The invention relates to hair treatment compositions for imparting improved fullness, body and volume to the hair, which compositions contain a particular combination of silicone and hydrocarbon materials.

Background of Invention and Prior Art

The use in hair treatment compositions of conditioning agents such as silicone polymers, cationic conditioning agents and oily materials in hair treatment compositions is well known and widely documented in the patent literature. However, a problem associated with such materials is that their use at levels necessary for achieving good tactile and/or visual benefits can make the hair feel limp and unmanageable.

Accordingly, hair fullness, body and volume is generally achieved by application of film-forming materials to the hair, usually after shampooing and/or conditioning, in the form of mousses, gels or sprays. However, the adhesive and/or resinous materials used frequently for style retention can damage dry hair properties, especially hair feel and ease of dry combing. Also, many people require a degree of hair fullness, body and volume improvement without the inconvenience and cost of a separate step.

EP-A-240 350 and US 4902499 (Procter & Gamble) for example disclose the use of specific rigid silicone polymers dissolved in a volatile carrier material for giving improved style retention to hair.

WO 96/31188 discloses that emulsion polymerised silicone polymers which are cross-linked in the emulsion form for giving improved styling benefits without compromising conditioning properties when formulated into a hair treatment composition.

EP 0 498 119 and EP 567 326 disclose the use of high molecular weight resinous per-alk(en)yl hydrocarbon materials for imparting body and stylability to hair.

The present inventors have now found that hair treatment compositions containing a particular combination of silicone and hydrocarbon materials can impart surprisingly improved fullness, body and volume to the hair, when compared with compositions utilising either of these materials alone.

Definition of the Invention

The present invention provides a hair treatment composition for imparting improved fullness, body and volume to the hair comprising, in an aqueous medium, (i) emulsified particles of a high viscosity silicone polymer and (ii) emulsified particles of a high molecular weight hydrocarbon material.

Detailed Description of the Invention

(i) Emulsified high viscosity silicone polymer

The hair treatment composition of the invention comprises particles of high viscosity silicone polymer. The silicone polymer is insoluble in the aqueous medium of the hair treatment composition and so is present in an emulsified form, with the silicone polymer present as dispersed particles.

By "high viscosity silicone polymer" is meant that the viscosity of the silicone polymer itself (not the emulsion or the final hair treatment composition) is at least 500,000 cst. The viscosity of the silicone polymer itself is suitably at least 1 million cst. Preferably the viscosity does not exceed 10^9 cst for ease of formulation. Viscosity can be measured by means of a glass capillary viscometer as set out further in Dow Corning Corporate Test Method CTM004 July 20 1970.

Suitable silicone polymers include polydiorganosiloxanes, in particular polydimethylsiloxanes which have the CTFA designation dimethicone. Also suitable for use in hair treatment compositions of the invention are polydimethyl siloxanes having hydroxyl end groups, which have the CTFA designation dimethiconol.

Particularly suitable emulsified, high viscosity silicone polymers for use in the invention incorporate cross-linking to provide a network of polydiorganosiloxane chains.

The degree of cross-linking of the can be measured as the percentage of branched monomer units in the silicone polymer. This value may suitably range from about 0.001% to about 35%, preferably 0.002 to 10%, more preferably 0.003 to 10%, optimally 0.004% to 2%. Increasing cross-linking is found to improve hair volumising benefits but also to reduce conditioning performance somewhat, so compromise levels must be selected with properties optimised to suit consumer preferences in different cases. Good overall performance has been obtained with about 0.6% degree of cross-linking (i.e., percentage of branched monomer units).

Cross linking of the silicone polymer may for example be introduced in situ during the polymerisation process which forms the silicone polymer from its constituent monomer units -through the inclusion of the required amount of trifunctional and tetrafunctional silane monomer units, for example, those of formula R Si $(OH)_3$ wherein R represents an alkyl, alkenyl (e.g. vinyl), alkaryl, aralkyl or aryl (e.g. phenyl) group, preferably methyl.

Alternatively, other types of silicone cross-linking chemistry may be used to produce suitable cross-linked silicone polymers for use in the invention. The cross-linking agents employed in such methods may be organosilicon cross-linking agents, for example as listed in EP 0 473 039, or non-silicone cross-linking agents, for which a representative example is the cross-linked silicone polymer described in US 5,654,362. The cross linker used here is an alpha, omega aliphatic diene of the following structure: $CH_2=CH(CH_2)_xCH=CH_2$, where X ranges from 1-20. A gel is formed by crosslinking and addition of Si-H across double bonds in the alpha, omega -diene.

Further examples of suitable cross-linked silicone polymers for use in the invention include the materials DC 3-2365, ex Dow Corning, and the silicone-urethane copolymer Polyderm PPI-SI-100, ex Akzo Incorporated, Matawan, New Jersey.

The especially preferred cross-linked silicone polymers for use in compositions of the invention are the are silicone gums having a slight degree of cross-linking as described in WO 96/31188. These materials can impart fullness, body and volume to hair, as well as good wet and dry conditioning.

Various methods of making emulsions of particles of high viscosity silicone polymers for use in the invention are available and are well known and documented in the art. For example, emulsions may be prepared by high shear mechanical mixing of the silicone polymer and water, or by emulsifying the silicone polymer with water and an emulsifier (mixing the silicone polymer into a heated solution of the emulsifier for instance), or by a combination of mechanical and chemical emulsification. For certain materials such as the cross-linked silicone polymer described in US 5,654,362, it may be advisable to mix them first with a hydrophilic or hydrophobic diluent such as PPG-2 myristyl ether propionate or cyclomethicone, in order to facilitate the subsequent emulsification step.

A particularly suitable technique for preparation of emulsions of particles of silicone polymers is emulsion polymerisation. Emulsion polymerised silicone polymers as such are described in US 2 891 820 (Hyde), US 3 294 725 (Findlay) and US 3 360 491 (Axon).

Emulsified high viscosity silicone polymers for use in hair treatment compositions of the invention generally have an average silicone particle size in the composition of less than 30 microns. Particle size may be measured by means of a laser light scattering technique, using a 2600D Particle Sizer from Malvern Instruments.

The average particle size of the silicone polymer in the hair treatment composition may for example range from 2 to 30 microns, preferably from 2 to 20 microns, more preferably 3 to 10 microns.

Alternatively the silicone polymer may be present in the hair treatment composition in the form of emulsified particles of small size, for example less than 2 microns. Reducing the particle size may under some circumstances improve conditioning performance.

Silicone polymer emulsions having an average silicone particle size of ≤ 0.15 microns are generally termed microemulsions. Typically such microemulsified particles will have a particle size of ≤ 0.15 microns, suitably from 0.01 to 0.15 microns. These may be advantageous since they enable the formulation of compositions of high stability and excellent optical properties such as translucent or transparent formulations.

Suitable silicone polymer emulsions for use in the invention are commercially available in a pre-emulsified form. This is particularly preferred since the pre-formed emulsion can be incorporated into the hair treatment composition by simple mixing. Pre-formed emulsions are available from suppliers of silicone oils such as Dow Corning, General Electric, Union Carbide, Wacker Chemie, Shin Etsu, Toshiba, Toyo Beauty Co, and Toray Silicone Co.

Examples of suitable pre-formed emulsions include emulsions DC2-1766 and DC2-1784 available from Dow Corning. These are both emulsions of dimethiconol in which the viscosity of the silicone itself is about 1 million cst.

The preferred cross-linked silicone gums for use in compositions of the invention are also available in a pre-emulsified form, which is advantageous for ease of formulation. An especially preferred example is the material available from Dow Corning as DC X2-1787, which is an emulsion of cross-linked dimethiconol gum in which the viscosity of the silicone polymer itself is about 2×10^7 cst. Another preferred example is the material available from Dow Corning as DC X2-1391, which is a microemulsion of cross-linked dimethiconol gum in which the viscosity of the silicone polymer itself is about 1 million cst.

The amount of emulsified high viscosity silicone polymer incorporated into the hair treatment 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. We have found that an amount of silicone polymer of from 0.05 to 1.0% by weight of the total composition, is a particularly suitable level.

When the silicone polymer is incorporated as a pre-formed emulsion as described above, the exact quantity of emulsion will of course depend on the concentration of the emulsion, and should be selected to give the desired quantity of silicone polymer in the final composition.

(ii) Emulsified particles of high molecular weight hydrocarbon material

By "high molecular weight" is meant that the weight average molecular weight of the emulsified hydrocarbon material is at least 20,000. Suitably it ranges from 20,000 to 1,000,000, preferably 20,000 to 500,000, most preferably 40,000 to 200,000; these materials are especially effective in conjunction with the high viscosity silicone described above for imparting improved fullness, body and volume to hair.

A preferred class of high molecular weight hydrocarbon materials are per-alk(en)yl hydrocarbon resins. These term "resin" is intended to encompass those materials which are solid or semi-solid at room temperature, as well as those which are liquids with high or moderate viscosities. The term does not cover oils or other low viscosity materials, e.g. hydrocarbon oils, which are known in the art for incorporation in cosmetic emulsions for their conditioning properties, as described in, for example, EP 0 610 407.

EP 567 326 and EP 498 119 describe suitable peralk(en)yl hydrocarbon resins for imparting stylability and enhanced body to hair. Preferred per-alk(en)yl hydrocarbon materials are polymers of butene, isoprene, terpene and styrene, and copolymers of any combination of these monomers, such as butyl rubber (poly isobutylene-co-isoprene), natural rubber (cis-1,4-polyisoprene) and hydrocarbon resins such as mentioned in the Encyclopedia of Chemical technology by Kirk and Othmer (3rd edition vol.8, pp 852-869), for example aliphatic and aromatic resins and terpene resins.

Especially preferred are polyisobutylene materials of the formula:

$$H_3C-[C(CH_3)_2-CH_2-]_m-R$$

wherein m is 1-5000, preferably 2-2500, and R is:

$$-CH(CH_3)_2 \text{ or } -C(CH_3)=CH_2$$

These materials are available from Presperse, Inc. under the PERMETHYL trade name, from Exxon Chemical under the VISTANEX trade name, and from BASF under the OPANOL trade name. Preferred examples include VISTANEX LM-MH and OPANOL B 15.

Suitable methods of making emulsions of particles of high molecular weight hydrocarbon materials such as polyisobutylene resins are described in EP 567 326 and EP 498 119. The process of EP 567 326 is preferred since it is a direct emulsification process with water and a suitable surfactant emulsifier which avoids the need to use a solvent or carrier which is capable of dissolving or dispersing the high molecular weight hydrocarbon material. Such solvents or carriers (e.g. low molecular weight hydrocarbons) can present safety hazards during processing and can destabilise the final formulations into which they are incorporated.

Emulsified high molecular weight hydrocarbon materials for use in hair treatment compositions of the invention generally have an average particle size in the composition of from about 0.01 to about 100 microns, more typically from about 0.1 to about 10 microns, thought this is not particularly critical. Particle size may be measured by means of a laser light scattering technique, using a 2600D Particle Sizer from Malvern Instruments.

Suitable high molecular weight hydrocarbon emulsions for use in the invention are commercially available in a pre-emulsified form. This is particularly preferred since the pre-formed emulsion can be incorporated into the hair treatment composition by simple mixing.

An example of a suitable pre-formed emulsion is the material PIB 96/003 available from Basildon Chemical. This is an aqueous emulsion of the polyisobutylene material OPANOL B 15 (ex BASF) with anionic and nonionic surfactant emulsifier.

The amount of high molecular weight hydrocarbon material incorporated into the compositions of the invention depends on the level of fullness, body and volume enhancement desired and the specific material used. A preferred amount is from about 0.01 to about 2% by weight of the total composition although these limits are not absolute. The lower limit is determined by the minimum level to achieve the fullness, body and volume enhancing effect and the upper limit by the maximum level to avoid making the hair unacceptably stiff. We have found that an amount of high molecular weight hydrocarbon material of from 0.2 to 0.5% by weight of the total composition is a particularly suitable level.

When the high molecular weight hydrocarbon material is incorporated as a pre-formed emulsion as described above, the exact quantity of emulsion will of course depend on the concentration of the emulsion, and should be selected to give the desired quantity of high molecular weight hydrocarbon material in the final composition.

(iii) Silicone: Hydrocarbon Ratios

It is particularly preferred that the emulsified particles of high viscosity silicone polymer (i) and the emulsified particles of high molecular weight hydrocarbon material (ii) are incorporated into compositions of the invention in a silicone:hydrocarbon weight ratio ranging from 1:20 to 2:1, preferably 1:10 to 1:1, optimally 1:4 to 1:2. The inventors have found that increasing the amount of silicone relative to hydrocarbon beyond the 2:1 weight ratio limit specified above tends to be detrimental to the hair volumising performance of the hair treatment composition. On the other hand, if the amount of hydrocarbon relative to silicone is increased too far then the hair may feel unacceptably stiff.

(iv) Product Form

Hair treatment compositions according to the invention may suitably take the form of shampoos, conditioners, sprays, mousses or lotions. Preferred hair treatment composition forms are shampoos and conditioners.

Shampoo Compositions

A particularly preferred hair treatment composition in accordance with the invention is a shampoo composition.

- Cleansing Surfactant

Such a shampoo composition will comprise one or more cleansing surfactants which are cosmetically acceptable and suitable for topical application to the hair. Further surfactants may be present as an additional ingredient if sufficient for cleansing purposes is not provided as emulsifying agent for oily or hydrophobic components (such as silicones) which may typically be present in the shampoo.

It is preferred that shampoo compositions of the invention comprise at least one further surfactant (in addition to that used as emulsifying agent) to provide a cleansing benefit.

Suitable cleansing surfactants, which may be used singularly or in combination, are selected from anionic, amphoteric and zwitterionic surfactants, and mixtures thereof. The cleansing surfactant may be the same surfactant as the emulsifier, or may be different.

Examples of anionic surfactants are the alkyl sulphates, alkyl ether sulphates, alkaryl sulphonates, alkanoyl isethionates, alkyl succinates, alkyl sulphosuccinates, N-alkyl sarcosinates, alkyl phosphates, alkyl ether phosphates, alkyl ether carboxylates, and alpha-olefin sulphonates, especially their sodium, magnesium, ammonium and mono-, di- and triethanolamine salts. The alkyl and acyl groups generally contain from 8 to 18 carbon atoms and may be unsaturated. The alkyl ether sulphates, alkyl ether phosphates and alkyl ether carboxylates may contain from 1 to 10 ethylene oxide or propylene oxide units per molecule.

Typical anionic surfactants for use in shampoos of the invention include sodium oleyl succinate, ammonium lauryl sulphosuccinate, ammonium lauryl sulphate, sodium dodecylbenzene sulphonate, triethanolamine dodecylbenzene sulphonate, sodium cocoyl isethionate, sodium lauryl isethionate and sodium N-lauryl sarcosinate. The most preferred anionic surfactants are sodium lauryl sulphate, triethanolamine monolauryl phosphate, sodium lauryl ether sulphate 1 EO, 2EO and 3EO, ammonium lauryl sulphate and ammonium lauryl ether sulphate 1EO, 2EO and 3EO.

Examples of amphoteric and zwitterionic surfactants include alkyl amine oxides, alkyl betaines, alkyl amidopropyl betaines, alkyl sulphobetaines (sultaines), alkyl glycinates, alkyl carboxyglycinates, 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 include lauryl amine oxide, cocodimethyl sulphopropyl betaine and preferably lauryl betaine, cocamidopropyl betaine and sodium cocamphopropionate.

The shampoo composition can also include co-surfactants, to help impart aesthetic, physical or cleansing properties to the composition. A preferred example is a nonionic surfactant, which can be included in an amount ranging from 0% to about 5% by weight based on total weight.

For example, representative nonionic surfactants that can be included in shampoo compositions of the invention include condensation products of aliphatic (C_8 - C_{18}) 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 nonionics include mono- or di-alkyl alkanolamides. Examples include coco mono- or di-ethanolamide and coco mono-isopropanolamide.

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:

$$RO - (G)_n$$

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_5 to about C_{20}. Preferably R represents a mean alkyl chain length of from about C_8 to about C_{12}. Most preferably the value of R lies between about 9.5 and about 10.5. G may be selected from C_5 or C_6 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.

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

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.

The total amount of surfactant (including any co-surfactant, and/or any emulsifying agent) in shampoo compositions of the invention is generally from 0.1 to 50% by weight, preferably from 5 to 30%, more preferably from 10% to 25% by weight of the total shampoo composition.

- Cationic Polymer

A cationic polymer is a preferred ingredient in shampoo compositions of the invention, for enhancing conditioning performance of the shampoo. Typically such a polymer enhances deposition of conditioning components such as silicone from the shampoo composition onto the intended site during use, i.e. the hair and/or the scalp.

The cationic polymer may be a homopolymer or be formed from two or more types of monomers. The molecular weight of the polymer will generally be between 5 000 and 10 000 000, typically at least 10 000 and preferably in the range 100 000 to about 2 000 000. The polymers will have cationic nitrogen containing groups such as quaternary ammonium or protonated amino groups, or a mixture thereof.

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 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 a polymer having a cationic charge density in the required range.

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, alkyl (meth)acrylate, vinyl caprolactone and vinyl pyrrolidine. 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.

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 polymerized in the amine form and then converted to ammonium by quaternization.

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

Suitable cationic polymers include, for example:

- copolymers of 1-vinyl-2-pyrrolidine and 1-vinyl-3-methyl-imidazolium salt (e.g. chloride salt), referred to in the industry by the Cosmetic, Toiletry, and Fragrance Association, (CTFA) as Polyquaternium-16. This material is commercially available from BASF Wyandotte Corp. (Parsippany, NJ, USA) under the LUVIQUAT tradename (e.g. LUVIQUAT FC 370);

- copolymers of 1-vinyl-2-pyrrolidine and dimethylaminoethyl methacrylate, referred to in the industry (CTFA) as Polyquaternium-11. This material is available commercially from Gaf Corporation (Wayne, NJ, USA) under the GAFQUAT tradename (e.g., GAFQUAT 755N);

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

- 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);

- 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.

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

$$A\text{-}O\text{-}[R\text{-}N^{+}(R^{1})(R^{2})(R^{3})X^{-}] \quad ,$$

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^1, R^2 and R^3 independently represent alkyl, aryl, alkylaryl, arylalkyl, alkoxyalkyl, or alkoxyaryl groups, each group containing up to about 18 carbon atoms. The total number of carbon atoms for each cationic moiety (i.e., the sum of carbon atoms in R^1, R^2 and R^3) is preferably about 20 or less, and X is an anionic counterion.

Cationic cellulose is available from Amerchol Corp. (Edison, NJ, USA) in their Polymer JR (trade mark) and LR (trade mark) series of polymers, as salts of hydroxyethyl cellulose reacted with trimethyl ammonium substituted epoxide, referred to in the industry (CTFA) as Polyquaternium 10. 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 Amerchol Corp. (Edison, NJ, USA) under the tradename Polymer LM-200.

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 hydroxypropyltrimonium chloride (Commercially available from Rhone-Poulenc in their JAGUAR trademark series).

Examples are JAGUAR C13S, which has a low degree of substitution of the cationic groups and high viscosity. JAGUAR C15, having a moderate degree of substitution and a low viscosity, JAGUAR C17 (high degree of substitution, high viscosity), JAGUAR C16, which is a hydroxypropylated cationic guar derivative containing a low level of substituent groups as well as cationic quaternary ammonium groups, and JAGUAR 162 which is a high transparency, medium viscosity guar having a low degree of substitution.

Preferably the cationic polymer is selected from cationic cellulose and cationic guar derivatives. Particularly preferred cationic polymers are JAGUAR C13S, JAGUAR C15, JAGUAR C17 and JAGUAR C16 and JAGUAR C162.

Conditioners

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

- Conditioning Surfactant

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.

- Fatty Alcohol

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.

(v) Optional Ingredients

Compositions of this invention may contain any other ingredient normally used in hair treatment formulations. These 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.

- fatty acids, for cuticle repair and damage prevention. 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 oleic acid. The fatty acids may be added singly, as mixtures, or in the form of blends derived from extracts of, e.g. lanolin.

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

The invention is further illustrated by way of the following non-limitative Example:

Example

A shampoo composition was prepared by mixing the following components in the amounts stated.

Component	% by weight
Sodium lauryl ether sulphate 2EO	14.0
Cocamidopropyl betaine	2.0
Jaguar C13S	0.2
CARBOPOL 980	0.4
Silicone(1)	0.2
Polyisobutylene(2)	0.5
Preservative, colour, fragrance	q.s.
Water, minors	to 100%

(1) Silicone Emulsion DC2-1787, 50% active aqueous emulsion of cross-linked dimethiconol in anionic/nonionic surfactant, ex Dow Corning.

(2) PIB 96/003, 50% active aqueous emulsion of polyisobutylene resin in anionic/nonionic surfactant, ex Basildon Chemicals.

CLAIMS

1. A hair treatment composition for imparting improved fullness, body and volume to the hair comprising, in an aqueous medium, (i) emulsified particles of a high viscosity silicone polymer and (ii) emulsified particles of a high molecular weight hydrocarbon material.

2. A composition according to claim 1, in which the silicone polymer (i) is cross-linked and the percentage of branched monomer units in the silicone polymer (i) ranges from 0.003 to 10%.

3. A composition according to claim 2, in which the silicone polymer (i) is a cross-linked dimethiconol gum and having from 0.004% to 2% branched monomer units.

4. A composition according to any of claims 1 to 3, in which the hydrocarbon material (ii) is a per-alk(en)yl hydrocarbon resin.

5. A composition according to claim 4, in which the per-alk(en)yl hydrocarbon resin is a polyisobutylene material of the formula:

$$H_3C - [C(CH_3)_2 - CH_2 -]_m - R$$

wherein m is 1-5000, preferably 2-2500, and R is:

$$-CH(CH_3)_2 \text{ or } -C(CH_3)=CH_2$$

6. A composition according to any one of the preceding claims, in which the emulsified particles of high viscosity silicone polymer (i) and the emulsified particles of high molecular weight hydrocarbon material (ii) are incorporated into compositions of the invention in a silicone:hydrocarbon weight ratio ranging from 1:20 to 2:1.

7. A composition according to any one of the preceding claims, which is a hair shampoo composition comprising one or more cleansing surfactants.

8. A composition according to claim 6, further comprising from about 0.01 to about 5% by weight of a deposition aid which is a cationic polymer selected from the group comprising hydroxyalkyl cellulose ethers, cationic guar derivatives and cationic polyacrylamides.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/05029

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K7/06

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)
IPC 7 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 95 23581 A (PROCTER & GAMBLE) 8 September 1995 (1995-09-08) claims 1,2,5,7 page 20 example 7 ---	1,4,5,7, 8
X	WO 97 14396 A (PROCTER & GAMBLE) 24 April 1997 (1997-04-24) claims 1,8 page 13, line 5 -page 14, line 9 page 15, line 22 -page 16, line 36 page 17, line 20-35 page 18, line 31-37 page 20, line 1-26 example 1 --- -/--	1-8

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in 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
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search 7 January 2000	Date of mailing of the international search report 14/01/2000
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INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/EP 99/05029

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 14406 A (PROCTER & GAMBLE) 24 April 1997 (1997-04-24) claims 1,6 page 14, line 14 -page 18; line 18 -----	1-8

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

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