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<b>(21) International Application Number:</b> PCT/US90/01471 <b>(22) International Filing Date:</b> 19 March 1990 (19.03.90)  <b>(30) Priority data:</b> 326,377                      21 March 1989 (21.03.89)                      US  <b>(71) Applicant:</b> IMAGINATIVE RESEARCH ASSOCIATES, INC. [US/US]; 416 Bunnell Street, Bridgeport, CT 06607 (US).  <b>(72) Inventors:</b> VISHNUPAD, Mohan ; 130 Knorr Road, Monroe, CT 06468 (US). RAMIREZ, Jose, E. ; 15 Fox Court, Trumbull, CT 06611 (US).  <b>(74) Agent:</b> TULLY, Thomas, L.; Perman & Green, 425 Post Road, Fairfield, CT 06430 (US).		<b>(81) Designated States:</b> AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), IT (European patent), LU (European patent), NL (European patent), SE (European patent).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
<b>(54) Title:</b> SELF-FOAMING OIL COMPOSITIONS AND PROCESS FOR MAKING AND USING SAME  <b>(57) Abstract</b> <p>The present invention relates to liquid, lotion-like aqueous oil-in-water emulsion compositions containing large amounts of oil or oil/wax mixtures, a volatile organic foam-producing liquid, and a mixture of foam suppressing agent(s) and surface active agent(s) which increase the solubility of the foam-producing liquid in the oil or oil/wax mixture. The present compositions are emulsions which do not foam or self-disperse from a non-pressurized container at temperatures up to 120° F, and can be poured onto a wet surface at room temperatures and spread to form a thin layer which will post foam under ambient conditions to leave a residue of the oil or oil/wax mixture for cosmetic, medicinal, aesthetic, protective or other purposes. The invention includes the methods for making and using the present emulsions.</p>		

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Self-Foaming Oil Compositions and Process  
for Making and Using Same

Background of the Invention

Liquid compositions containing oils and/or soluble waxes are well known for a variety of uses, such as cosmetic lotions, medicinal lotions, furniture polishes, cleansers for tile, glass, metal, etc. Some such compositions contain soaps and/or detergents to enable them to entrap air and produce a foam or lather during use. However if high levels of oil or oil/wax mixture are added to such aqueous compositions, the foam- or lather-producing properties of the compositions are substantially reduced. Therefore aqueous liquid compositions, capable of being poured from a non-pressurized container to form a foam-producing coating, have not been available with oil or oil/wax contents greater than about 4% or 5% by weight. Such low contents are not satisfactory where the purpose of the product is to apply coatings which are high in oil or oil/wax content.

Aerosol compositions containing oil and/or oil/wax ingredients and water are also well known but such compositions must be dispensed as a foam from a pressurized container and cannot be contained as a self-foaming lotion-like liquid in a non-pressurized container. Reference is made to U.S. Patents 2,655,480 and 3,705,855 for their disclosure of such aerosol compositions.

It is also known to provide aerosol soap and detergent compositions which dispense as a single phase gel capable of being spread over the skin as a self-foaming coating, and reference is made to U.S. Patents 3,541,581, 4,505,489 and 4,772,427 for their disclosure of such compositions.

Finally, it is known from U.S. Patent 4,726,944 to provide self-foaming or post foaming aqueous liquid detergent compositions which are capable of being poured from a non-pressurized container and rubbed into the hair as a post-foaming shampoo. Such compositions contain mixtures of anionic, amphoteric and non-ionic surfactants; water-soluble gum and a volatile hydrocarbon, and foaming occurs by evaporation of the latter as the composition is applied to the hair. U.S. Patent 4,744,979 relates to similar post-foaming shaving gel compositions containing an aqueous soap solution and a mixture of surface active agents comprising amine oxides and alkanolamides.

While self-foaming or post-foaming compositions of the aforementioned types intended for the cleansing of wet or dry surfaces that contain no oil or small amounts thereof are capable of being poured as clear liquid solutions from a non-pressurized container, they function well for their intended purposes only at temperatures close to room temperature, 70-80°F. It has not been possible heretofore to produce lotion-like post-foaming compositions of these types which are detergent-based and are used for cleansing which contain large amounts of oil or oil/wax mixture for purposes of applying oil or oil/wax coatings to the skin or other wet or dry surfaces

for cosmetic, medicinal, aesthetic, protective, household, automotive or other purposes. In addition, such lotion-like post-foaming compositions show a markedly increased solubility of the volatile hydrocarbon component. This property allows the non-pressurized containers to be opened at much higher temperatures, i.e., 110-120°F.

#### Summary of the Invention

The present invention relates to the discovery of formulations for aqueous, lotion-like compositions which contain large amounts of dispersed oil or oil/wax mixture, greater than about 5% by weight, a volatile organic foam-producing liquid and a surfactant or detergent which increases the solubility of the foam-producing liquid in the oil or oil/wax mixture, optional additional foam suppressing agents depending on the surfactant or surfactants used, the surfactant or detergent comprising the discontinuous phase of the composition, the continuous phase comprising water. This allows the presence of large amounts of the oil or oil/wax mixture without any interference with the foam-forming ability of the foam-producing liquid, whereby the composition can be poured onto a preferably wet surface and spread as a creamy lotion coating which forms a uniform fine foam within a few seconds under ambient exposure, due to the evaporation of the volatile organic foam-producing liquid, to leave an oil or oil/wax foam residue which can be rubbed over the skin or other surface for cosmetic, medicinal, aesthetic, protective, cleansing or other purposes. The presence of the oil or oil/wax on the skin during the foaming action permits the

oil or oil/wax mixture, and any medicaments, emollients or other additives dissolved therein or present in the water phase to penetrate the skin and displace moisture, moisture-soluble dirt skin oils or infected matter which may be withdrawn from the skin during the foaming process, for increased effectiveness in softening and treating the skin.

The preferred compositions of the present invention are aqueous emulsions including pseudo emulsions and other aqueous dispersions which can be agitated within the container, prior to use, to form lotion-like liquids containing oil or oil/wax mixture dispersed within the continuous water phase.

#### Detailed Description

The present compositions contain at least about 5% by weight of one or more oils, alone or in combination with one or more waxes soluble in or compatible with said oil(s), at least about 5% by weight of at least one suitable surface active agent or detergent, at least about 5% by weight of at least one volatile organic foam-producing liquid, optionally one or more foam-suppressing compounds in the amount of 2-15% by weight, and the remainder, generally less than about 60%, water.

The ingredient of the present compositions that enables the presence of large amounts of oil or oil/wax mixtures, is the surface active agent or detergent. This material preferably is present in an amount within the range of from about 5% to about 20% by weight, and preferably from

10% to about 15% by weight, to enable the incorporation of from about 5% to about 60% by weight of the oil or oil/wax mixture, preferably from 20% to about 35% by weight of said oil or oil/wax mixture.

The most critical ingredients of the present compositions from the standpoint of increasing the solubility of the volatile hydrocarbon are both the oil and surface active agent. Their combination enables the incorporation of about 15% volatile hydrocarbons, increasing their solubility to the point that the compositions of the invention can be opened to the atmosphere at temperatures much higher than room temperature.

The addition of foam-suppressing compounds also increases the solubility of the volatile hydrocarbon component. Some surfactants by their nature do not need the addition of foam-suppressing agents, while other surfactants are not suitable for commercial utilization without them.

The most preferred mild surfactants that do not need foam suppressing agents are anionic materials such as sodium methyl cocoyl taurate (sodium salts of N-methyl taurine-coconut oil amides, referred to herein as SMCT); disodium cocamido monoisopropanol amide sulfosuccinate (disodium salts of sulfo-2-cocamide-1-methyl ethyl esters of butanedioic acid, referred to herein as DCMS); sodium lauryl sulfoacetate (sodium salt of sulfo-1-dodecyl ester of acetic acid, referred to herein as SLSA); dioctyl sodium sulfosuccinate (sodium salt of the diester of 2-ethylhexyl alcohol and sulfosuccinic acid, referred to herein as DSS), and amphoteric materials such as cocamidopropyl hydroxy sultaine, referred to herein as

CHS, and combinations of such detergents with each other or with small amounts of other foam-boosting surfactants.

The inclusion of foam-suppressing compounds, preferably in amounts between about 3% and 7% by weight where necessary, in combination with highly foaming surfactants allows the use of a greater variety of surfactants which, per se, are not useful for the preparation of suitable commercial products. Combinations of this type can be obtained by adding alcohols, alkoxy alcohols, etc. to surfactants like sodium lauryl sulfate, referred to herein as SLS, ammonium lauryl ether sulfate, referred to herein as ALS, and many other surfactants generally of the anionic type. A similar foam-controlling effect can be obtained by blending high foaming surfactants, generally of the anionic type, with low foaming surfactants. The preferred low foaming surfactants used for this foam controlling effect are generally of the non-ionic and the amphoteric type. Typical of these are nonoxinol-9 (nonionic) and cocampho-carboxyl glycinate (amphoteric), referred to herein as CCG.

Suitable oils for use in the compositions of the present invention include all of the conventional water-insoluble liquid or semi-solid mineral (including mixtures of petroleum derived hydrocarbons containing 10 or more carbon atoms), vegetable, synthetic and animal oils, including fatty acid esters, lanolin, etc. The particular oils selected for a particular composition will depend upon its desired function and/or its ability to dissolve additives such as fragrances, waxes, medicaments, etc.



Suitable waxes include semi-solid and solid vegetable, mineral, animal and synthetic waxes, present in amounts which are soluble in the oils present to form liquid oil/wax mixtures.

The preferred volatile organic foam-producing liquids are those having a vapor pressure from about 4 to 14 p.s.i.g. at temperatures between about 90° - 100°F, most preferably hydrocarbons having 5 or 6 carbon atoms such as isopentane, pentane and hexane. The volatile organic liquid is present in an amount between about 5% and 15% by weight, preferably between 7% and 12% by weight.

The preferred foam suppressing agents are alcohols, alkoxy alcohols, low foaming surfactants and any other suitable compounds that help prevent the compositions of the invention from self-dispensing at temperatures well in excess of room temperature.

The final essential ingredient of the present compositions is water, which is present as an oil-in-water emulsion or dispersion to form the continuous phase of the self-foaming composition. Generally the water is present in an amount between about 25% and 60% by weight of the composition, most preferably between about 35% and 45% by weight.

Other ingredients generally are present in minor amounts, less than 10% by weight and usually less than about 2% by weight. Such additives should be soluble in or miscible with either the oils or oil/wax mixtures or in the water and include perfumes or fragrances, emollients, humectants, medicaments, colorants, etc.

The following examples are illustrative of several compositions within the scope of the present invention and should not be considered limitative. The compositions thereof are produced by adding the oils or oil/wax mixtures to a suitable container, adding the surface active agents or detergents thereto and homogenizing at a suitable elevated temperature until the detergents are thoroughly dispersed in the oil or oil/wax phase, water being added while homogenizing. Finally the mixture is cooled to room temperature or lower and the volatile organic foam-producing liquid, cooled below its boiling point, is added while the composition is stirred with a mixer. Generally any additives are initially incorporated with the oils or oil/wax mixtures in the first step.

Example 1

<u>Ingredients</u>	<u>Wt%</u>
Mineral Oil	35.0
DCMS	15.0
Water	40.0
Pentane	10.0

## Example 2

<u>Ingredients</u>	<u>Wt%</u>
Mineral Oil	35.0
DCMS	13.0
Sodium Lauryl Sulfate	2.0
Fragrance	0.5
Water	39.5
Isopentane	10.0

## Example 3

<u>Ingredients</u>	<u>Wt%</u>
Mineral Oil	35.0
SMCT	15.0
Water	40.0
Pentane	10.0

## Example 4

<u>Ingredients</u>	<u>Wt%</u>
Mineral Oil	35.0
DCMS	20.0
Water	35.0
Pentane	10.0

10

## Example 5

<u>Ingredients</u>	<u>Wt%</u>
Mineral Oil	35.0
DCMS	5.0
Water	50.0
Pentane	10.0

## Example 6

<u>Ingredients</u>	<u>Wt%</u>
Petroleum Jelly	15.0
Mineral Oil	10.0
Isopropyl Palmitate	10.0
DCMS	12.0
SLS	3.0
Water	39.5
Fragrance	0.5
Isopentane	10.0

## Example 7

<u>Ingredients</u>	<u>Wt%</u>
Mineral Oil	35.0
SLSA	5.0
Water	50.0
Isopentane	10.0

## Example 8 (Shaving Preparation)

<u>Ingredients</u>	<u>Wt%</u>
Mineral Oil	15
Isopropyl Palmitate	8
Glycerine	10
DCMS	13
SLS	2
Palmitic Acid	2
Water	40
Isopentane	10
NaOH to adjust to pH 8.5	

## Example 9 (Antidandruff cleanser)

<u>Ingredient</u>	<u>Wt%</u>
Mineral Oil	35.0
DCMS	15.0
Omadine MDS ( $\text{MgSO}_4$ adduct)	1.0
Water	39.0
Isopentane	10.0

## Example 10 (Psoriatic Skin Cleanser)

<u>Ingredient</u>	<u>Wt%</u>
Petroleum Jelly	10.0
Mineral Oil	20.0
DCMS	15.0
Coal Tar Aqueous Soln.	5.0
Water	40.0
Isopentane	10.0

## Example 11 (Auto Cleaner/Polish)

<u>Ingredient</u>	<u>Wt%</u>
Carnauba Wax	17.5
Mineral Oil	17.5
DCMS	9.0
SLS	1.0
Water	45.0
Isopentane	10.0

## Example 12 (Fabric Cleaner)

<u>Ingredient</u>	<u>Wt%</u>
Deodorized Kerosene	35.0
DCMS	15.0
Water	45.0
Pentane	5.0

## Example 13 (Cosmetic Cleanser)

<u>Ingredient</u>	<u>Wt%</u>
Lanolin	10.0
Acetulan (acetylated lanolin)	25.0
DCMS	13.0
SLS	2.0
Water	40.0
Isopentane	10.0

13

## Example 14

<u>Ingredients</u>	<u>Wt%</u>
DCMS	15.0
Mineral Oil	60.0
Water	15.0
Isopentane	10.0

## Example 15

<u>Ingredients</u>	<u>Wt%</u>
DCMS	5.0
Mineral Oil	35.0
Water	50.0
Isopentane	10.0

## Example 16

<u>Ingredients</u>	<u>Wt%</u>
SCT	15.0
Mineral Oil	10.0
Water	65.0
Isopentane	10.0

## Example 17

<u>Ingredients</u>	<u>Wt%</u>
DSS	15.0
Mineral Oil	35.0
Water	40.0
Isopentane	10.0

## Example 18

<u>Ingredients</u>	<u>Wt%</u>
DCMS	12.0
SLS	3.0
Mineral Oil	20.0
Petroleum Jelly	12.5
Polyethyleneglycol-8	
Dilaurate	2.5
Water	39.5
Fragrance	0.5
Hexane	10.0

## Example 19 (Depilatory Lotion)

<u>Ingredients</u>	<u>Wt%</u>
DCMS	15.0
Mineral Oil	35.0
Water	34.0
Calcium Thioglycolate	6.0
Isopentane	10.0



15

## Example 20

<u>Ingredients</u>	<u>Wt%</u>
SLS	15.0
Mineral Oil	30.0
Water	40.0
Ethyleneglycol	
n-Butyl ether	5.0
Pentane	10.0

## Example 21

<u>Ingredients</u>	<u>Wt%</u>
SLS	15.0
Mineral Oil	35.0
Water	32.5
Ethanol	7.5
Pentane	10.0

## Example 22

<u>Ingredients</u>	<u>Wt%</u>
SLS	7.5
Cocampho-carboxyl glycinate (CCG)	7.5
Mineral Oil	35.0
Water	40.0
Pentane	10.0

16

## Example 23

<u>Ingredients</u>	<u>Wt%</u>
SLS	7.5
Nonoxinol-9	7.5
Mineral Oil	35.0
Water	40.0
Pentane	10.0

## Example 24

<u>Ingredients</u>	<u>Wt%</u>
CHS	15.0
Mineral Oil	35.0
Water	40.0
Pentane	10.0

## Example 25 (surgical scrub)

<u>Ingredients</u>	<u>Wt%</u>
CHS	15.0
Chlorhexidine gluconate	4.0
Capramide DEA	2.0
Polyquaternium-7	0.2
Mineral Oil	18.0
Petroleum Jelly	12.0
Fragrance	0.3
Water	38.5
Pentane	10.0

## Example 26 (acne cleanser)

<u>Ingredients</u>	<u>Wt%</u>
DCMS	12.0
ALS	3.0
Polyquaternium-7	0.2
Mineral Oil	30.0
Benzoyl Peroxide	5.0
Glycerine	5.0
Water	34.5
Fragrance	0.3
Pentane	10.0

The following Examples 27 to 31 illustrate non-functional comparative compositions:

## Example 27

<u>Ingredients</u>	<u>Wt%</u>
Sodium Lauryl Sulfate (SLS)	15.0
Mineral Oil	35.0
Water	40.0
Pentane	10.0

18

## Example 28

<u>Ingredients</u>	<u>Wt%</u>
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Ammonium Lauryl Ether	
Sulfate (ALS)	15.0
Mineral Oil	35.0
Water	40.0
Pentane	10.0

## Example 29

<u>Ingredients</u>	<u>Wt%</u>
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Nonoxinol-9	15.0
Mineral Oil	35.0
Water	40.0
Pentane	10.0

## Example 30

<u>Ingredients</u>	<u>Wt%</u>
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Dimethyl-1-Naphthyl	
Methyl Ammonium	
Chloride	15.0
Mineral Oil	35.0
Water	40.0
Pentane	10.0

## Example 31

<u>Ingredients</u>	<u>Wt%</u>
CCG	15.0
Mineral Oil	35.0
Water	40.0
Pentane	10.0

In order to establish the critical nature of the components of the present compositions we have compared examples of the preferred surfactants with other surfactants considered non-functional by themselves for the purpose of this invention. The compositions being compared are identical in every respect except by substitution of identical amounts of total surfactant. The compositions of Example 1, 3, 7, 17 and 24 were compared with the non-functional compositions of examples 27, 28, 29, 30 and 31. Each of the compositions was placed in an individual 100ml graduated cylinder, 10 ml of water was added to 10g of each composition, and the cylinder was closed and shaken vigorously ten times. The initial and final volumes of the foam were recorded as 1 (0 ml increase), 3 (27 ml increase), 7 (0 ml increase), 17 (0 ml increase), 24 (24 ml increase), 27 (55 ml increase), 28 (59 ml increase), 29 (8 ml increase), 30 (5 ml increase) and 31 (28 ml increase). The preferred compositions, Examples 1, 7 and 17, showed no tendency to foam in the sealed container under agitation, establishing the solubilizing effect on the volatile organic liquid and its suppression against escape and foaming within the container, whereby the compositions have excellent post-foaming properties after being poured

onto the wet skin and scrubbed for cleansing action. The compositions of Example 3 and 24 foamed somewhat but still solubilized the volatile organic liquid within the oil to a sufficient extent that the composition has excellent post-foaming properties similar to those of Examples 1, 7 and 17.

The compositions of examples 1, 3, 7, 17 and 24 when opened at temperatures much higher than room temperature, e.g. from 110 to 120°F, will not self-dispense. The compositions of Examples 27 and 28 foamed excessively and self-dispensed from the container even at room temperature, although they do post-foam because the volatile liquid hydrocarbon is solubilized somewhat in the oil phase but only to an unsatisfactory extent.

The compositions of Examples 29, 30 and 31 while they showed little or no tendency to foam when agitated in the sealed container, they were non-functional when poured onto the skin and spread in the same manner as the other compositions since they do not self-foam or post-foam to any useful extent.

The inclusion of foam suppressing components in combination with highly foaming surfactants allows the preparation of suitable commercial products. Preparations of this type can be obtained by adding alcohols, alkoxy alcohols, etc. to the highly foaming surfactant of Examples 27. For example, the compositions of Examples 20 and 21 show limited foam increase in the sealed container under agitation, i.e., composition 20 (23 ml increase) and composition 21 (15 ml increase). This establishes the solubilizing effect on the volatile

organic liquid and its suppression against escape and foaming within the container.

A similar foam-controlling effect can be obtained by blending high foaming surfactants generally of the anionic type with low foaming surfactants generally the non-ionic and amphoteric types. Thus, in Examples 22 and 23 the surfactants of the unsatisfactory compositions of Examples 29 and 31 are modified to prepare suitable commercial products by adding the low foaming surfactants of the compositions to provide additional foam-controlling effect. The foaming values of composition 22 (23 ml increase) and compositions 23 (25 ml increase) illustrate the effect of the low foaming surfactants on compositions containing SLS which, by its chemical nature, will foam uncontrollably when used alone and will produce compositions which self-dispense at room temperature. The compositions of Examples 20, 21, 22 and 23 contain foam suppressants and demonstrate controlled foaming and will not self-dispense at temperatures from 110-120°F. All these compositions are functional when poured onto the skin and spread in the same manner as the compositions of examples 1, 3, 7, 17 and 24 since they do foam and post-foam to a useful extent.

Therefore it will be apparent to those skilled in the art that the various classes of oils or oil/wax mixtures, specific ones of which are illustrated by the various examples set forth herein, can be incorporated in large amounts in self-foaming compositions capable of being contained within non-aerosol, non-pressurized containers, preferably small-mouth rigid containers, which compositions can be poured onto the skin or other surface

and rubbed or spread in the same manner as a conventional lotion and will self-generate a copious foam on the wet skin or other wet surfaces in a few seconds time. The foaming operation results from the evaporation of the organic foam-producing liquid to leave an oily foam residue which can be rubbed into the skin or over a wooden, metallic, plastic or other surface for cleaning, medication, polishing, waxing or other purposes.

It is to be understood that the above described embodiments of the invention are illustrative only and that modifications throughout may occur to those skilled in the art. Accordingly, this invention is not to be regarded as limited to the embodiments disclosed herein but is to be limited as defined by the appended claims.



CLAIMS

What is claimed is:

1. Aqueous, lotion-like, flowable liquid emulsion composition, containing large amounts of oil or oil/wax mixture, which is capable of being contained within a non-pressurized container without self-foaming therefrom at temperatures up to about 120°F, and capable of being poured onto a surface at room temperatures and spread as a thin layer to self-develop a copious foam, said composition comprising an aqueous emulsion having a continuous aqueous phase and a discontinuous phase comprising at least about 10% by weight of said composition of at least one oil or oil/wax mixture, at least about 5% by weight of said composition of at least one volatile organic foam-producing liquid which has an evaporation temperature at or slightly above ambient room temperature, and a foam-controlling mixture comprising (a) at least about 5% by weight of said composition of at least one high foaming surface active agent which increases the solubility of said foam-producing liquid in said oil or oil/wax mixture of said discontinuous phase to an insufficient degree to prevent self foaming at 120°F, and (b) one or more foam suppressing agents which cooperate with said high foaming surface active agent(s) to cause said foam-producing liquid to be solubilized in said oil or oil/wax mixture to prevent the composition from self-foaming from an open container at temperatures up to about 120°F, the balance of said composition comprising water as the continuous phase.

2. A composition according to Claim 1 comprising from about 10% to 60% by weight of said oil or oil/wax mixture, from about 5% to 20% by weight of said high foaming surface active agent, from about 5% to 15% by weight of said volatile organic liquid, from about 2% to 15% by weight of said foam-suppressing agent and from about 30% to 60% by weight of water.

3. A composition according to Claim 1 comprising from about 20% to 35% by weight of said oil or oil/wax mixture, from about 10% to 15% by weight of said surface active agent, from about 7% to 12% by weight of said volatile organic liquid, from about 3 to 7% by weight of said foam-suppressing agent and from about 35% to 45% by weight of water.

4. A composition according to Claim 1 in which said foam-suppressing agent comprises a low foaming surface active agent which does not produce a self foaming composition in the absence of said high foaming surface active agent.

5. A composition according to Claim 1 in which said foam-suppressing agent comprises an aliphatic alcohol or alkoxy aliphatic alcohol.

6. A composition according to Claim 1 in which said volatile organic liquid is one having a vapor pressure from about 4 to 14 p.s.i.g. at a temperature between 90° and 100°F.

7. A composition according to Claim 5 in which said volatile organic liquid comprises pentane, isopentane or hexane.

8. A composition according to Claim 1 in which said oil comprises mineral oil or a mineral oil/petroleum jelly mixture.

9. A composition according to Claim 1 further containing minor amounts of one or more oil-soluble or water-soluble additives for imparting fragrance, emollient, cosmetic, medication, humectant, disinfectant or other properties to said composition.

10. A shaving composition according to Claim 9 in which said oil comprises a fatty acid ester and said additives include a humectant and sufficient alkali to render said composition alkaline.

11. An anti-dandruff shampoo composition according to Claim 9 in which said additives include an anti-dandruff agent.

12. A psoriatic composition according to Claim 9 in which said additives include an aqueous coal tar solution.

13. A disinfectant composition according to Claim 9 in which said additives include a compatible antimicrobial agent.

14. Process for producing an aqueous, lotion-like liquid emulsion composition containing large amounts of

oil or oil/wax mixture and a foam-producing volatile organic liquid dissolved therein, which composition, is capable of being contained within a non-pressurized container without self-foaming therefrom at temperatures up to about 120°F, and capable of being poured onto a surface at room temperatures and spread as a thin layer to self-develop a copious foam, which process comprises mixing together at least about 10% by weight of the total composition of at least one oil or oil/wax mixture, a foam-controlling mixture comprising (a) at least about 5% by weight of the total composition of at least one high foaming surface active agent which increases the solubility of said foam-producing volatile organic liquid in said oil or oil/wax mixture to an insufficient degree to prevent self foaming at 120°F, and (b) one or more foam suppressing agents which cooperate with said high foaming surface active agent(s) to cause said foam-producing liquid to be solubilized in said oil or oil/wax mixture to a sufficient degree to prevent the composition from self-foaming from an open container at temperatures up to about 120°F, and homogenizing said mixture until said surface active agent(s) and foam-suppressing agents are thoroughly dispersed in said oil or oil/wax mixture, adding water thereto while homogenizing to form an oil-in-water emulsion, and finally adding thereto at least about 5% by weight of the total composition of a said foam-producing volatile organic liquid, which is evaporable at or above room temperature to form an oil-in-water emulsion containing said volatile organic liquid as a foam-producing liquid dissolved to a substantial degree within the dispersed oil or oil/wax phase.

15. A process according to Claim 14 which comprises mixing from about 10% to 60% by weight of said oil or oil/wax mixture, from about 5% to 20% by weight of said high foaming surface active agent(s), from about 2% to 15% by weight of said foam suppressing agent(s), and from about 30% to 50% by weight of water to form said emulsion, and dissolving thereinto from about 5% to about 15% by weight of said volatile organic liquid.

16. A process according to Claim 14 which comprises mixing from about 20% to 35% by weight of said oil or oil/wax mixture, from about 10% to 15% by weight of said high foaming surface active agent, from 3% to 7% by weight of said foam suppressing agent(s), and from about 35% to 45% by weight of water to form said emulsion, and dissolving thereinto from about 7% to about 12% by weight of said volatile organic liquid.

17. A process according to Claim 28 in which said foam suppressing agent comprises a low foaming surface active agent which does not produce a self foaming composition in the absence of said high foaming surface active agent.

18. A process according to Claim 28 in which said foam suppressing agent comprises an aliphatic alcohol or alkoxy aliphatic alcohol.

19. A process according to Claim 14 in which said volatile organic liquid is one having a vapor pressure from about 4 to 14 p.s.i.g. at a temperature between 90<sup>o</sup> and 100<sup>o</sup>F.

20. A process according to Claim 19 in which said volatile organic liquid comprises pentane, isopentane or hexane.

21. A process according to Claim 14 in which said oil comprises mineral oil or a mineral oil/mineral wax mixture.

22. A process according to Claim 14 in which said composition further contains minor amounts of one or more oil-soluble or water-soluble additives for imparting fragrance, emollient, cosmetic, medication, humectant, disinfectant or other properties to said composition.

23. A process for applying a thin coating of oil or oil/wax composition to a surface for cosmetic, aesthetic, protective, medication, cleansing or other purposes, which comprises producing a self-foaming, lotion-like, flowable liquid, aqueous oil-in-water emulsion comprising a continuous aqueous phase and a discontinuous phase comprising at least about 10% by weight of oil or oil/wax mixture, a volatile organic foam-producing liquid, and a foam-controlling mixture comprising (a) at least one high foaming surface active agent which increases the solubility of the foam-producing liquid in the oil or oil/wax to an insufficient degree to prevent self-foaming at 120°F, and (b) one or more foam suppressing agents which cooperate with said high foaming surface active agents to cause said foam-producing liquid to be solubilized in said oil or oil/wax mixture to a sufficient degree that said liquid remains dissolved within the oil or oil/wax until the composition is spread at room temperature as a thin layer on a surface exposed

to the atmosphere, pouring said lotion-like dispersion onto a surface to be treated and spreading it as a thin layer exposed to ambient conditions, whereby said composition self-develops a copious foam due to the evaporation of said volatile foam-producing liquid, which foam contains said oil or oil/wax mixture and can be rubbed into or over said surface to provide a cosmetic, aesthetic, protective, medicinal, cleansing or other coating thereon.

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/US90/01471

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC(5): C11D 3/18; C11D 3/43; C11D 3/44; C11D 3/48 U.S. CL. 252/49.5, 164,167, Dig.5, Dig.13		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
U.S.	252/49.5,164, 167, Dig.5, Dig 13	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>9</sup>		
Category <sup>*</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	US, A 2,176,423 (JAEGER) 17 October 1939, See page 1, column 2, line 44-page 2, column 1, line 75 and Example 3.	1-23
Y	US, A 2,995,521 (ESTIGNARD-BLUARD) 08 August 1961 See column 1, lines 9-13 and lines 48-63, column 3, lines 30-34 and lines 43-45, column 4, lines 66-68, and Example 8.	1-23
A	US, A 3,541,581 (MONSON) 17 November 1970, See column 8, lines 8-26.	7,20
Y	US, A 3,912,666 (SPITZER et al) 14 October 1975 See column 9, line 51-column 11, line 19.	4,5,17,18
A	US, A 3,941,722 (SHEVLIN) 02 March 1976 See column 2, lines 55-62.	1-23
A	US, A 4,048,123 (HRAMCHENKO et al) 13 September 1977 See column 3, lines 41-46 and Table 1.	1-23
A	US, A 4,405,489 (SISBARRO) 20 September 1983 See column 2, lines 14-65.	1-23
<p><sup>*</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
25 May 1990		06 AUG 1990
International Searching Authority		Signature of Authorized Officer
ISA/US		<i>Andrius Beadles</i>



**FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET**

A	US, A 4,490,355 (DESAI) 25 December 1984, See column 1, line 53- column 2, line 2 and Example III.	1-23
A	US, A 4,554,098 (KLISCH et al) 19 November 1985, See column 5 lines 3-19 and Examples 26-27.	1-23
Y	US, A 4,606,913 (ARONSON et al) 19 August 1986 See column 6, lines 30-51	8,21
Y	US, A 4,626,529 (GROLIER) 02 December 1986 See column 1, line 47-column 2, line 10.	11,13
A	US, A 4,654,213 (RAMIREZ et al) 31 March 1987, See column 1, lines 29-34.	11,13

**V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE <sup>1</sup>**

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers \_\_\_\_\_, because they relate to subject matter <sup>12</sup> not required to be searched by this Authority, namely:

2. ☐ Claim numbers \_\_\_\_\_, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out <sup>13</sup>, specifically:

3. ☐ Claim numbers \_\_\_\_\_, because they are dependent claims not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

**VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING <sup>2</sup>**

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

**Remark on Protest**

- ☐ The additional search fees were accompanied by applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
Y	US,A 4,708,813 (SNYDER) 24 November 1987, See See column 4, line 39- column 5, line 61.	5,18
A	US,A 4,769,169 (FISHLOCK-LOMAX) 06 September 1988 See column 2, line 67- column 3, line 17.	1-23