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(54) Title: SHOWER GEL COMPOSITIONS

(57) Abstract

Novel shower gels having a surfactant content of 5-80 % by weight; a water content of 20-95 %, preferably 20-40 % by weight; and optional additives contain a tert-amine oxide as a nonionic surfactant comprising 5-100 % of the total surfactant weight. The tert-amine oxide is a compound corresponding to the formula RR′R″NO in which R is a primary alkyl group containing 6-24 carbons and R′ and R″ are independently selected from methyl, ethyl, and 2-hydroxyethyl - a preferred amine oxide being N-tetradecyldimethylamine oxide.

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SHOWER GEL COMPOSITIONS

Field of Invention

This invention relates to shower gel compositions containing tert-amine oxides.

Background

As disclosed in Brassard, *Cosmetics & Toiletries*, Vol. 104, December 1989, pp. 53-59, shower gels are cleansing compositions which are viscous enough to remain on the hand or a washcloth when dispensed, but fluid enough to lather easily when applied over the body.

All shower gel compositions contain a surfactant and water; and they may also have other ingredients, such as secondary surfactants, foam boosters, agents for adjusting pH and/or viscosity, colorants, pearlizing agents, clarifying agents, fragrances, preservatives, antioxidants, chelating agents, skin conditioners, botanical extracts, and antibacterial agents.

Although, as taught by Brassard, water generally constitutes more than 70% of the weight of a shower gel composition, it is sometimes desirable for a shower gel to have a lower water content, as shown in U. S. Patents 4,690,818 (Puchalski et al.) and 4,772,427 (Dawson et al.) and European Patent Application 0246854 (Hermann et al.). Moreover, it is always necessary to prevent the water content from being so high that it would prevent the composition from having sufficient lathering ability and a viscosity appropriate for a shower gel.

Since the anionic surfactants preferred for use in shower gels are normally provided as aqueous compositions which contain rather large amounts of water, the necessity for limiting the water content of a shower gel composition has prevented formulators from considering the use of any significant amounts of additional ingredients that would normally be provided as dilute aqueous solutions.

Tert-amine oxides are nonionic surfactants which are known to be useful in various cleaning compositions, including shampoos, but appear never to have been considered for use as the surfactant or one of the surfactants in a shower gel. The reason for this is most likely that amine oxides have typically been prepared as dilute

aqueous solutions having water contents of 60-80% by weight and — because of the bother and expense involved in recovering them, as well as the product degradation or contamination that is apt to accompany their recovery — have ordinarily been sold as dilute aqueous solutions. As a result, it is probable that they never received serious consideration for use in commercial compositions in which their high water content would be expected to be a liability.

U.S. Patent 5,130,488 (Smith et al.-I) and International Patent Publication WO 92/13832 (Smith et al.-II) teach processes which now make it possible for tert-amine oxides to be prepared as solids which can be used in applications in which the dilute solutions would not be satisfactory.

Summary of Invention

The invention resides in a shower gel composition having a surfactant content of 5-80% by weight and a water content of 20-95% by weight, at least 5% by weight of the surfactant being a tert-amine oxide corresponding to the formula RR'R"NO in which R is a primary alkyl group containing 6-24 carbons and R' and R" are independently selected from methyl, ethyl, and 2-hydroxyethyl.

Detailed Description

The tert-amine oxide-containing compositions of the invention have higher viscosities at lower surfactant levels than permit the attainment of such viscosities in known shower gel compositions. This unexpected advantage of the inclusion of tert-amine oxides permits even the conventional dilute solutions of tert-amine oxides to be used in the novel shower gels, although it is frequently preferred to employ solid tert-amine oxides.

A solid tert-amine oxide utilized in the practice of the invention can be a solid that has been recovered from the aqueous solution prepared by a conventional amine oxide synthesis, but it is preferably an amine oxide that has been prepared in solid form, as in the processes of Smith et al.-I and Smith et al.-II.

Briefly, both of the Smith et al. processes are conducted by reacting the appropriate tert-amine with at least a stoichiometric amount of an aqueous hydrogen

peroxide having a concentration of at least 50% by weight so as to synthesize an amine oxide in easily-recoverable solid form.

In the Smith et al.-I process, (1) stirrability of the reaction mixture is maintained by conducting at least the latter part of the reaction in an organic solvent (e.g., ethyl acetate) in which the amine and amine oxide are soluble at the reaction temperature but in which the amine oxide is insoluble at a lower temperature, (2) the water content of the reaction mixture is adjusted at the end of the reaction, if necessary, to provide a water/amine oxide mol ratio not higher than about 2.1/1, and (3) the temperature is lowered to precipitate the amine oxide, at least some of the molecules of which are dihydrate molecules.

The Smith et al.-II process differs from this process in using a liquefied gas, such as liquefied carbon dioxide, instead of an organic solvent during at least the latter part of the reaction to maintain stirrability, thus permitting more economical recovery of the product.

Although the tert-amine oxide may be any amine oxide corresponding to the formula given above, it is preferably such a compound in which the primary alkyl group has a straight chain in at least most of the molecules, generally at least 70%, preferably at least 90% of the molecules. Moreover, the tert-amine oxides in which R contains 10-18 carbons and R' and R" are both methyl are especially preferred.

Exemplary of the preferred tert-amine oxides are the N-hexyl-, N-octyl-, N-decyl-, N-dodecyl-, N-tetradecyl-, N-hexadecyl-, N-octadecyl-, N-eicosyl-, N-docosyl-, and N-tetracosyldimethylamine oxides, the corresponding amine oxides in which one or both of the methyl groups are replaced with ethyl or 2-hydroxyethyl groups, etc., and mixtures thereof. A particularly preferred amine oxide is N-tetradecyldimethylamine oxide.

The amine oxide may constitute 5-100% of the total weight of surfactant in a shower gel composition of the invention. However, in a preferred embodiment, the surfactant is a combination of 5-95% by weight of one or more tert-amine oxides and 95-5% by weight of one or more different surfactants selected from anionic, cationic, nonionic, and amphoteric surfactants.

Exemplary of the surfactants which can be employed in combination with the amine oxide surfactants are those which are already known to be useful in shower gels.

These surfactants include (1) anionic surfactants such as alkyl sulfates, alkyl ether sulfates, sulfonates, taurates, sulfosuccinates, sarcosinates, glutamates, and isethionates, especially sodium and ammonium lauryl sulfates, sodium and ammonium lauryl ether sulfates, sodium sulfonates, substituted ammonium lauryl sulfates, substituted ammonium lauryl ether sulfates, fatty acid alkanolamide sulfosuccinates, fatty acid sarcosinates, sodium lauryl ether sulfosuccinates, and magnesium lauryl ether carboxylates, (2) nonionic surfactants such as fatty acid alkanolamides, polyalkoxylated fatty acid amides, polyalkoxylated sorbitan esters of long-chain fatty acids, polyalkoxylated long-chain alkylamine oxides and amido amine oxides of long-chain fatty acids, polyalkoxylated fatty alcohols, and glycerol esters of long-chain fatty acids, (3) cationic surfactants such as polyethoxylated quaternary ammonium compounds, polyethoxylated fatty alkylamines, and ethoxylated and quaternized condensation products of long chain fatty acids and polyamines, and (4) amphoteric surfactants such as cocoamidopropylbetaine and hexadecyldimethylbetaine.

Cosurfactants which have been found to be especially attractive for use in combination with the amine oxides are:

(1) fatty acid alkanolamides of the type usually designated as superamides, i.e., alkanolamides obtained by reacting a fatty acid, usually a fatty acid containing 8-18 carbons, with an alkanolamine in equimolar proportions — preferably cocodiethanolsuperamide,

(2) ethoxylated fatty alcohols having an HLB number >8, preferably at least 9, and corresponding to the formula $Z(OCH_2CH_2)_mOH$ in which Z is an alkyl group containing 4-30 carbons, preferably 10-18 carbons, and m is an integer of 1-50, preferably 2-15 — preferably the ethoxylate of a mixture of C_{12} and C_{14} alcohols in which m is 6, but desirably also another ethoxylate formed from one or more alcohols such as butanol, isobutanol, hexanol, octanol, decanol, dodecanol, tetradecanol, pentadecanol, hexadecanol, octadecanol, eicosanol, docosanol, tetracosanol, and triacontanol,

(3) alkoxylated alkylphenols corresponding to the formula $Z[OC(Z')HCH_2]_mOH$ in which Z is an alkylphenyl group wherein the alkyl group contains 4-30 carbons; Z' is hydrogen or an alkyl or hydroxyalkyl group containing 4-30 carbons, such as methyl, ethyl, propyl, hydroxymethyl, 2-hydroxyethyl, or 3-hydroxypropyl (preferably hydrogen);

and m is an integer of 1-100, preferably 2-15 — especially a nonylphenol ethoxylate in which the ethylene oxide unit/alkylphenol unit mol ratio is an average of nine, but desirably also an alkoxylate formed from one or more other alkylphenols such as butyl-, isobutyl-, hexyl-, octyl-, decyl-, undecyl-, dodecyl-, tetradecyl-, hexadecyl-, octadecyl-, eicosyl-, docosyl-, tetracosyl-, and triacontylphenols,

(4) alkylphenoxysulfosuccinates in which the alkyl group contains 8-18 carbons, e.g., nonylphenoxysulfosuccinate,

(5) alkyl sulfates, alkylbenzenesulfonates, and alkyl sarcosinates, such as the alkali metal and ammonium salts of such compounds in which the alkyl groups contain 10-18 carbons, e.g., sodium lauryl sulfate, sodium dodecylbenzenesulfonate, and sodium lauryl sarcosinate,

(6) alkyl ether sulfates corresponding to the formula $T(OCH_2CH_2)_nOSO_3M$ in which T is an alkyl group containing 10-18 carbons, M represents an alkali metal or ammonium, and n is an integer of at least one, preferably 2-5, e.g., sodium lauryl sulfate, especially the ether sulfate containing two $-OCH_2CH_2-$ groups per molecule,

(7) alkyldimethylbetaines in which the alkyl group contains 8-18 carbons, preferably tetradecyldimethylbetaine, and

(8) alkylamidopropyldimethylbetaines in which the alkyl group contains 8-18 carbons, preferably cocoamidopropyldimethylbetaine.

In the preferred embodiment in which the amine oxides are used in conjunction with one or more different surfactants, it has been found that the use of certain combinations of surfactants gives particularly desirable results. For example:

(A) When it is desired to increase viscosity,

(1) using an alkanolamide with an amine oxide so that the mixture contains 10-95%, preferably 20-90%, more preferably 45-75%, and most preferably 50% by weight of the alkanolamide provides a greater viscosity than the amine oxide alone even though alkanolamides are surfactants which, by themselves, give lower viscosities than amine oxides,

(2) an increase in the viscosity achievable by either surfactant alone is also obtained when an amine oxide and an alkyl sulfate surfactant are combined to provide a mixture containing 55-95%, preferably 70-80%, and most

preferably about 75% by weight of the amine oxide,

(3) even higher viscosities can be obtained with mixtures of 5-90% by weight of the amine oxide, 5-90% by weight of the alkanolamide, and 5-15% by weight of the alkyl sulfate surfactant, and

(4) synergistic improvements in viscosity are also provided by mixtures of 5-90% by weight of the amine oxide, 5-90% by weight of the alkanolamide, and either (a) 5-35%, preferably 5-25% by weight of an alkyl ether sulfate surfactant or (b) 5-35%, preferably 10-35% by weight of an alkylbenzenesulfonate surfactant.

(B) When it is wished to achieve a greater volume of foam or an equivalent amount of foam at a lower cost,

(1) amine oxides and alkyl sarcosinates interact synergistically to provide a greater foam volume in hard water than can be achieved with either surfactant alone when the amine oxide constitutes 25-95%, preferably 50-80%, of the weight of the surfactant mixture,

(2) a mixture of an amine oxide and an alkanolamide provides (a) more foam than the alkanolamide alone at a lower cost per mL of foam than either the amine oxide or the alkanolamide alone when the amine oxide content of the mixture is 45-95% by weight and (b) as much or more foam than either the amine oxide or the alkanolamide alone at a lower cost than either of the surfactants alone when the mixture contains 65-95% by weight of the amine oxide,

(3) improvements in foamability at a reasonable cost can also be achieved by mixing an amine oxide and an alkanolamide with an alkyl sulfate, alkyl ether sulfate, or alkyl sarcosinate surfactant to provide a mixture containing (a) 5-50%, preferably 10-35% by weight of the amine oxide, 5-70%, preferably 5-35% by weight of the alkanolamide, and 25-90%, preferably 30-75% by weight of the alkyl sulfate, (b) 10-15% by weight of the amine oxide, 5-85% by weight of the alkanolamide, and 5-85% by weight of the alkyl ether sulfate, or (c) 5-90% by weight of the amine oxide, 5-90% by weight of the alkanolamide, and 5-60% by weight of the sarcosinate,

(4) ethoxylated fatty alcohols act as performance extenders for amine oxides or amine oxide/anionic surfactant blends when used in combination therewith to provide (a) binary surfactant mixtures containing at least 25% by weight

of the amine oxide and up to 75% by weight of the ethoxylate, (b) ternary mixtures of 5-95% by weight of the amine oxide, 5-95% by weight of an alkyl sulfate surfactant, and 5-80%, preferably 5-35%, more preferably 10-25% by weight of the ethoxylate, or (c) ternary mixtures of 5-95% by weight of the amine oxide, 5-95% by weight of an alkyl ether sulfate surfactant, and 5-75%, preferably 5-50%, more preferably 5-25%, and most preferably 10-15% by weight of the ethoxylate, thereby forming mixtures which provide at least as much foam as the amine oxide or amine oxide/anionic surfactant blend at a lower cost,

(5) mixtures of alkyldimethylbetaines and amine oxides in all proportions provide more foam than either surfactant alone, the greatest improvements in foamability being achieved when the betaine content of the mixture is 5-45% (especially 15-35%) or 60-85% by weight,

(6) alkylamidopropyldimethylbetaines synergize with amine oxides to provide more foam than either surfactant alone when the surfactant mixtures contain 30-80% by weight of the betaine,

(7) mixtures of amine oxides and alkyl sulfates are synergistic in their production of foam when they contain at least 5% by weight of the amine oxide, optimum foam volumes and lowest costs per mL of foam being achieved when the amine oxide constitutes 20-40% of the weight of the mixture,

(8) the foamability of an alkyl sulfate can also be improved by employing it in conjunction with a foam booster consisting of 1-99% by weight of an amine oxide and 99-1% by weight of an alkoxyalted alkylphenol to form a mixture consisting of 5-95% by weight of the alkyl sulfate and 95-5% by weight of the foam booster, and

(9) synergism in the production of foam is also found in amine oxide/alkylphenoxysulfosuccinate mixtures containing 55-95% by weight of the amine oxide.

(C) When greater foam density is an objective,

(1) the density of the foam produced by a composition containing an alkylbenzene sulfonate surfactant can be increased by using an amine oxide with the alkylbenzene sulfonate, the density obtained being greater than that which can

be achieved by either surfactant alone when the mixture contains 50-90%, preferably 75% by weight of the amine oxide,

(2) an amine oxide can be used with an alkyl ether sulfate surfactant in a mixture containing 50-95%, preferably 75%, by weight of the amine oxide to increase the foam density obtainable from an alkyl ether sulfate-containing system,

(3) a similar increase in foam density can be achieved from an alkyl sulfate surfactant-containing system when an amine oxide is combined with the alkyl sulfate to provide a mixture containing 45-95%, preferably 75%, by weight of the amine oxide, and

(4) higher foam densities can also be obtained by mixing an alkanolamide with an amine oxide or an amine oxide/anionic surfactant blend to form (a) a binary amine oxide/alkanolamide mixture containing 5-95%, preferably 20-85%, more preferably 40-80%, and most preferably about 75% by weight of the amine oxide, (b) a ternary amine oxide/alkanolamide/alkyl ether sulfate mixture containing 5-90% by weight of the amine oxide, 5-90% by weight of the alkanolamide, and 5-35%, preferably 5-25% by weight of the alkyl ether sulfate, or (c) a ternary amine oxide/alkanolamide/alkylbenzenesulfonate mixture containing 5-90%, preferably 10-75% by weight of the amine oxide, 5-90%, preferably 10-75% by weight of the alkanolamide, and 5-55%, preferably 10-50% by weight of the alkylbenzenesulfonate.

Thus, the use of amine oxides in combination with other surfactants can reduce or even obviate the need for some of the additives frequently used in shower gel compositions to adjust viscosity, increase the volume of foam, or improve the density of the foam. However, especially when surfactant combinations are not used, the shower gel compositions of the invention frequently contain such additives when appropriate; and the compositions may also contain minor amounts of other additives, if desired.

Examples of the additives that may be used in the novel shower gels are those mentioned above as being particularly apt to be included in conventional shower gels, e.g., additional surfactants, foam boosters, agents for adjusting pH and/or viscosity, colorants, pearlizing agents, clarifying agents, fragrances, preservatives, antioxidants,

chelating agents, skin conditioners, botanical extracts, and antibacterial agents. As in conventional shower gels, these additives, when used, constitute not more than a minor amount of the compositions of the invention.

As already mentioned, the novel shower gel compositions necessarily contain 5-80% by weight of surfactant and 20-95% by weight of water. It is generally preferred that the water content be in the lower range of the permissible amount, i.e., about 20-40% by weight.

The invention is advantageous in that the use of the tert-amine oxides provides greater flexibility in the formulation of shower gels and permits (1) the formation of shower gels having improved viscosity and/or foam-producing properties from surfactants of the types generally preferred for use in such compositions or (2) the formation of shower gels having properties comparable to known shower gels from smaller amounts of surfactant. For example, a commercial shower gel containing 15-20% by weight of surfactant and having a viscosity of 6000-8000 mPa•s can be matched with a shower gel composition of the invention having a viscosity of 8000 mPa•s but containing only 5% by weight of a 76/24 mixture of N-tetradecyldimethylamine oxide and sodium dodecylbenzenesulfonate.

The following examples are given to illustrate the invention and are not intended as a limitation thereof. Unless otherwise specified, quantities mentioned in the examples are quantities by weight.

EXAMPLE 1

Viscosity Studies

Prepare several aqueous solutions having a total surfactant content of 5% from one or more of the following surfactants: N-tetradecyldimethylamine oxide (AX), cocodiethanolsuperamide (SA), sodium lauryl sulfate (AS), sodium lauryl ether sulfate containing two $-OCH_2CH_2-$ groups per molecule (AES), and sodium dodecylbenzenesulfonate (LAS). The proportions of these surfactants used in preparing each of the solutions, as well as the viscosities of the solutions, are shown in Table I.

TABLE I

% AX	% SA	% AES	% AS	% LAS	Viscosity (mPa•s)
100	--	--	--	--	23
--	100	--	--	--	37
--	--	100	--	--	2
--	--	--	100	--	2
--	--	--	--	100	2
90	10	--	--	--	52
80	20	--	--	--	84
55	45	--	--	--	157
50	50	--	--	--	177
25	75	--	--	--	150
10	90	--	--	--	84
5	95	--	--	--	52
75	--	--	25	--	1250
50	--	--	50	--	24
34	33	--	--	33	1420
25	50	--	--	25	848
75	12	--	--	13	1270
12	75	--	--	13	1040
13	75	12	--	--	154
75	13	12	--	--	537
25	50	25	--	--	417
50	25	25	--	--	250
33	33	34	--	--	83
12	75	--	13	--	1040
75	12	--	13	--	1000
25	50	--	25	--	624
34	33	--	33	--	102

EXAMPLE 2

Foam Density Studies

Prepare several aqueous solutions having a total surfactant content of 5% from

one or more of the AX, SA, AES, AS, and LAS surfactants of Example 1. Test each solution to show the density of the foam it can produce by placing 25 mL of the solution in a 100 mL blender cup, mixing for 15 seconds, transferring the foam to a tared graduated cylinder, and calculating the foam density. The proportions of the surfactants used in preparing each of the solutions and the foam densities obtained are shown in Table II.

TABLE II

% AX	% SA	% AES	% AS	% LAS	Density (g/mL)
100	--	--	--	--	0.188
--	100	--	--	--	0.223
--	--	100	--	--	0.199
--	--	--	100	--	0.190
--	--	--	--	100	0.144
75	25	--	--	--	0.711
50	50	--	--	--	0.655
75	--	25	--	--	0.411
75	--	--	25	--	0.648
75	--	--	--	25	0.864
50	--	--	--	50	0.460
25	--	--	--	75	0.207
33	33	34	--	--	0.268
50	25	25	--	--	0.569
25	50	25	--	--	0.485
75	13	12	--	--	0.823
13	75	12	--	--	0.557
25	25	--	--	50	0.509
34	33	--	--	33	0.535
50	25	--	--	25	0.750
25	50	--	--	25	0.800
75	12	--	--	13	0.852
12	75	--	--	13	0.471

EXAMPLE 3

Foam Volume Studies

Part A

Prepare several aqueous solutions having a total surfactant content of 0.1% by dissolving in hard water (200 ppm as $CaCO_3$) one or more of the following surfactants: the AX, AS, and AES of Example 1, an ethoxylate of a mixture of C_{12} and C_{14} alkanols containing six $-OCH_2CH_2-$ groups per molecule (AE-6), and an ethoxylate of a mixture of C_6 and C_{10} alkanols containing three $-OCH_2CH_2-$ groups per molecule (AE-3). Measure the foamability of the surfactants by (1) placing 30 mL of each of the solutions in a 100 mL stoppered graduated cylinder, (2) inverting the cylinder ten times, (3) measuring the foam height, (4) repeating steps 1-3 twice, and (5) calculating the average of the three measurements. The proportions of surfactant components used in preparing each of the solutions and the foam heights obtained from them are shown in Table III.

TABLE III

% AX	% AE-6	% AE-3	% AS	% AES	Foam Height (mL)
100	--	--	--	--	33
--	100	--	--	--	28
--	--	100	--	--	19
--	--	--	100	--	30
--	--	--	--	100	42
50	50	--	--	--	35
75	12	--	13	--	43
12	13	--	75	--	47
25	25	--	50	--	41
75	--	12	13	--	46
12	--	13	75	--	50
34	--	33	33	--	46
25	--	25	50	--	43
75	12	--	--	13	43
12	13	--	--	75	46

Part B

Repeat Part A except for employing as the surfactants one or more of the AX, SA, AES, AS, and LAS of Example 1. The proportions of surfactant components used in preparing each of the solutions and the foam heights obtained from them are shown in Table IV.

TABLE IV

% AX	% SA	% AES	% AS	% LAS	Foam Height (mL)
100	--	--	--	--	33
--	100	--	--	--	17
--	--	100	--	--	42
--	--	--	100	--	30
--	--	--	--	100	43
95	5	--	--	--	34
90	10	--	--	--	35
75	25	--	--	--	37
70	30	--	--	--	35
65	35	--	--	--	33
50	50	--	--	--	27
45	55	--	--	--	25
75	--	--	25	--	42
50	--	--	50	--	42
25	--	--	75	--	48
12	13	--	75	--	42
34	33	--	33	--	37
25	50	--	25	--	34
12	13	75	--	--	44
12	75	13	--	--	44
12	13	--	--	75	43

Part C

Repeat Part A except for using one or more of the following as the surfactants: the AX and SA of Example 1, sodium lauryl sarcosinate (SAR), tetradecyldimethylbe-

taine (AB), and cocoamidopropyldimethylbetaine (CB). The proportions of surfactant components used in preparing each of the solutions and the foam heights obtained from them are shown in Table V.

TABLE V

% AX	% SA	% SAR	% AB	% CB	Foam Height (mL)
100	--	--	--	--	33
--	100	--	--	--	17
--	--	100	--	--	9
--	--	--	100	--	33
--	--	--	--	100	36
95	--	5	--	--	35
75	--	25	--	--	44
65	--	35	--	--	41
50	--	50	--	--	36
25	--	75	--	--	37
50	25	25	--	--	40
25	25	50	--	--	38
75	12	13	--	--	44
12	75	13	--	--	36
34	33	33	--	--	40
80	--	--	20	--	48
75	--	--	25	--	52
65	--	--	35	--	45
50	--	--	50	--	35
40	--	--	60	--	37
25	--	--	75	--	40
75	--	--	--	25	41
60	--	--	--	40	44
50	--	--	--	50	46
25	--	--	--	75	45
20	--	--	--	80	43

Part D

Repeat Part A except for using the AX of Example 1 and nonylphenoxysulfosuccinate (NPSS) as the surfactants. The proportions of surfactant components used in preparing each of the solutions and the foam heights obtained from them are shown in Table VI.

TABLE VI

% AX	% NPSS	Foam Height (mL)
100	0	33
75	25	40
50	50	33
25	75	33
0	100	31

Part E

Repeat Part A except for using one or more of the following surfactants in preparing the surfactant solutions: N-dodecyldimethylamine oxide (C_{12}AX), a 9-mol ethoxylate of nonylphenol (NPE-9), and the AS of Example 1. The proportions of surfactant components used in preparing each of the solutions and the foam heights obtained from them are shown in Table VII.

TABLE VII

% C_{12}AX	% NPE-9	% AS	mL Foam (theory)	mL Foam (actual)
100	--	--	28	28
--	100	--	21	21
--	--	100	30	30
18.75	6.25	75	29	34
12.5	12.5	75	28.6	38
6.25	18.75	75	28.2	34
25	25	50	27.3	43
18.75	56.25	25	24.6	45

Claims

1. A shower gel composition having a surfactant content of 5-80% by weight and a water content of 20-95% by weight, at least 5% by weight of the surfactant being a tert-amine oxide corresponding to the formula RR'R"NO in which R is a primary alkyl group containing 6-24 carbons and R' and R" are independently selected from methyl, ethyl, and 2-hydroxyethyl.

2. The composition of claim 1 wherein the water content is 20-40% by weight.

3. The composition of claim 1 wherein the tert-amine oxide is the sole surfactant.

4. The composition of claim 1 wherein the surfactant is a mixture of 5-95% by weight of at least one tert-amine oxide and 95-5% by weight of one or more cosurfactants selected from anionic, cationic, nonionic, and amphoteric surfactants.

5. The composition of claim 4 containing as a cosurfactant an ethoxylated fatty alcohol having an HLB number >8 and corresponding to the formula $Z(OCH_2CH_2)_mOH$ in which Z is an alkyl group containing 4-30 carbons and m is an integer of 1-50.

6. The composition of claim 4 containing a fatty acid alkanolamide as a cosurfactant.

7. The composition of claim 4 containing as a cosurfactant an alkali metal or ammonium salt of an alkyl sarcosinate in which the alkyl group contains 10-18 carbons.

8. The composition of claim 4 containing as a cosurfactant an alkali metal or ammonium salt of an alkylbenzenesulfonate in which the alkyl group contains 10-18 carbons.

9. The composition of claim 4 containing as a cosurfactant an alkali metal or ammonium salt of an alkyl sulfate in which the alkyl group contains 10-18 carbons.

10. The composition of claim 4 containing as a cosurfactant an alkyldimethylbetaine or an alkylamidopropyldimethylbetaine in which the alkyl groups contain 8-18 carbons.

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 93/03269

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 A61K7/50

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	A61K

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	US,A,3 808 311 (OLSON F.W. ET AL) 30 April 1974 see column 6; examples 1-3	1,4,6
P,X	EP,A,0 531 943 (KAO CORPORATION) 17 March 1993 see page 4; example 1	1,4,7
X	EP,A,0 133 905 (REVLON INC) 13 March 1985 see page 16, line 10 - line 20	1,4,5
X	US,A,3 449 430 (DOBR R. ET AL) 10 June 1969 see column 5 - column 6; example 3	1-3

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° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"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.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
27 JULY 1993	03. 08. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	BOULOIS D.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

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ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

US 9303269
SA 72797

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The members are as contained in the European Patent Office EDP file on
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