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NONTANGLING SHAMPOO

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This invention relates to improved cleansing shampoo compositions, and is more particularly concerned with hair cleansing and treating compositions containing the soap and/or detergent materials of a conventional shampoo and a fluid polyorganosiloxane.

The improved shampoo of my invention is useful for washing hair, and is especially useful for washing long hair such as women often have when fashion so dictates. I have found shampoo compositions which unexpectedly overcome and prevent to a major extent the problem of snarling of the hair after it has been washed. This problem is known to everyone who attempts to brush or comb their hair after it has been washed, but it is most painfully evident to those with longer hair. The usual procedure followed is to brush or comb the hair starting from the free ends, a little at a time until finally the brush or comb will pass freely the entire length of the hair. But when hair is washed in the usual manner with the shampoo of my invention the individual strands of hair exhibit no tendency to stick together and the snarling due to "tying" action of the individual hairs is greatly minimized.

In addition to its snarl prevention effects my shampoo also imparts to hair on which it is used a marked softness and feeling of silkiness to the touch. It increases the ease with which hair may be brushed or combed many days subsequent to its use. It increases the length of time before hair becomes oily and dull in appearance. Further, my shampoo makes hair more manageable, soft, silky, and gives it "highlights" or "gleams," bringing out any tints which are present. My shampoo, since it accomplishes in one operation the purposes of both the conventional cleansing shampoo and the so-called "after-shampoo rinses" now on the market, eliminates the necessity and present desirability of using two separate products in two separate operations. Thus my invention makes the hair washing operation easier and less time-consuming by eliminating the separate operation required for "after-shampoo rinses." Since many of these rinses, especially home-made rinses, contain vinegar, beer, eggs, lemon and other fruit juices, which have a distinct and lingering odor, their elimination would be appreciated for this reason alone.

My improved cleansing compositions comprise as their essential active ingredients between about 15.0% to about 99.6% of a detergent, and between about 0.4% to about 17.0% of a fluid polyorganosiloxane having a minimum viscosity of 5 centistokes at 25° centigrade wherein the amount of detergent present is at least twice the amount of fluid polyorganosiloxane present. "Detergent," as used herein, in the specification and appended claims includes soaps, anionic detergents, cationic detergents, nonionic detergents, and other conventional cleansing agents. "Fluid polyorganosiloxane" as used herein in the specification and appended claims is defined as including linear poly-alkylsiloxanes and linear poly-alkyl-arylsiloxanes. Other ingredients of conventional shampoos such as water,

perfume, coloring etc. may be added to impart fluidity and cosmetic elegance to the product.

While the cleansing action of my shampoo, which depends on the amount and type of detergent used, is essentially that of a conventional shampoo, its unexpected hair dressing and other advantageous properties are due to a coating of silicone (polyorganosiloxane) deposited on the individual hair strands during the washing process. While it would normally be expected that the silicone present in the shampoo of my invention, in amounts as low as 0.4 percent, would be washed away during the usual hair washing procedure which normally entails wetting the hair, applying shampoo, massaging the shampoo well into the hair, rinsing the hair with water a few times, and perhaps repeating the entire operation again, such is not the case. A significant amount of the silicone unexpectedly remains as a coating on the individual hair strands.

Another unexpected finding of my invention is that the presence of the silicone fluid does not appreciably inhibit the formation of copious foam or lather during the course of the hair washing process, even though silicone fluids, and particularly the polydimethylsiloxane fluid, are noted for their foam-killing properties. Mixtures, such as those found in Example 1 below, exhibit good lathering properties.

Other advantages and properties of my new shampoo will be apparent to those skilled in the art to which this invention pertains.

My new improved composition may comprise any of the soaps and/or anionic, nonionic or cationic detergent materials used conventionally for cleansing purposes, in combination with poly-alkyl or poly-alkyl-aryl linear siloxanes. A satisfactory shampoo of my invention requires only a homogeneous physical mixture of all the ingredients of sufficient stability to prevent the separation of the mixture into separate phases during standing, sufficient fluid polyorganosiloxane to accomplish the desirable results listed above, and the usual cleansing ability and pleasing appearance customarily expected of shampoo products by the public. These requirements are easily met by incorporating poly-alkyl and/or poly-alkyl-aryl linear siloxanes in conventional shampoo formulations in the amount of 0.4 percent to 17 percent of siloxane based on the total weight of the prepared silicone shampoo.

The incorporation may be accomplished in most cases by vigorous mechanical agitation at room temperature of the prepared shampoo base in which the fluid polyorganosiloxane has been placed. The fluid polyorganosiloxanes used in my invention may have viscosities ranging upward from 5 centistokes at 25° centigrade. If desired, the fluid polyorganosiloxane may be added to the soap and/or detergent materials during the course of the manufacture of the shampoo base, either when such materials are at room temperature or when heated during preparation of the shampoo base.

The preferred fluid polyorganosiloxanes used in this invention are polydimethylsiloxane and polydiethylsiloxane and the preferred viscosity range is from 100 to 2,500,000 centistokes at 25° centigrade and the preferred range of concentration is from 1% to 13% polysiloxane based on the total weight of the prepared silicone-shampoo.

The optimum silicone-shampoo of this invention comprises a polydimethylsiloxane of from 60,000 to 2,500,000 centistokes at 25° centigrade in a concentration of 1% to 9% polyorganosiloxane based on the total weight of the prepared silicone-shampoo.

The concentration of active cleansing ingredients in the shampoo is not very critical inasmuch as public custom dictates the use of a liberal amount of shampoo during each hair washing (and usually hair is sham-

pooed twice in rapid succession), so that generally more of the active cleansing ingredient is employed than would be necessary under strictly controlled conditions. The concentration of fluid polyorganosiloxane in the shampoo is of greater importance because, in general, it has a controlling effect upon the amount of polyorganosiloxane (silicone) which is deposited on the hair strands during washing with the silicone-shampoo and thus has a controlling effect upon the degree to which the above-listed objects and benefits are realized. Too low a concentration of fluid polyorganosiloxane in the shampoo will result in a product having essentially the same properties as the same shampoo base made without any polyorganosiloxane, whereas too high a polyorganosiloxane concentration will result in the deposition of so much silicone on the hair strands that the hair will feel "heavy" and stringy or oily after rinsing and drying. But the proper concentration of silicone in the shampoo produces the above-listed benefits without causing any obvious oiliness of the hair strands.

The viscosity of the polyorganosiloxane employed is not very critical. Silicone fluids of 100 centistokes viscosity at 25° centigrade yield much the same result when used in shampoos as the same type fluids of 1,000,000 centistokes viscosity at 25° centigrade, the main exception being that the higher viscosity fluids are somewhat more effective, at equal concentration in the shampoo, in preventing snarling of the hair. Thus the viscosity of the silicone also exerts some controlling effect upon the efficacy of the silicone-shampoo.

If desired the silicone fluid may first be diluted with a carrier such as hexyl ether, chloroform, amyl acetate, 2-ethyl hexanol, methyl ethyl ketone, or any other relatively non-toxic solvent miscible with the silicone, before it is added to the shampoo base. Such dilution makes for ease of handling in some instances, especially when very high viscosity silicone fluids are being utilized. Preferred solvents of this type should evaporate or leach out during the hair shampooing operation.

Another method for facilitating the handling of the very high viscosity silicone fluids (such as 1,000,000 centistokes and above) is to use a very low viscosity silicone fluid as a diluent.

The type of silicone fluid employed may vary with respect to the alkyl or aryl groups substituted on the siloxane unit. Any polyorganosiloxane will be effective to some degree so long as: it exhibits the properties of a fluid substance at room temperature, it is hydrophobic, it is not sufficiently irritating or toxic to endanger the user when blended into a shampoo base, it is sufficiently inert chemically to preclude reaction with the usual shampoo base materials, it is chemically stable to a degree sufficient to prevent decomposition under normal use and storage conditions, and it is not volatile under normal use conditions. Some examples of polyorganosiloxanes which meet the above specifications are polydimethylsiloxane, polydiethylsiloxane, polydimethyl-phenylsiloxanes and homologues thereof. Shampoos made with methyl-phenyl silicone fluids with varying ratios of methyl to phenyl groupings in the polymers exhibit the same basic improvements in the art as shampoos containing only the polydialkyl siloxane fluids, when compared on the basis of identical concentrations and viscosities of each type of silicone in the same shampoo base. Of all silicone fluids available the polydimethylsiloxanes are preferred because of their commercial availability in quantity, proven physiological inertness, high degree of chemical purity, relatively low and stable cost and availability in specific, closely controlled viscosity grades.

The shampoo compositions of my invention may be prepared by admixing a conventional shampoo base and a silicone fluid and agitating until an emulsion or a homogeneous physical mixture results of sufficient stability so as not to separate upon standing. The silicone fluid may be added after the base has already been prepared or during the preparation of the base. The silicone fluid may be added while the prepared or the partially prepared base is hot or is at room temperature. The silicone fluid per se may be added or it may be first diluted with a carrier, i. e., a relatively non-toxic solvent miscible with the silicone, such as hexyl ether, chloroform, amyl acetate, 2-ethyl hexanol or methyl ethyl ketone, for ease of handling. A mixture of different silicone fluids and/or different viscosities of the same or different silicone fluids may also be used.

There are innumerable possible shampoo compositions of my invention, which may be prepared by many slightly varying procedures. The following examples will help to illustrate my invention.

BASE SHAMPOO FORMULAE

Materials	Parts by Weight			
	A	B	C	D
Fatty Alcohol Sulfate	250.0	200.0	250.0	
Nonionic Alkylolamide		50.0		250.0
Sodium Salt of Alkyl Aryl Polyether Sulfonate, 28%			161.0	161.0
Stearic Acid	22.5	22.5		
Cocoanut Fatty Acids	15.0	15.0		
Hydrous Lanolin	0.5	0.5		
Sodium Hydroxide	7.0	7.0		
Distilled or De-Ionized Water	202.0	202.0	86.0	86.0
Preservative	0.5	0.5	0.5	0.5
Perfume	2.5	2.5	2.5	2.5
Total	500.0	500.0	500.0	500.0

Examples of materials listed above under general headings:
Fatty alcohol sulfate: Lauryl alcohol sulfate.
Nonionic alkylolamide: Lauric isopropanolamide.
Sodium salt of alkyl aryl polyether sulfonate: A proprietary product made by Rohm & Haas Company and called "Triton X-200," supplied as a 28% solution by weight in water.
Preservative: Formaldehyde in water at 37% aldehyde concentration by weight.

The examples of materials listed in each classification are only one of many compounds known and used in the art and wide range of substitution equivalents in the above formulae will be apparent to those skilled in the art. The above formulae are only intended to represent typical conventional shampoo formulations since substantially all shampoo formulations can serve as a base for the preparation of the shampoos of my invention.

Example 1.—(Utilizing Formula A)

Two hundred fifty parts lauryl alcohol sulfate, 22.5 parts stearic acid, 15.0 parts cocoanut fatty acids, and 0.5 part hydrous lanolin were weighed into a jacketed kettle and heated with gentle agitation to 70° centigrade. Into another kettle was weighed 202 parts of distilled water and 7 parts of sodium hydroxide and the temperature of this mixture was raised to 80° centigrade with gentle agitation. When the sodium hydroxide was dissolved, 0.5 part of formaldehyde in water (at 37% aldehyde concentration by weight) was added to the sodium hydroxide solution and mixed in. This solution was then added to the first solution and the resulting admixture was agitated mechanically without further application of heat for ten minutes. The mixing was stopped and the mixture was allowed to cool to 50° centigrade. 2.5 parts of perfume were added and the mixture was slowly agitated until the perfume was blended in, whereupon the agitation was stopped and the mixture was allowed to cool to room temperature.

Fifty parts of polydimethylsiloxane having a viscosity of approximately 1,000,000 centistokes at 25° centigrade was then added by weighing it into the same kettle in which the shampoo base mixture had been prepared. The resulting admixture was then agitated at room temperature until it appeared homogeneous.

Example 2.—(Utilizing Formula A)

Following the procedure of Example 1, 2.5 parts of

polydimethylsiloxane having a viscosity of approximately 2,500,000 centistokes at 25° centigrade was mixed with 12.5 parts of hexyl ether, and the resulting admixture was added to the shampoo base.

Example 3.—(Utilizing Formula B)

Two hundred parts of fatty alcohol sulfate, 50 parts of lauric isopropanolamide, 22.5 parts of stearic acid, 15.0 parts cocoanut fatty acids, and 0.5 part hydrous lanolin were weighed into a jacketed kettle and heated with gentle agitation to 70° centigrade. Twenty-five parts of polydiethylsiloxane having a viscosity of 60,000 centistokes at 25° centigrade were added to the same kettle. 7.0 parts of sodium hydroxide and 202.0 parts de-ionized water were weighed into another jacketed kettle and heated with gentle agitaton to 80° centigrade. When the sodium hydroxide was dissolved, 0.5% of a preservative was added to the sodium hydroxide solution and mixed in. This solution was then added to the mixture in the first kettle and the resulting admixture was mixed without further application of heat for about 10 minutes, after which mixing was stopped and the mixture was allowed to cool to 50° centigrade. 2.5 parts of perfume were added and the mixture was slowly agitated while being allowed to cool to room temperature.

Example 4.—(Utilizing Formula C)

250 parts fatty alcohol sulfate, 161 parts "Triton X–200," 86 parts distilled water, 2.5 parts perfume and 0.5 part preservative were weighed into a kettle. Sixty parts polydimethyl-phenylsiloxane having a viscosity of 100,000 centistokes were then added to the contents of the kettle which was then agitated at room temperature until all the ingredients were thoroughly dispersed and the mixture was homogeneous.

Example 5.—(Utilizing Formula D)

Two hundred fifty parts of lauric isopropanolamide, 161 parts of "Triton X–200," 86.0 parts de-ionized water, and 0.5 part preservative were weighed into a mixing kettle. Thirty parts polydimethylsiloxane having a viscosity of 5 centistokes at 25° centigrade, and 30 parts polydimethylphenylsiloxane having a viscosity of 100,000 centistokes were added to the same kettle. The kettle was then heated to 80° centigrade while it was being thoroughly agitated until a homogeneous dispersion was reached. The contents of the kettle were then allowed to cool with continuing agitation. When the mixture had been cooled to room tempreature, 2.5 parts of perfume were added and thoroughly blended in.

Extensive tests on the hair of numerous people, both men and women with various types of hair, utilizing the compositions of the foregoing examples, have demonstrated their excellent utility as a hair shampoo, and in preventing snarling, imparting softness, silkiness and manageability to the hair. These tests also served to confirm the unexpected result that the presence of the fluid polyorganosiloxane did not deleteriously affect the foaming and cleansing action of the shampoo.

It is to be understood that the invention is not to be limited to the exact compositions shown and described, as obvious equivalents will be apparent to one skilled in the art, and the invention is therefore to be limited only by the scope of the appended claims.

I claim:

1. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99.6% by weight of a water-soluble detergent; and between about 0.4–17.0% by weight of a liquid linear polysiloxane of the class consisting of polydimethylsiloxanes, polydiethylsiloxanes, polymethyl-phenylsiloxanes having a viscosity at 25° C. of between about 5–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

2. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99% by weight of a water-soluble detergent; and between about 1–13% by weight of a liquid linear polysiloxane of the class consisting of polydimethylsiloxanes, polydiethylsiloxanes, polymethyl-phenylsiloxanes having a viscosity at 25° C. of between about 100–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

3. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99% by weight of a water-soluble detergent; and between about 1–9% by weight of a liquid linear polysiloxane of the class consisting of polydimethylsiloxanes, polydiethylsiloxanes, polymethyl-phenylsiloxanes having a viscosity at 25° C. of between about 60,000–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

4. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99.6% by weight of a water-soluble detergent; and between about 0.4–17.0% by weight of a liquid linear polydimethylsiloxane having a viscosity at 25° C. of between about 5–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

5. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99% by weight of a water-soluble detergent; and between about 1–9% by weight of a liquid linear polydimethylsiloxane having a viscosity at 25° C. of between about 60,000–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

6. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99.6% by weight of a water-soluble detergent; and between about 0.4–17.0% by weight of a liquid linear polydiethylsiloxane having a viscosity at 25° C. of between about 5–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

7. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99% by weight of a water-soluble detergent; and between about 1–9% by weight of a liquid linear polydiethylsiloxane having a viscosity at 25° C. of between about 60,000–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

8. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99.6% by weight of a water-soluble detergent; and between about 0.4–17.0% by weight of a liquid linear polymethyl-phenylsiloxane having a viscosity at 25° C. of between about 5–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

9. A hair shampoo adapted to form a hair cleansing and anti-snarling liquid with water, comprising as essential ingredients: between about 15–99% by weight of a water-soluble detergent; and between about 1–9% by weight of a liquid linear polymethyl-phenylsiloxane having a viscosity at 25° C. of between about 60,000–2,500,000 centistokes, the amount of detergent present being at least about twice the amount of polysiloxane.

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