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SHAMPOO COMPOSITION

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The present invention relates to a composition of matter suitable for use as a shampoo and, more particularly, to a pressurized liquid shampoo for employment in a pressure resistant container commonly referred to as the aerosol type.

Within recent years, the aerosol type dispenser has received wide application in the dispensing of various materials in the food, paint, insecticidal, cosmetic, pharmaceutical and other fields. In essence, the material to be dispensed contains a propellant or normally gaseous substance under pressure. Upon release to normal atmospheric conditions, such as by the actuation of a valve, the material is propelled or discharged from the container in the form of a fine mist or fog, e.g. for use as an insecticide, or as a fluffed type product, e.g. as an aerated type foam or lather useful in whipped cream, shaving creams, etc. The enclosed gaseous substance serving generally as the principal propelling force will gradually be dissipated to the surrounding atmosphere.

Many varied types of shampoo compositions have been developed in the past. They generally contain as the principal cleansing agent either soap, i.e. water-soluble salts of higher fatty acids, or various synthetic detergents, usually anionic organic sulfates or sulfonates. Certain of these compositions have been prepared in the form of liquids, creams, pastes, etc. with varying success.

Broadly, the present invention relates to a satisfactory liquid shampoo suitable for employment in these pressure containers which comprises the ammonium salts of sulfated monoglyceride of higher fatty acids as a detergent, a liquefied normally gaseous organic propellant, a minor proportion of a suitable saturated higher fatty alcohol in an aqueous lower alcoholic medium. More particularly, it has been found that a pressurized liquid shampoo which consists essentially of said detergent, a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant, and a minor proportion of a saturated fatty alcohol of 16 carbon atoms, preferably 1-hexadecanol, in an aqueous alcoholic solvent exhibits highly desirable foaming characteristics. On discharge from the pressure container the novel compositions of the present invention are characterized by improved foam stability, a rich "feel," and which on washing and rinsing leaves the hair with a good luster and satisfactory manageability.

The detergent used in the present invention is a well known synthetic detergent which may be made in any suitable way, e.g., as shown by Muncie, U.S. Patent Numbers 2,130,631 and 2,130,632. The product obtained in this manner will usually contain a considerable proportion of inorganic salt such as ammonium sulphate which may be largely removed by alcohol extraction, e.g., as disclosed in Russell et al. U.S. Patent Number 2,303,582. The ammonium salt may be prepared either by direct neutralization of the sulphated material or by ion exchange, e.g., as disclosed in Bell et al. U.S. Patent Number 2,187,144. The amount of ammonium sulphate and the like left in the detergent used in the present invention is preferably as low as practicable and generally should not exceed about 15% of the active ingredient. Any of the oils and fats used in soap making, such as coconut oil, palm kernel oil, tallow, palm oil, olive oil, etc., may be used either individually, in mixtures, as fractionated fatty acids or blends thereof for making the active ingredient for the present invention.

The concentration of this detergent in the liquid shampoo is generally at least about 5%, usually between about 10 to about 50%, and preferably from about 20 to about 50%. Furthermore, it is where the composition contains appreciable amounts of detergent, such as within the latter range, that the beneficial effects of the instant invention are encountered to an optimum degree.

The detergent, generally containing a minor proportion of inorganic salts such as ammonium sulfate, may be utilized in any suitable alcoholic medium. In the manufacture of the detergent as indicated, it may be extracted with a lower alcohol solvent to separate the major amount of inorganic salts. As a result thereof, the detergent containing only minor amounts of residual inorganic salts may be recovered admixed with alcohol which may be utilized at least in part as the solvent medium herein.

The aqueous alcoholic solvent mediums of the compositions of the present invention are requisite to the preparation of the shampoo in the liquid state with certain desired properties. They possess adequate solubility for the detergent and the higher alcohol, required miscibility with the liquefied normally gaseous propellant etc. In general, any aqueous low molecular weight alcoholic solvent may be employed, preferably the aqueous lower monohydric alcoholic mediums, e.g. aqueous methanol, ethanol, normal propanol, isopropanol, etc. Any suitable concentration of alcohol may be used, the only requirement being sufficient to maintain the desired physical characteristics of the liquid shampoo, as indicated above. The amount of alcohol will generally be at least about 5%, and usually about 10–25%, of the total weight.

As propellants, any suitable normally gaseous organic substance (or mixtures) may be used. In general, they should be substantially non-toxic, non-inflammable, odorless, etc. It is preferred to use the normally gaseous low molecular weight halogenated hydrocarbon propellants, such as halogenated ethane, halogenated methane, and mixtures thereof in view of their high volatility at usual atmospheric conditions, stability in and miscibility with suitable solvent mediums such as aqueous alcoholic solutions, etc. The halogenated hydrocarbon propellants known in the art as the "Genetrons" and "Freons" have been found to be particularly suitable. Further specific examples of suitable propellants are methyl chloride, dichlorodifluoromethane, monochloro-difluoroethane, dichlorotetrafluorethane, etc.

The amount of propellant may be varied depending on the properties desired in the final product. In general, it need only be sufficient to satisfactorily propel or eject the shampoo material satisfactorily from the container. It is preferred to use at least about 5%, preferably about 10% to about 20%, propellant by weight of the total liquid shampoo composition, though higher amounts may be used if desired, e.g. up to about 30%.

These propellants in sole combination with the ammonium salt of the higher fatty acid monoglyceride sulfate detergent in an aqueous alcoholic solvent have a unique and marked adverse effect on the foaming properties of the product upon discharge from the container. It has been found that the foaming characteristics of the product when released from the aerosol dispenser are highly unsatisfactory. The generated foam or lather tends to collapse readily and possesses a thin consistency or body, rendering the product unsuitable for consumer ap-

peal and use. Such undesirable effects appear to be most pronounced where the shampoo contains an appreciable amount of alcohol in the shampoo, e.g. at least about 10%, and particularly where at least about 15% alcohol of the total weight of the shampoo is employed. Marked adverse effects are also obtained wherein high amounts of detergent containing inorganic salts are used, since it has also been found that excessive amounts of inorganic salts will have a detrimental effect on the foam in the relationship set forth. No reason is known at this time for such advarse effects, particularly with the alcohol solvent, on the foaming characteristics with respect to this particular detergent material.

It has been found that in combination with certain saturated higher fatty alcohols the foaming characteristics of the product are completely modified in an advantageous manner. The shampoo composition containing the detergent, propellant, and aqueous alcoholic medium in combination with the indicated higher saturated fatty alcohol will exhibit desired fluffing power on discharge from the container and in addition yield a rich stable foam having a desirable "feel." Furthermore, on application to the human hair, the product has high foaming power and stability, excellent cleansing properties, and after washing and rinsing renders the hair lustrous and manageable etc. In general, saturated fatty alcohols, particularly the monohydric type of about 12 to about 16 carbon atoms are suitable, e.g. lauryl alcohol, myristyl alcohol, etc. It has been found, moreover, that marked optimum effects are obtained with the use of 1-hexadecanol (cetyl alcohol). The specificity of action, particularly in regard to the use of cetyl alcohol, is not completely understood at this time. The desired higher fatty alcohol may be used in pure, impure or commercial form wherein it may contain varying amounts of other alcohols provided the same are not significant enough to substantially adversely affect the desired result. In contrast thereto, the incorporation of equivalent amounts of "Stenol" comprising essentially stearyl alcohol does not have any significant desirable effect on the foaming characteristics of the product.

The amount of fatty alcohol to be incorporated therein is variable and may be determined by routine tests since the effects on foaming are observable phenomena. In general, the amount of cetyl alcohol and the like should be a minor proportion of the total weight of the shampoo and effective to improve the foam, particularly the foam stability, in addition to other desirable advantages resulting from its use. It is preferred to use from about 2 to about 8% of cetyl alcohol and the like of the total weight of the shampoo. If desired however, amounts from about ½% to about 15% of this additive may be incorporated therein, depending on the specific effects desired.

The higher fatty alcohols are essentially water-insoluble materials. It has been further found that the propellant in the relationship set forth has a solubilizing action on the higher fatty alcohols with the result that generally a clear aqueous solution results in the container, permitting these higher alcohols to exert their maximum beneficial effects.

These compositions may be prepared in any suitable manner. One satisfactory method is to dissolve the cetyl alcohol in an aqueous alcoholic solution of the detergent and add the mixture to the pressure container or aerosol bomb which is subsequently sealed. Thereafter, the propellant while under pressure may be admitted to the container through a valve or other appropriate means, the container generally being slightly chilled during this operation. The chilling of the bomb permits it to be charged under conditions providing a greater available propelling pressure when the bomb regains atmospheric temperature. Another satisfactory method is to prechill the alcoholic solution of the various ingredients and the propellant, either individually or as a mixture below the boiling point of the propellant, and charge them into the container which is sealed thereafter.

The following specific examples are further illustrative of the nature of the present invention, and it is to be understood that the invention is not limited thereto.

Example I

Eight parts of cetyl alcohol are dissolved at about 130° F. in 92 parts of a solution of the ammonium salt of coconut fatty acid monoglyceride sulfate detergent having approximately the following composition: 40% ammonium monoglyceride sulfate derived from coconut oil, 20% ethyl alcohol, 4% ammonium sulfate, and the reminder water. 176 gms. of the mixture are weighed into an open, inverted pressure container, and the contents are cooled by suitable means to a temperature of −5° F. 24 gms. of a cooled and liquefied halogenated ethane ($C_2H_3ClF_2$ known as Genetron 101) are then added to the contents. The container is sealed and the product after it has warmed to room temperature is ready to be dispensed through the manually operated valve. The foaming properties of this product are excellent, particularly in foam stability and consistency. In contrast thereto, a similar product prepared without cetyl alcohol exhibits highly undesirable foaming characteristics, with the foam collapsing readily and having a thin consistency.

Example II

Seven parts of cetyl alcohol and one part of lanolin are dissolved in 92 parts of detergent solution having the above specified composition. 176 gms. of the mixture are transferred to a pressure container, the container is sealed and 24 gms. of the same propellant are admitted through the valve while the can is slightly cooled. The foaming characteristics of the product are excellent also.

Example III

Following the procedure of mixing and filling of Example I, there are used 4 parts of cetyl alcohol and 96 parts of detergent solution. 176 gms. of this mixture and 24 gms. of pressure propellant are employed.

The foaming properties of this product are markedly improved over one containing no cetyl alcohol, but the foam stability is not as good as those obtainable in preparations made as described in Examples I and II.

Other suitable formulations productive of desired results are:

Example IV

	Percent
Ammonium salt of higher fatty acid monoglyceride sulfate derived from coconut oil	35
Ammonium sulfate	3.5
Propellant	12
Perfume	0.7
Lanolin	0.8
Cety alcohol	6
Isopropanol	17
Water	25

Example V

Ammonium salt of higher fatty acid monoglyceride sulfate derived from coconut oil	20
Sodium lauryl sulfate	10
Ammonium sulfate	3
Sodium sulfate	1
Glycerine	1
Cety alcohol	6
Lauric monoethanolamide	3
Lanolin	1
Propellant	10
Ethyl alcohol	15
Water	30

As indicated above it is common to add various adjuvant materials to shampoo compositions. Thus the shampoo ordinarily will contain a perfume which should

be selected so as to be compatible with the character of the shampoo. It will usually contain minor amounts of inorganic salts, generally formed in the manufacture of the active detersive ingredient. Other ingredients which may be used in shampoos for imparting desired qualities to the hair after washing may be further incorporated in the present compositions. Thus hair conditioners or superfatting materials such as lanolin, fatty amides and fatty acids may generally be used in minor proportions. Suitable coloring materials or whitening agents may be used if desired etc. The term "consisting essentially of" as used in the definition of the ingredients present in the composition claimed is intended to exclude the presence of other materials in such amounts as to interfere substantially with the properties and characteristics possessed by the composition set forth but to permit the presence of other materials in such amounts as not substantially to affect said properties and characteristics adversely.

Although the present invention has been described with reference to particular embodiments and examples, it will be apparent to those skilled in the art that variations and modifications can be made without departing from the principles and true spirit of the invention.

Having described the invention what is desired to be secured by Letters Patent is:

1. A liquid shampoo in a pressure container which comprises the ammonium salts of sulfated monoglycerides of higher fatty acids as a detergent, a liquefied normally gaseous propellant, a minor proportion of a saturated higher fatty alcohol of about 12 to about 16 carbon atoms effective to improve the foaming characteristics, and an aqueous lower monohydric alcohol solvent.

2. A liquid shampoo in a pressure container which comprises the ammonium salts of sulfated monoglycerides of higher fatty acids as a detergent, a liquefied normally gaseous propellant, an aqueous lower monohydric alcohol solvent and a minor proportion of 1-hexadecanol effective in combination therewith to improve the foaming characteristics.

3. A liquid shampoo in a pressure container consisting essentially of the ammonium salts of sulfated monoglycerides of higher fatty acids as a detergent, a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant, a minor proportion of a saturated higher fatty alcohol of about 12 to about 16 carbon atoms, and an aqueous lower monohydric alcohol solvent.

4. A liquid shampoo in a pressure container consisting essentially of the ammonium salts of sulfated monoglycerides of higher fatty acids as a detergent, a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant, a minor proportion of 1-hexadecanol, and an aqueous lower monohydric alcohol solvent.

5. A liquid shampoo in a pressure container consisting essentially of at least about 5% by weight of the ammonium salts of higher fatty acid monoglyceride sulfate detergent, an effective amount up to about 15% of cetyl alcohol, a liquefied normally gaseous propellant, and an aqueous lower monohydric alcohol solvent.

6. A liquid shampoo in a pressure container consisting essentially of the ammonium salts of sulfated monoglycerides of higher fatty acids as a detergent, a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant from about ½% to about 15% of a higher saturated fatty alcohol of 12 to 16 carbon atoms and effective in combination therewith to improve the foaming characteristics, and an aqueous lower monohydric alcohol solvent.

7. A liquid shampoo in a pressure container consisting essentially of at least about 20% of ammonium salts of sulfated monoglycerides of higher fatty acids as a detergent, a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant, from about 2 to 8% of 1-hexadecanol effective in combination therewith to improve the foaming characteristics, and an aqueous lower monohydric alcohol solvent.

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