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(54) **ANTI-DANDRUFF AND CONDITIONING SHAMPOOS CONTAINING POLYALKYLENE GLYCOLS AND CATIONIC POLYMERS**

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(58) **Field of Search** ..... 424/70.1, 70.8, 424/70.22, 70.11, 70.12, 70.13

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(57) **ABSTRACT**

Disclosed are shampoo compositions that provide a superior combination of anti-dandruff efficacy and conditioning, and a method of cleansing and conditioning the hair comprising applying to the hair and scalp an effective amount of said compositions. The anti-dandruff and conditioning shampoos comprise: (A) from about 5% to about 50%, by weight of the composition, of an anionic surfactant; (B) from about 0.01% to about 10%, by weight of the composition, of a non-volatile conditioning agent; (C) from about 0.1% to about 4%, by weight of the composition, of an anti-dandruff particulate; (D) from about 0.02% to about 5%, by weight of the composition, of at least one cationic polymer; (E) from 0.005% to about 1.5%, by weight of the composition, of a polyalkylene glycol corresponding to the formula: H(OCH<sub>2</sub>—CHR)<sub>n</sub>—OH, (i) wherein R is selected from the group consisting of hydrogen, methyl and mixtures thereof, (ii) wherein n is an integer having an average value from about 1,500 to about 120,000; and (F) water.

**25 Claims, No Drawings**

## ANTI-DANDRUFF AND CONDITIONING SHAMPOOS CONTAINING POLYALKYLENE GLYCOLS AND CATIONIC POLYMERS

This application claims priority of Provisional application Ser. No. 60/132,869 filed May 3, 1999.

### TECHNICAL FIELD OF THE INVENTION

The present invention relates to shampoo compositions which provide a superior combination of anti-dandruff efficacy and conditioning. These compositions contain anionic surfactants, conditioning agents, anti-dandruff particulates, cationic polymers, polyalkylene glycols, and water.

### BACKGROUND OF THE INVENTION

Shampoo compositions comprising various combinations of detergent surfactants and conditioning agents, especially silicone conditioning agents, are known in the art and are commercially available. Many of these compositions have been found to provide excellent hair cleansing and conditioning performance. For example, Pantene® Shampoo Plus Pro-Vitamin Conditioner-in-One formulas which contain anionic surfactants, a cationic polymer and silicone conditioning agents provide excellent cleaning, conditioning and hair feel benefits upon application to hair.

Anti-dandruff shampoos are also well known in the art and are also commercially available. Anti-dandruff shampoos typically incorporate an anti-dandruff active and detergent surfactants. Among the preferred type of anti-dandruff agents are particulate, crystalline anti-dandruff agents, such as sulfur, selenium disulfide and heavy metal salts of pyridinethione. Soluble anti-dandruff agents, such as ketoconazole, are also known in the art.

Anti-dandruff shampoos which also provide conditioning benefits are likewise known in the art. For example, U.S. Pat. No. 5,624,666 exemplifies and claims shampoo compositions which contain anionic surfactants, cationic polymers and zinc pyridinethione as an anti-dandruff agent. U.S. Pat. No. 5,624,666 teaches that conditioning agents such as silicone fluids can optionally be incorporated into the compositions therein. Head & Shoulders® Dandruff Shampoo Plus Conditioner is an example of a marketed product which provides both anti-dandruff and conditioning benefits upon application of the shampoo to hair.

Nevertheless, some consumers desire a shampoo which provides a superior combination of anti-dandruff efficacy and conditioning performance versus currently marketed products. Such a superior combination of efficacy and conditioning can be difficult to achieve.

For example, it was previously believed that excellent anti-dandruff efficacy could be achieved by utilizing a coacervate to deposit anti-dandruff actives on the hair and scalp. Unfortunately, the use of coacervates to deposit anti-dandruff actives on the hair or scalp can negatively affect conditioning, specifically clean hair feel. In order to achieve good conditioning, the level of anti-dandruff agent could be reduced, resulting in good conditioning, but less than optimal anti-dandruff efficacy.

Applicants have now discovered, however, that, surprisingly, bioavailability and coverage of the anti-dandruff active are much more predictive of efficacy than deposition of the active on the hair or scalp. In fact, Applicants have found that, in some cases, even when an anti-dandruff active deposited very well on the hair and scalp, acceptable anti-dandruff efficacy was not achieved.

Conversely, good anti-dandruff efficacy could be achieved in situations where the anti-dandruff active had good coverage and was highly bioavailable, but did not deposit superiorly to the hair or scalp. Thus, in order for a shampoo composition to provide a superior combination of anti-dandruff efficacy and conditioning compared to known shampoo compositions, it must meet certain criteria with respect to bioavailability and coverage, but it does not necessarily have to have the ability to deposit the anti-dandruff active superiorly on the hair or scalp.

It is an object of the present invention to provide shampoo compositions, which provide a superior combination of anti-dandruff efficacy and conditioning. It is also an object of the present invention to provide a method for cleansing and conditioning the hair. These, and other objects, will become readily apparent from the detailed description below.

### SUMMARY OF THE INVENTION

The present invention relates to shampoo compositions which provide a superior combination of anti-dandruff efficacy and conditioning. These shampoo compositions comprise: (A) from about 5% to about 50%, by weight, of an anionic surfactant; (B) from about 0.01% to about 10%, by weight, of a non-volatile conditioning agent; (C) from about 0.1% to about 4%, by weight, of an anti-dandruff particulate; (D) from about 0.02% to about 5%, by weight of the composition, of at least one cationic polymer; (E) from 0.005% to about 1.5%, by weight, of a polyalkylene glycol; and (F) water. The polyalkylene glycol corresponds to the formula  $H(O-CH_2-CHR)_n-OH$ , wherein R is hydrogen, methyl or mixtures thereof, and n is an integer having an average value from about 1,500 to about 120,000.

The present invention further relates to a method for providing anti-dandruff efficacy and conditioning hair comprising applying to the hair and scalp an amount of the above-described composition which is effective to provide such benefits.

### DETAILED DESCRIPTION OF THE INVENTION

The shampoo compositions of the present invention provide a superior combination of anti-dandruff efficacy and conditioning. Such anti-dandruff and conditioning shampoo compositions of the present invention can comprise, consist of, or consist essentially of the essential elements and limitations of the invention described herein, as well as any of the additional or optional ingredients, components or limitations described herein.

Particularly, these compositions comprise anionic surfactants, conditioning agents, anti-dandruff particulates, cationic polymers, polyalkylene glycols and water. Upon dilution, the anionic surfactants and cationic polymers form a coacervate, and the type and level of polyalkylene glycol employed will influence the amount of anti-dandruff particulates that are bioavailable. This is important for anti-dandruff efficacy and conditioning.

The components, including those which may optionally be added, of the shampoo compositions of the present invention, as well as methods for preparation, and methods for use, are described in detail below.

#### I. Components

The anti-dandruff and conditioning shampoo compositions of the present invention comprise an anionic surfactant, a conditioning agent, an anti-dandruff particulate,

at least one cationic polymer, a polyalkylene glycol, and water. Each of these ingredients is described in detail below.

#### A. Anionic Surfactant

The anti-dandruff and conditioning shampoo compositions of the present invention comprise from about 5% to about 50%, by weight of the composition, preferably from about 8% to about 30%, more preferably from about 10% to about 25%, most preferably from about 12% to about 18%, of an anionic deterative surfactant component suitable for application to the hair or skin. The anionic deterative surfactant is believed to provide cleaning and lather performance to the composition. Additionally, the anionic deterative surfactant forms a coacervate, upon aqueous dilution, with the cationic polymer component (described below) of the present invention. This coacervate is believed to be important in providing the efficacy and conditioning benefits described herein.

The anionic deterative surfactant component can comprise an anionic deterative surfactant, a zwitterionic or an amphoteric deterative surfactant having an attached moiety that is anionic at the pH of the composition, or a combination thereof, preferably an anionic deterative surfactant. Such surfactants should be physically and chemically compatible with the essential components described herein, and should not otherwise unduly impair product stability, aesthetics or performance. Examples of anionic deterative surfactants which may be suitably employed in the shampoo compositions herein include, but are not limited to: sulfates, sulfonates, sarcosinates and sarcosine derivatives.

##### 1. Sulfates

Preferred anionic deterative surfactants for use in the anti-dandruff and conditioning shampoo compositions of the present invention are the alkyl and alkyl ether sulfates. These surfactants have the respective formulae  $\text{ROSO}_3\text{M}$  and  $\text{R}(\text{C}_2\text{H}_4\text{O})_x\text{OSO}_3\text{M}$ , wherein R is alkyl or alkenyl from about  $\text{C}_8$  to about  $\text{C}_{18}$ , x is an integer having a value from 1 to 10, and M is a cation selected from the group consisting of electropositive covalently bonded moieties (e.g. ammonium), alkanolamines (e.g. triethanolamine), monovalent metals (e.g. sodium or potassium), polyvalent metal cations (e.g. magnesium and calcium) and mixtures thereof. The cation M should be selected such that the anionic deterative surfactant component is water soluble. Solubility of the surfactant will depend upon the particular anionic deterative surfactants and cations chosen.

Preferably, R is from about  $\text{C}_8$  to about  $\text{C}_{18}$ , more preferably from about  $\text{C}_{10}$  to about  $\text{C}_{16}$ , most preferably from about  $\text{C}_{12}$  to about  $\text{C}_{14}$ , in both the alkyl and alkyl ether sulfates. The alkyl ether sulfates are typically made as condensation products of ethylene oxide and monohydric alcohols from about  $\text{C}_8$  to about  $\text{C}_{24}$ . The alcohols can be synthetic or they can be derived from fats, e.g., coconut oil, palm kernel oil, and tallow. Lauryl alcohol and straight chain alcohols derived from coconut oil or palm kernel oil are preferred. Such alcohols are reacted with from 0 to about 10, preferably from about 2 to about 5, most preferably about 3, moles of ethylene oxide. The resulting mixture of molecular species will have, for example, an average of 3 moles of ethylene oxide per mole of alcohol, and is sulfated and neutralized.

Non-limiting examples of alkyl ether sulfates which may be used in the shampoo compositions of the present invention include sodium and ammonium salts of coconut alkyl triethylene glycol ether sulfate, tallow alkyl triethylene glycol ether sulfate, and tallow alkyl hexa-oxyethylene sulfate. Preferred alkyl ether sulfates are those comprising a mixture of individual compounds, wherein the compounds

in the mixture have an average alkyl chain length from about  $\text{C}_{10}$  to about  $\text{C}_{16}$  and an average degree of ethoxylation of from about 1 to about 4 moles of ethylene oxide.

Specific examples of preferred alkyl sulfates include, but are not limited to, ammonium lauryl sulfate, ammonium cocoyl sulfate, potassium lauryl sulfate, potassium cocoyl sulfate, sodium lauryl sulfate, sodium cocoyl sulfate, monoethanolamine lauryl sulfate, monoethanolamine cocoyl sulfate, diethanolamine lauryl sulfate, triethanolamine lauryl sulfate, triethylamine lauryl sulfate, and mixtures thereof. Especially preferred is ammonium lauryl sulfate.

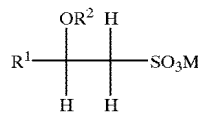
Specific examples of preferred alkyl ether sulfates include, but are not limited to, ammonium laureth sulfate, potassium laureth sulfate, sodium laureth sulfate, monoethanolamine laureth sulfate, diethanolamine laureth sulfate, triethanolamine laureth sulfate, triethylamine laureth sulfate, and mixtures thereof. Especially preferred is ammonium laureth sulfate.

Still another class of sulfate surfactants suitable for use in the for use in the anti-dandruff and conditioning shampoos of the present invention are the sulfated glycerides, an example of which includes, but is not limited to, lauric monoglyceride sodium sulfate.

##### 2. Sulfonates

Also suitable for use in the anti-dandruff and conditioning shampoos of the present invention are those anionic deterative surfactants known as olefin sulfonates. As used herein, the term "olefin sulfonates" refers to compounds which can be produced by the sulfonation of  $\alpha$ -olefins by means of uncomplexed sulfur trioxide, followed by neutralization of the acid reaction mixture in conditions such that any sulfones which have been formed in the reaction are hydrolyzed to give the corresponding hydroxy-alkanesulfonates. The sulfur trioxide can be liquid or gaseous, and is usually, but not necessarily, diluted by inert diluents, for example by liquid  $\text{SO}_2$ , chlorinated hydrocarbons, and the like, when used in the liquid form, or by air, nitrogen, gaseous  $\text{SO}_2$ , and the like, when used in the gaseous form. The  $\alpha$ -olefins from which the olefin sulfonates are derived are mono-olefins which are from about  $\text{C}_{10}$  to about  $\text{C}_{24}$ , preferably from about  $\text{C}_{12}$  to about  $\text{C}_{16}$ . Preferably, they are straight chain olefins. In addition to the true alkene sulfonates and a proportion of hydroxy-alkanesulfonates, the olefin sulfonates can contain minor amounts of other materials, such as alkene disulfonates depending upon the reaction conditions, proportion of reactants, the nature of the starting olefins and impurities in the olefin stock and side reactions during the sulfonation process. A non-limiting example of such an  $\alpha$ -olefin sulfonate mixture is described in U.S. Pat. No. 3,332,880, which description is incorporated herein by reference.

Another class of sulfonates suitable for use in the anti-dandruff and conditioning shampoo compositions of the present invention are those anionic deterative surfactants known as  $\beta$ -alkyloxy alkane sulfonates. These surfactants conform to the general Formula (I):



where  $\text{R}^1$  is a straight chain alkyl group from about  $\text{C}_6$  to about  $\text{C}_{20}$ ,  $\text{R}^2$  is a lower alkyl group from about  $\text{C}_1$  to about  $\text{C}_3$ , preferably  $\text{C}_1$ , and M is a water-soluble cation, as described above.

Still other sulfonates suitable for use in the anti-dandruff and conditioning shampoo compositions of the present

invention are those anionic deterative surfactants known as alkyl aryl sulfonates. Non-limiting examples of alkyl aryl sulfonates include sodium tridecyl benzene sulfonate, sodium dodecyl benzene sulfonate, and mixtures thereof.

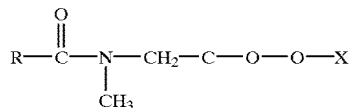
Other suitable sulfonates for use in the anti-dandruff and conditioning shampoos of the present invention are the water-soluble salts of organic, sulfuric acid reaction products conforming to the formula  $[R^1-SO_3-M]$  where  $R^1$  is a straight or branched chain, saturated, aliphatic hydrocarbon radical from about  $C_8$  to about  $C_{24}$ , preferably about  $C_{10}$  to about  $C_{18}$ ; and M is a cation described above. Non-limiting examples of such anionic deterative surfactants are the salts of an organic sulfuric acid reaction product of a hydrocarbon of the methane series, including iso-, neo-, and n-paraffins, and a sulfonating agent, e.g.,  $SO_3$ ,  $H_2SO_4$ , obtained according to known sulfonation methods. The sulfonation methods may include bleaching and hydrolysis. The salts are preferably from about  $C_8$  to about  $C_{24}$ ; more preferably from about  $C_{12}$  to about  $C_{18}$ . Preferred are alkali metal and ammonium sulfonated  $C_{10}$  to  $C_{18}$  n-paraffins.

Still other suitable sulfonates for use in the anti-dandruff and conditioning shampoo compositions of the present invention are the reaction products of fatty acids, which are esterified with isethionic acid, and then neutralized with sodium hydroxide. Preferred fatty acids are those derived from coconut oil or palm kernel oil. Also suitable are the sodium or potassium salts of fatty acid amides of methyl tauride in which the fatty acids are derived from coconut oil or palm kernel oil. Other similar anionic surfactants are described in U.S. Pat. Nos. 2,486,921; 2,486,922; and 2,396,278, which descriptions are incorporated herein by reference.

Other sulfonates suitable for use in the anti-dandruff and conditioning shampoo compositions of the present invention are the succinates, examples of which include, but are not limited to, disodium N-octadecylsulfosuccinate, disodium lauryl sulfosuccinate, diammonium lauryl sulfosuccinate, tetrasodium N-(1,2-dicarboxyethyl)-N-octadecylsulfosuccinate, diamyl ester of sodium sulfosuccinic acid, dihexyl ester of sodium sulfosuccinic acid, dioctyl esters of sodium sulfosuccinic acid, and mixtures thereof.

### 3. Sarcosinates and Sarcosine Derivatives

Also suitable for use in the anti-dandruff and conditioning shampoos of the present invention are those anionic deterative surfactants known as sarcosinates and sarcosine derivatives. Sarcosinates are the derivatives of sarcosine and N-methyl glycine, acylated with a fatty acid chloride. They conform to the general Formula (II):



wherein  $RCO-$  is a fatty acid radical and wherein X is either hydrogen (acid form) or a cationic species, such as  $Na^+$  or  $TEA^+$  (salt form). Non-limiting examples of sarcosinates and sarcosine derivatives include: sodium lauryl sarcosinate, lauryl sarcosine, cocoyl sarcosine, and mixtures thereof. A preferred sarcosinate is sodium lauryl sarcosinate.

### B. Conditioning Agent

The anti-dandruff and conditioning shampoo compositions of the present invention comprise from about 0.01% to about 10%, by weight of the composition, preferably from about 0.1% to about 8%, more preferably from about 0.1% to about 5%, most preferably from about 0.2% to about

3.5%, of a conditioning agent suitable for application to the hair or skin. It is believed that the conditioning agent provides improved conditioning benefits to the hair, particularly clean hair feel and wet rinse feel.

The conditioning agent comprises a water insoluble, water dispersible, non-volatile, liquid that forms emulsified, liquid particles or are solubilized by the surfactant micelles, in the anionic deterative surfactant component (described above). Suitable conditioning agents for use in the shampoo composition are those conditioning agents characterized generally as silicones (e.g. silicone oils, cationic silicones, silicone gums, high refractive silicones, and silicone resins), organic conditioning oils (e.g. hydrocarbon oils, polyolefins, and fatty esters) or combinations thereof, or those conditioning agents which otherwise form liquid, dispersed, particles in the aqueous surfactant matrix herein. Such conditioning agents should be physically and chemically compatible with the essential components of the composition, and should not otherwise unduly impair product stability, aesthetics or performance.

The concentration of the conditioning agent in the shampoo composition should be sufficient to provide the desired conditioning benefits, and as will be apparent to one of ordinary skill in the art. Such concentration can vary with the conditioning agent, the conditioning performance desired, the average size of the conditioning agent particles, the type and concentration of other components, and other like factors.

#### 1. Silicones

The conditioning agent of the anti-dandruff and conditioning shampoo compositions of the present invention is preferably an insoluble silicone conditioning agent. The silicone conditioning agent particles may comprise volatile silicone, non-volatile silicone, or combinations thereof. Preferred are non-volatile silicone conditioning agents. If volatile silicones are present, it will typically be incidental to their use as a solvent or carrier for commercially available forms of non-volatile silicone materials ingredients, such as silicone gums and resins. The silicone conditioning agent particles may comprise a silicone fluid conditioning agent and may also comprise other ingredients, such as a silicone resin to improve silicone fluid deposition efficiency or enhance glossiness of the hair (especially when high refractive index (e.g. above about 1.46) silicone conditioning agents are used (e.g. highly phenylated silicones).

The concentration of the silicone conditioning agent typically ranges from about 0.01% to about 10%, by weight of the composition, preferably from about 0.1% to about 8%, more preferably from about 0.1% to about 5%, most preferably from about 0.2% to about 3%. Non-limiting examples of suitable silicone conditioning agents, and optional suspending agents for the silicone, are described in U.S. Reissue Pat. No. 34,584, U.S. Pat. Nos. 5,104,646, and 5,106,609, which descriptions are incorporated herein by reference. The silicone conditioning agents for use in the anti-dandruff and conditioning shampoo compositions of the present invention preferably have a viscosity, as measured at 25° C., from about 20 to about 2,000,000 centistokes ("csk"), more preferably from about 1,000 to about 1,800,000 csk, even more preferably from about 50,000 to about 1,500,000 csk, most preferably from about 100,000 to about 1,500,000 csk.

The dispersed, silicone conditioning agent particles typically have a number average particle diameter ranging from about 0.01  $\mu\text{m}$  to about 50  $\mu\text{m}$ . For small particle application to hair, the number average particle diameters typically range from about 0.01  $\mu\text{m}$  to about 4  $\mu\text{m}$ , preferably from

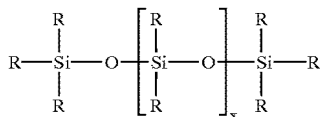
about 0.01  $\mu\text{m}$  to about 2  $\mu\text{m}$ , more preferably from about 0.01  $\mu\text{m}$  to about 0.5  $\mu\text{m}$ . For larger particle application to hair, the number average particle diameters typically range from about 4  $\mu\text{m}$  to about 50  $\mu\text{m}$ , preferably from about 6  $\mu\text{m}$  to about 30  $\mu\text{m}$ , more preferably from about 9  $\mu\text{m}$  to about 20  $\mu\text{m}$ , most preferably from about 12  $\mu\text{m}$  to about 18  $\mu\text{m}$ . Conditioning agents having an average particle size of less than about 5  $\mu\text{m}$  may deposit more efficiently on the hair. It is believed that small size particles of conditioning agent are contained within the coacervate that is formed between the anionic surfactant component (described above) and the cationic polymer component (described below), upon dilution of the shampoo.

Background material on silicones including sections discussing silicone fluids, gums, and resins, as well as manufacture of silicones, are found in *Encyclopedia of Polymer Science and Engineering*, vol. 15, 2d ed., pp 204–308, John Wiley & Sons, Inc. (1989), incorporated herein by reference.

#### i. Silicone Oils

Silicone fluids include silicone oils, which are flowable silicone materials having a viscosity, as measured at 25° C., less than 1,000,000 csk, preferably from about 5 csk to about 1,000,000 csk, more preferably from about 10 csk to about 100,000 csk. Suitable silicone oils for use in the anti-dandruff and conditioning shampoo compositions of the present invention include polyalkyl siloxanes, polyaryl siloxanes, polyalkylaryl siloxanes, polyether siloxane copolymers, and mixtures thereof. Other insoluble, non-volatile silicone fluids having hair conditioning properties may also be used.

Silicone oils include polyalkyl or polyaryl siloxanes which conform to the following Formula (III):



wherein R is aliphatic, preferably alkyl or alkenyl, or aryl, R can be substituted or unsubstituted, and x is an integer from 1 to about 8,000. Suitable unsubstituted R groups for use in the anti-dandruff and conditioning shampoo compositions of the present invention include, but are not limited to: alkoxy, aryloxy, alkaryl, arylalkyl, arylalkenyl, alkamino, and ether-substituted, hydroxyl-substituted, and halogen-substituted aliphatic and aryl groups. Suitable R groups also include cationic amines and quaternary ammonium groups.

The aliphatic or aryl groups substituted on the siloxane chain may have any structure so long as the resulting silicones remain fluid at room temperature, are hydrophobic, are neither irritating, toxic nor otherwise harmful when applied to the hair, are compatible with the other components of the shampoo compositions, are chemically stable under normal use and storage conditions, are insoluble in the shampoo compositions herein, and are capable of being deposited on and conditioning the hair. The two R groups on the silicon atom of each monomeric silicone unit may represent the same or different groups. Preferably, the two R groups represent the same group.

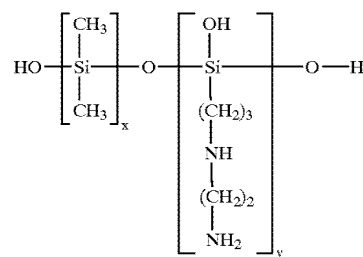
Preferred alkyl and alkenyl substituents are C<sub>1</sub> to C<sub>5</sub> alkyls and alkenyls, more preferably from C<sub>1</sub> to C<sub>4</sub>, most preferably from C<sub>1</sub> to C<sub>2</sub>. The aliphatic portions of other alkyl-, alkenyl-, or alkynyl-containing groups (such as alkoxy, alkaryl, and alkamino) can be straight or branched chains, and are preferably from C<sub>1</sub> to C<sub>5</sub>, more preferably from C<sub>1</sub> to C<sub>4</sub>, even more preferably from C<sub>1</sub> to C<sub>3</sub>, most

preferably from C<sub>1</sub> to C<sub>2</sub>. As discussed above, the R substituents can also contain amino functionalities (e.g. alkamino groups), which can be primary, secondary or tertiary amines or quaternary ammonium. These include mono-, di- and tri-alkylamino and alkoxyamino groups, wherein the aliphatic portion chain length is preferably as described above. The R substituents may also be substituted with other groups, such as halogens (e.g. chloride, fluoride, and bromide), halogenated aliphatic or aryl groups, hydroxy (e.g. hydroxy substituted aliphatic groups), and mixtures thereof. Suitable halogenated R groups could include, for example, tri-halogenated (preferably tri-fluoro) alkyl groups such as —R<sup>1</sup>CF<sub>3</sub>, wherein R<sup>1</sup> is a C<sub>1</sub>–C<sub>3</sub> alkyl. An example of such a polysiloxane includes, but is not limited to, polymethyl 3,3,3-trifluoropropylsiloxane.

Suitable R groups for use in the anti-dandruff and conditioning shampoo compositions of the present invention include, but are not limited to: methyl, ethyl, propyl, phenyl, methylphenyl and phenylmethyl. Specific non-limiting examples of preferred silicones include: polydimethyl siloxane, polydiethylsiloxane, and polymethylphenylsiloxane. Polydimethylsiloxane is especially preferred. Other suitable R groups include: methyl, methoxy, ethoxy, propoxy, and aryloxy. The three R groups on the end caps of the silicone may represent the same or different groups.

Non-volatile polyalkylsiloxane fluids that may be used include, for example, low molecular weight polydimethylsiloxanes. These siloxanes are available, for example, from the General Electric Company in their Viscasil R and SF 96 series, and from Dow Corning in their Dow Corning 200 series. Polyalkylaryl siloxane fluids that may be used, also include, for example, polymethylphenylsiloxanes. These siloxanes are available, for example, from the General Electric Company as SF 1075 methyl phenyl fluid or from Dow Corning as 556 Cosmetic Grade Fluid. Polyether siloxane copolymers that may be used include, for example, a polypropylene oxide modified polydimethylsiloxane (e.g., Dow Corning DC-1248) although ethylene oxide or mixtures of ethylene oxide and propylene oxide may also be used. The ethylene oxide and polypropylene oxide concentrations must be sufficiently low to prevent solubility in water and the composition described herein.

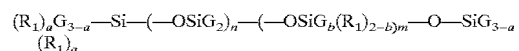
Alkylamino substituted silicones suitable for use in the anti-dandruff and conditioning shampoo compositions of the present invention include, but are not limited to, those which conform to the following general Formula (IV):



wherein x and y are integers. This polymer is also known as “amodimethicone.”

#### ii. Cationic Silicones

Cationic silicone fluids suitable for use in the anti-dandruff and conditioning shampoo compositions of the present invention include, but are not limited to, those which conform to the general formula (V):



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