

[54] **AEROSOL PACKAGE CONTAINING A
HOMOGENEOUS SINGLE PHASE
LIQUID SKIN-CONDITIONER**

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[57] **ABSTRACT**

A single phase, liquid skin-conditioning formulation which can be discharged from an aerosol-type container by means of a halogenated alkane propellant is disclosed. The liquid formulation contains a non-soap, surface-active agent and the propellant dissolved in a solvent system comprising water and a lower-alkanol. When expelled from the pressurized container through a suitable nozzle, the composition forms a stable, non-sticky foam.

4 Claims, No Drawings

AEROSOL PACKAGE CONTAINING A HOMOGENEOUS SINGLE PHASE LIQUID SKIN- CONDITIONER

This application is a continuation-in-part of copending application Ser. No. 509,207, filed Nov. 22, 1965 now abandoned.

The present invention relates to aerosol foam skin conditioner compositions and to homogeneous liquid self-propelling skin conditioner compositions which when dispensed from a suitable pressurized container produce stable foams.

In recent years the aerosol type dispenser has gained wide acceptance as a means for dispensing various materials in the food, cosmetic, and pharmaceutical industries. These aerosol dispensable preparations are packaged in a pressurized vessel containing, as a propellant, a normally gaseous substance which can be liquified by pressure. When the pressure is released the preparation is expelled or discharged from the container in the form of an atomized spray or a foam.

This invention provides a self-propelled skin conditioner composition suitable for use in pressurized containers.

This invention also provides a skin conditioner composition characterized by a stable foam.

This invention also provides a self-propelling, clear, transparent liquid skin conditioner composition which maintains its clarity and transparency at ambient temperatures, e.g., from about 30°F. to about 105°F. and which is suitable for use in conventional and transparent pressurized containers.

This invention also provides a composition which, upon discharge from a pressurized container, forms a suitable foam having skin conditioning properties and a soothing pleasing feel when applied to the skin.

This invention moreover provides a homogeneous single phase liquid skin conditioner composition which can be discharged from a pressurized container to form a stable foam which may be used in the manner of a skin conditioner.

The term "skin conditioner composition" as used herein refers to a composition which, when applied to the skin, imparts a soothing or softening effect due to its lubricating and/or moisturizing properties.

The term "stable foam" as used herein refers to a foam of light consistency (as opposed to a heavy foam such well known aerosol shaving cream foams) which does not become liquified for about 1 to 2 minutes when left undisturbed and which, when rubbed, slowly breaks down to a liquid. The stability of the foam is not adversely affected by body heat or variations in temperature, that is, temperatures, which normally may be encountered during shipping, storing or application of the skin conditioner composition, even in tropical climates.

Broadly, the present invention provides a package consisting of a pressurized container having a valve controlled foam dispensing head and charged with a self-propelling, clear, transparent, homogeneous, liquid skin conditioner composition capable of retaining its clear, transparent, homogenous and liquid properties at temperatures between about 30°F. and about 105°F. and forming a stable foam upon discharge from said container comprising, in compatible mixture, non-soap surface-active agents, and a liquified halogenated al-

kane propellant dissolved in a solvent medium consisting essentially of a lower-alkanol and water. When the skin conditioner composition is discharged from the pressurized container through a suitable foam dispensing valve there is provided a stable, pleasant feeling, non-sticky foam.

The skin conditioner composition of this invention possesses all of the hereinabove disclosed properties only by virtue of a critical balance, more fully disclosed hereinbelow, between the relative amounts of water, lower-alkanol, propellant, and surfactant. Thus one or more of the properties possessed by the skin conditioner composition of this invention and/or the foam formed therefrom will be adversely affected if the proportion of water, alcohol, propellant, and surfactant is varied so as to cause one or more of these to fall outside the critical weight per cent ranges defined for each hereinbelow. For example, the composition can become incompatible, that is, it can become cloudy or separate into two liquid layers; or the foam can become either too runny, tacky or sticky, or liquify too quickly on coming in contact with the skin; or certain of the ingredients of the composition can precipitate or crystallize on standing, or combinations of these undesirable properties can result.

The self-propelling liquid skin conditioner composition can be described as consisting of an aqueous composition consisting essentially of a surfactant or a mixture of surfactants dissolved in a water-alcohol system and a propellant consisting essentially of a suitable halogenated alkane propellant or mixtures of suitable halogenated alkane propellants which is soluble in the aqueous composition.

The soluble non-soap surface active agents may be anionic, nonionic, cationic or amphoteric in nature. Suitable anionic surfactants which are co-soluble with the liquified propellant in the alcohol-water solvent medium include the alkali metal salts of sulfated fatty alcohols or mixtures thereof having about eight to 18 carbon atoms, e.g., sodium and potassium salts of sulfated cetyl alcohol, sodium and potassium salts of sulfated stearyl alcohol, sodium and potassium salts of sulfated lauryl alcohol, sodium and potassium salts of sulfated coconut fatty alcohols, and the like; alkali metal salts of alkyl esters of sulfated succinic acid having about eight to 18 carbon atoms in the alkyl group such as the sodium salt of the dioctyl ester of sulfated succinic acid; alkali metal salts of sulfated fatty acid amides having eight to 18 carbon atoms, e.g., sodium and potassium salts of sulfated caprylamide, sodium and potassium salts of sulfated lauric amide, sodium and potassium salts of sulfated stearic amide, sodium and potassium salts of sulfated oleic amide, sodium and potassium salts of ricinoleic amide, and the like.

Suitable compatible nonionic surfactants include alkylamine oxides having about eight to 18 carbons atoms such as myristyldimethylamine oxide, cetyldimethylamine oxide, lauryldimethylamine oxide, stearyldimethylamine oxide, and the like; fatty acid mono- and di-alkanalamides having about 8 to 18 carbon atoms such as lauric monoethanolamide, myristic monoethanolamide, stearic monoethanolamide, lauric diethanolamide, stearic diethanolamide, mixtures of coconut fatty acid mono- and diethanolamides, and the like. Further suitable nonionic surfactants include

polyethylene oxide condensates of castor oil (e.g. Surfactol 365 having a saponification value of 64, The Baker Castor Oil Co., Bayonne, N.J.). Other suitable nonionic surfactants include condensates of fatty acids, fatty alcohols, and fatty hydroxy acids, which are characteristic of lanolin or wool-fat, with 50 to 70 moles ethylene oxide. Such ethylene oxide condensates are available as water-soluble lanolin designated as ethoxylated lanolin. Acetylated derivatives of these ethoxylated lanolins may also be used as water-alcohol soluble nonionic surfactants. Additional suitable nonionic surfactants include condensates of higher fatty acids having about eight to 18 carbon atoms, such as ricinoleic acid, with 3 moles ethylene oxide and condensates of the higher fatty alcohols having about eight to 18 carbon atoms, exemplified by iso-octyl alcohol, nonyl alcohol, decyl alcohol, and oleyl alcohol, with 3 moles ethylene oxide.

Suitable cationic surfactants include the quaternary ammonium compounds of mono- and di-alkylamines having from eight to 18 carbons in the alkyl chain such as hexyltrimethyl ammonium chloride, dihexyldimethyl ammonium chloride, octyltrimethyl ammonium chloride, dioctyldimethyl ammonium chloride, distearyldimethyl ammonium chloride, dicoco dimethyl ammonium chloride, and the like.

Amphoteric surface active agents which may be used in the practice of this invention include compounds prepared by adding higher fatty amines across the double bond of propenoic acid, e.g., the alkali metal salts of N-lauryl beta-iminodipropionic acid, N-lauryl myristyl beta-aminopropionic acid, and the like.

The surfactant component or components of the aqueous composition are well known the surfactant art and are employed in effective amounts, i.e., in an amount which is sufficient to provide a stable foam having skin conditioning properties. In general from about 7 to about 15 weight per cent and preferably from about 9.4 to about 13.3 weight per cent of a suitable surfactant or mixture of surfactants, based on the total weight of the aqueous composition, has been found satisfactory. Excessive amounts of surfactant tend to produce foams which are sticky and tacky to the touch, while insufficient amounts of surfactant provide a product having insufficient foaming and skin conditioning power.

Although any lower-alkanol having one to three carbon atoms e.g., methanol, ethanol, n-propanol and isopropanol, may be employed, the preferred solvent-system comprises water and from about 15 to about 20 weight percent ethanol based on the total weight of the aqueous composition. Since the skin conditioner composition is intended to be a clear transparent single phase liquid, the nature and composition of the alcohol-water solvent medium is particularly important.

The propellant may be any volatile organic material that exists as a gas at room temperature which can be liquified under pressure and dissolved in the alcohol-water solution of surfactant to provide a stable homogeneous single phase solution. Saturated aliphatic hydrocarbons and halogenated (e.g. chlorinated, fluorinated and chlorofluorinated) saturated aliphatic hydrocarbons having a vapor pressure within the range of from about 5 to about 300 p.s.i.g. and preferably from about 20 to about 40 p.s.i.g. at 70°F., especially in

situations where the use of transparent glass or plastic containers is contemplated, are typical of the propellants which may be used.

Propellants such as dichlorodifluoromethane, monochlorodifluoromethane, dichlorotrifluoroethane, trichlorotrifluoroethane, difluoroethane, difluoromonochloroethane, trichloroethane, methylene chloride and mixtures thereof have been found to be suitable.

It will of course be appreciated that certain of the above listed propellants are incapable, when used individually, of providing sufficient propellant power to discharge the entire contents of the aerosol container and to form a suitable quantity of stable foam. Accordingly, compounds such as methylene chloride, trichloroethane and trichloromonofluoromethane which are characterized by relatively low propellant power, will be used in admixture with other propellants which are capable of providing sufficient pressure. It has been found that the use of such low-pressure propellants is beneficial in that they tend to provide desirable solubility characteristics and increase the compatibility of the total system for the other more volatile propellants.

A particularly suitable propellant, which has been found to provide adequate foaming and propellant characteristics, is a mixture of difluoromonochloroethane and trichloromonofluoromethane in a weight by weight ratio of from about 3:2 to about 2:3 and preferably about 1:1.

The propellant is generally employed in amounts of from about 5 to about 15 weight per cent and preferably from about 8 to about 11 weight per cent, based on the total weight of the aqueous composition and propellant in the pressurized container.

In addition to the above described surfactants, the aqueous compositions can contain adjuvants or combinations of adjuvants which are soluble in the water-alcohol-propellant-surfactant mixture. For example, the aqueous composition can advantageously contain compatible humectants such as glycerine, propylene glycol, and the like and skin conditioners such as cetyl alcohol, polyethylene glycol having an average molecular weight of from about 400 to about 3000, and polyvinyl pyrrolidone having an average molecular weight of from about 40,000 to about 150,000. Such adjuvants or combinations thereof are preferably present in amounts ranging from about 3 to about 8 per cent by weight based on the total weight of the aqueous composition. Perfumes, colorants and corrosion inhibitors may also be incorporated. Illustrative corrosion inhibitors include, morpholine, oleic acid, formaldehyde, and the like.

From another standpoint, this invention provides a package consisting of a pressurized container having a valve controlled foam dispensing head charged with a self-propelling, clear, transparent, homogeneous, liquid skin conditioner composition capable of forming a stable foam upon discharge from the container, the skin conditioner composition consisting of about 85 to about 95 weight per cent of an aqueous composition and about 15 to about 5 weight per cent of a propellant, the aqueous composition consisting essentially of from about 7 to about 15 weight per cent of a non-soap sur-

face active agent selected from the group consisting of alkali metal salts of sulfated fatty alcohols, alkali metal salts of alkyl esters of sulfated succinic acid, alkali metal salts of sulfated fatty acid amides, alkylamine oxides, fatty acid alkanolamides, ethoxylated castor oil, ethoxylated lanolin, acetylated ethoxylated lanolin, ethylene oxide condensates of higher fatty acids, ethylene oxide condensates of higher fatty alcohols, quaternary ammonium compounds of alkylamines, alkali metal salts of N-lauryl beta-iminodipropionic acid and N-lauryl myristyl beta-aminopropionic acid, from about 15 to about 20 weight per cent of a lower-alkanol having from one to three carbon atoms, and the balance water, and the propellant consisting essentially of a liquified halogenated saturated aliphatic propellant having a vapor pressure from about 5 to about 300 pounds per square inch gauge at about 70°F., the propellant being soluble in the aqueous composition.

In a preferred embodiment the pressurized container is charged with a clear, transparent, homogeneous, liquid skin conditioner composition capable of forming a stable foam upon discharge from the container, the skin conditioner composition consisting of about 85 to about 95 weight per cent of an aqueous composition and about 15 to about 5 weight per cent of a propellant, the aqueous composition consisting essentially of from about 0.5 to about 5 weight per cent glycerine, from about 0.5 to about 2 weight per cent water-soluble lanolin, from about 1 to about 3 weight per cent polyethylene glycol having an average molecular weight between about 400 and about 3000, from about 2.4 to about 3.3 weight per cent alkyldimethylamine oxide having 14 to 16 carbon atoms in the alkyl chain, from about 7 to about 10 weight per cent ethoxylated castor oil, from about 15 to about 20 weight per cent ethanol, and the balance water; and the propellant consisting essentially of a mixture of difluoromonoethane and trichloromonoethane, in a weight to weight ratio between 2:3 and 3:2.

In particularly preferred embodiments the pressurized container is charged with a clear, transparent, homogeneous, liquid skin conditioner composition capable of forming a stable foam upon discharge from the container, the skin conditioner composition consisting of about 89 to about 92 weight per cent (but more preferably about 90 weight per cent) of an aqueous composition and about 11 to about 8 weight per cent (but more preferably about 10 weight per cent) of a propellant, the aqueous composition consisting essentially of about 2.8 weight per cent of a mixture of cetyl dimethylamine oxide and myristyl dimethylamine oxide, about 8.56 weight per cent ethoxylated castor oil, about 2.0 weight per cent glycerine, about 1.0 weight per cent water soluble lanolin, about 1.5 weight per cent polyethylene glycol having an average molecular weight between about 570 and about 1100, about 15 to 20 weight per cent ethanol and the balance water, the propellant consisting essentially of a mixture of difluoromonoethane and trichloromonoethane, in a weight to weight ratio between 2:3 and 3:2 (but more preferably in equal parts by weight).

These formulations can be prepared in any suitable manner. For example, the surfactant, emollients, hu-

mectants, perfumes and colorants can be conveniently dissolved in a suitable alcohol-water solvent at room temperature and then the solution is added to and sealed in a suitable aerosol container. Thereafter the liquified propellant under pressure is introduced into the aerosol container which may be partially evacuated. Alternately, the entire composition, including the liquified propellant, can be formulated and charged to the container while under pressure. It may be advantageous to employ chilling temperatures during charging of the pressurized containers.

I claim:

1. A package consisting of a pressurized container having a valve controlled foam dispensing head charged with a self-propelling, clear, transparent, homogeneous, liquid skin conditioner composition capable of retaining said clear, transparent, homogeneous and liquid properties at temperatures between about 30°F and about 105°F and forming upon discharge from the container a foam of light consistency which does not become liquified for about 1 to 2 minutes when left undisturbed and which breaks down to a liquid when rubbed; the skin conditioner composition consisting of about 85 to about 95 weight per cent of an aqueous composition and about 15 to about 5 weight per cent of a propellant; said aqueous composition consisting essentially of from about 7 to about 15 weight per cent of a non-soap surface active agent selected from the group consisting of the sodium salt of a sulfated fatty alcohol having eight to 18 carbon atoms, the potassium salt of a sulfated fatty alcohol having eight to 18 carbon atoms, the alkali metal salt of an alkyl ester of sulfated succinic acid having eight to 18 carbons atoms in the alkyl group, the sodium salt of a sulfated fatty acid amide having eight to 18 carbon atoms, the potassium salt of a sulfated fatty acid amide having eight to 18 carbon atoms, an alkyl-dimethylamine oxide having eight to 18 carbon atoms in the alkyl group, a fatty acid mono-ethanolamide having eight to 18 carbon atoms in the fatty acid group, a fatty acid di-ethanolamide having eight to 18 carbon atoms in the fatty acid group, ethylene oxide condensate of castor oil having a saponification value of 64, a condensate of lanolin with 50 to 70 moles of ethylene oxide, an acetylated condensate of lanolin with 50 to 70 moles of ethylene oxide, a condensate of a fatty acid having eight to 18 carbon atoms with 3 moles of ethylene oxide, a condensate of a fatty alcohol having eight to 18 carbon atoms with 3 moles of ethylene oxide, a quaternary ammonium compound of a mono-alkylamine having from eight to 18 carbon atoms in the alkyl group, a quaternary ammonium compound of a di-alkylamine having from eight to 18 carbon atoms in the alkyl group, an alkali metal salt of N-lauryl beta-iminodipropionic acid, an alkali metal salt of N-lauryl myristyl beta-aminopropionic acid and mixtures of said surface active agents; from about 15 to about 20 weight per cent of a lower alkanol having from one to three carbon atoms; and the balance water; and the propellant being a liquified halogenated alkane propellant or mixtures of liquified halogenated alkane propellants, the propellant having a vapor pressure from about 5 to about 300 pounds per square inch gauge at about 70 F and being soluble in the aqueous composition.

2. A package according to claim 1 wherein the aqueous composition consists essentially of from about 0.5 to about 5 weight per cent glycerine, as an additional component; from about 0.5 to about 2 weight per cent a condensate of lanolin with 50 to 70 moles ethylene oxide, from about 1 to about 3 weight per cent polyethylene glycol having an average molecular weight between about 400 and about 3000, as an additional component, from about 2.4 to about 3.3 weight per cent alkyldimethylamine oxide having 14 to 16 carbon atoms in the alkyl group; from about 7 to about 10 weight per cent ethylene oxide condensate of castor oil having a saponification value of 64; from about 15 to about 20 weight per cent ethanol; and the balance water; and the propellant is a mixture of difluoromonochloroethane and trichloromonofluoromethane, in a weight to weight ratio between 2:3 and 3:2.

3. A package according to claim 2 wherein the skin conditioner composition consists of about 89 to about 92 weight per cent of the aqueous composition and

about 11 to about 8 weight per cent of the propellant, wherein the aqueous composition consists essentially of about 2.8 weight per cent of a mixture of cetyl dimethylamine oxide and myristyl dimethylamine oxide, about 8.56 weight per cent ethylene oxide condensate of castor oil having a saponification value of 64, about 2.0 weight per cent glycerine, about 1.0 weight per cent a condensate of lanolin with 50 to 70 moles ethylene oxide, about 1.5 weight per cent polyethylene glycol having an average molecular weight between about 570 and about 1100, about 15 to 20 weight per cent ethanol and the balance water.

4. A package according to claim 3 wherein the skin conditioner composition consists of about 90 weight per cent of the aqueous composition and about 10 weight per cent of the propellant, wherein the propellant is a mixture in equal parts by weight of difluoromonochloroethane and trichloromonofluoromethane.

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