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CLEAR MINERAL OIL IN WATER EMULSION FOR HAIR APPLICATION

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The present invention relates to clear mineral oil in water gels. More specifically, the present invention relates to cosmetic compositions of clear transparent gels comprising mineral oil, water and a combination of surfactants.

Hair grooming preparations in the form of highly viscous or solid creams or gels of mineral oil in water are well known. These solid preparations have many advantages over other types of hair grooming preparations such as the solid or highly viscous preparations comprising water in oil, brilliantines or gum bases. Illustratively, the oil in water preparations do not have a greasy feel or the propensity to stain clothing as do the brilliantines or water in oil preparations. Also, the oil in water preparations can produce a high luster or sheen on the hair without any stickiness whereas the gum base hair dressings do not impart luster to the hair and often leave the hair with a dried adhesive-like texture.

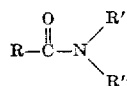
Although the oil in water creams or gels possess many advantages over other types of hair preparations they suffer from a number of defects. Thus, such preparations suffer from one or more of the following disadvantages: they are ordinarily opaque, unstable, foam when applied to the hair, leave a white film on the hair, irritate the scalp or employ ingredients such as certain thickening agents which do not aid in the care or grooming of the scalp or hair. Also, clear oil in water gels containing relatively large quantities of both mineral oil and water require quantities of a surfactant or surfactants which are substantially in excess of the mineral oil component and when additional hair grooming agents such as lanolin alcohol are added to the gel, the gel again becomes opaque.

It has now been found that clear gels comprising substantial quantities of mineral oil in water can be produced wherein the total quantity of surfactant or surfactants employed in the gel need not be in substantial excess from the quantity of mineral oil employed and can even be less than the quantity of mineral oil employed. The clear gel compositions of this invention possess many other advantageous properties and characteristics. Illustratively, the gels of this invention are stable, non-toxic, non-irritating and aid in the removal of dandruff; they impart a thin uniform attractive film to the hair without greasiness; provide good moisturizing properties; do not stain clothing and the residue which remains on the hands after application can be easily removed. Also, all the essential ingredients of the novel gels serve a useful purpose in the care of the scalp or hair.

The essential ingredients of the clear transparent gels of this invention are mineral oil, water, a higher fatty acid alkylolamide, polyoxyethylene ethers of higher aliphatic alcohols and lanolin alcohol. In addition to the essential ingredients, various cosmetic or medicinal adjuvants can also be incorporated in the clear transparent gels provided that the material incorporated does not interfere substantially with the properties and characteristics possessed by the gels. Illustratively, the gelled compositions can contain various cosmetic or pharmaceutical adjuvants such as humectants, e.g., less than about 15% of glycerine, bactericides, e.g., less than about 1% of hexachlorophene and additional hair conditioning agents, e.g., less than about 1% of beeswax.

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The higher fatty acid alkylolamide surfactants employed in this invention can be represented by the following generic formula:

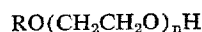


wherein R is a fatty acid residue (aliphatic radical) which can be either saturated or unsaturated, i.e., olefinically unsaturated, and which preferably contains from about 9 to about 13 carbon atoms; R' is hydrogen or a lower alkyl monohydric radical having from 1 to about 4 carbon atoms; and R'' is a lower alkyl monohydric radical having from 1 to about 4 carbon atoms. The higher fatty acid alkylolamide surfactant is also referred to herein as simply the amide surfactant. Illustrative of the amide surfactant there can be mentioned lauric diethanolamide, lauric mono-ethanolamide, undecylic dimethanolamide, myristic diethanolamide, coconut fatty acid diethanolamide and lauric monoisopropanolamide. The amide surfactant aids in the formation of the gel structure and is a good hair conditioner.

Lanolin alcohol, also referred to as lanolin alcohols, is a well known material which represents the alcohol fraction of lanolin. A description and a typical chemical composition of lanolin alcohol can be found on pages 150 and 151 of Sagarin, Cosmetics, Science and Technology (1957). Lanolin alcohol is an excellent emollient, aids in the formation of a thin even film of the gel and is a good moisturizing agent.

Mineral oil is also known as liquid petrolatum or white mineral oil. The preparation and properties of mineral oil can be found on pages 514 to 515 of Remington's Practice of Pharmacy, tenth edition.

The polyoxyethylene ethers of higher aliphatic alcohols, also referred to herein as the ether surfactant, are well known non-ionic surfactants which can be represented by the following generic formula:



wherein RO is a higher aliphatic alcohol residue containing from about 8 to about 18 carbon atoms and preferably from about 10 to about 14 carbon atoms; and (n) represents the number of oxyethylene units in the molecule. The higher aliphatic alcohol residue can be either saturated, i.e., straight or branched chain alkyl, or unsaturated, e.g., olefinically unsaturated. Also, the alcohol can be a natural alcohol, e.g., lauryl alcohol or an oxo-type aliphatic alcohol. It is preferred to use a mixture of polyoxyethylene ethers of a higher aliphatic alcohol such as that of lauryl alcohol or the oxo-type 12 carbon chain alcohol, wherein the number of oxyethylene units of the polyoxyethylene chain varies from 2 to about 30 for each member of the ether surfactant mixture and has an average value based on the weight of the ethers employed of about 10 to about 18 and particularly about 14 oxyethylene units (n). Thus, if a mixture of the ether surfactant contains 3 grams of the lauryl alcohol derivative having 2 oxyethylene units, i.e., n=2, per molecule and 9 grams of the lauryl alcohol derivative having 25 oxyethylene units (n=25) per molecule the average value for (n), or the average number of oxyethylene units, is

$$\frac{3 \text{ (grams)} \times 2 \text{ (units)} + 9 \text{ (grams)} \times 25 \text{ (units)}}{12 \text{ (grams)}} = 17.51$$

Thus, although (n) is an integer in the generic formula, the average value of (n) when a mixture of a polyethoxylated alcohol is employed need not be a whole number. In place of mixtures of the ether surfactant there can also be employed an individual polyoxyethylene ether of a higher aliphatic alcohol, as described in the above

generic formula, wherein (n) is an integer having a value of about 10 to about 18. Illustrative of the other surfactant there can be mentioned the polyoxyethylene ethers of oxo-type decyl alcohol, lauryl alcohol, oxo-type dodecyl alcohol, myristyl alcohol, cetyl alcohol, stearyl alcohol, oleyl alcohol and the like.

The clear gels of this invention are produced by mixing the requisite quantities of mineral oil, ether surfactant, amide surfactant and lanolin alcohol. This mixture is heated at a temperature of at least about 160° F. and preferably below 200° F. Water is also heated to this temperature and is then added to the mixture of mineral oil and surfactants with constant stirring until the gel is cooled to about room temperature, i.e., about 25° C. When it is desired to incorporate additives into the gel, the water soluble additives are added to the water portion whereas oil soluble additives are added to the oil surfactant portion prior to mixing and gelling.

By the term gel as used herein we mean the solid state of a colloid solution as opposed to a sol, the fluid state. The gels are firm and substantially clear and transparent. When extruded through conventional collapsible tubes which have an orifice or passageway of about 3/8 of an inch diameter, such as is often used with hair preparations, the gel is extruded in the form of a cylindrical clear transparent ribbon which maintains its shape after extrusion.

In addition to the hair grooming utility, the clear gels of this invention can be used as cosmetics in a manner similar to hand creams, cold creams or vanishing creams. Also, the clear gels of this invention can be used as anti-corrosion agents and as lubricants, e.g., antifriction agents in the processing of wool.

The clear gel composition of this invention comprises, by weight: (a) from about 15% to about 30% and preferably from about 15% to about 25% of mineral oil; (b) from about 40% to about 70% and preferably from about 50% to about 65% of water; (c) from about 5% to about 12% and preferably from about 6% to about 10% of the amide surfactant; (d) from about 6% to about 20% and preferably from about 8% to about 15% of the ether surfactant and (e) from about 2% to about 4% and preferably about 3% of the lanolin alcohol.

The clarity of the gels is destroyed by removing either the amide surfactant, ether surfactant or the lanolin alcohol. The substitution of many of the other well known surfactants for certain of the surfactants used in this invention such as the amide surfactant substantially reduced the clarity of the gel. Also, a substantial change in the relative concentrations or total quantities of the various ingredients, from that set forth herein destroys the clarity, transparency or gel structure of the compositions.

The clear gels of this invention can be packaged in the conventional containers such as metallic, plastic or glass jars or they can be packaged in metallic tubes, such as the conventional aluminum or plastic collapsible tubes which are used in packaging toothpastes, hair preparations and the like.

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.

EXAMPLE 1

This example describes the formation of a clear transparent gel containing, by weight, 5% of a polyoxyethylene ether or an oxo-type dodecyl alcohol having 3 moles of ethylene oxide per molecule and 6% of a polyoxyethylene ether of an oxo-type dodecyl alcohol having 23

moles of ethylene oxide per molecule (to provide an average of about 14 oxyethylene units, by weight, in the ether mixture); 2.7% of Ceralan (a lanolin alcohol manufactured by Robinson-Wagner Co. Inc.); 20% of mineral oil; 6% of lauric diethanolamide and 60.3% of water. There was thoroughly mixed 20 grams of mineral oil, 2.7 grams of Ceralan, 5 grams of a polyoxyethylene ether of lauryl alcohol having 3 moles of ethylene oxide, 6 grams of polyoxyethylene ether of lauryl alcohol having 23 moles of ethylene oxide, and 6 grams of lauric diethanolamide. This mixture was heated to about 180° F.; water was also heated to about 180° F. The hot water (60.3 grams) was added to the hot mineral oil mixture with constant stirring. The subsequent mixture was allowed to cool to room temperature, i.e., about 25° C. with constant stirring. The resulting gel was packaged in a conventional aluminum collapsible tube having an orifice of about 3/8 of an inch. When the gel was extruded from the tube it was stiff, brilliantly clear and transparent. The gel had a viscosity of about 184,000 to about 200,000 cps. at 25° C. when tested with the Brookfield RVF instrument with spindle No. 7 at 10 r.p.m. By following the procedure of Example 1 and using the same ingredients and quantities employed therein except for decreasing the polyoxyethylene ether of lauryl alcohol having 3 moles of ethylene oxide $[C_{12}H_{25}O(C_2H_4O)_3H]$ to only 2.4% decreasing the quantity of the polyoxyethylene ether of lauryl alcohol having 23 moles of ethylene oxide $[C_{12}H_{25}O(C_2H_4O)_{23}H]$ to only 2.9% and increasing the quantity of water by 5.7% to a total water content of 66% so as to compensate for the decrease in the ether surfactant, there was produced a cloudy liquid. Still another experiment was conducted in the manner described in Example 1 except that the average number of the ethylene oxide units in the ether surfactant mixture, by weight of the ethers employed, was only 8 instead of about 14 as in Example 1; the composition so produced failed to form a gel.

EXAMPLE 2

Stiff, non-greasy, clear, transparent oil in water gels were produced by employing the process of Example 1 with the following ingredients:

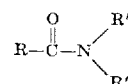
Formulation

[Parts by weight]

	A	B
Mineral oil.....	20	20
Lauric diethanolamide.....	6	6
Lanolin alcohol.....	2.7	2.7
Water.....	62.5	64.8
Polyoxyethylene ether of lauryl alcohol having 3 oxyethylene units $C_{12}H_{25}O(C_2H_4O)_3H$	4	3
Polyoxyethylene ether of lauryl alcohol having 23 oxyethylene units $C_{12}H_{25}O(C_2H_4O)_{23}H$	4.8	3.5

What is claimed is:

1. A clear transparent gel composition consisting essentially of, by weight: (a) from about 15% to about 30% of mineral oil; (b) from about 40% to about 70% of water; (c) from about 5% to about 12% of a higher fatty acid alkylolamide having the following generic formula:



wherein R is a fatty acid residue containing from about 9 to about 13 carbon atoms, R' is a member selected from the group consisting of hydrogen and a lower alkyl monohydric radical having from 1 to 4 carbon atoms, and R'' is a lower alkyl monohydric radical having from 1 to 4 carbon atoms; (d) from about 6% to about

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20% of a non-ionic ether containing surfactant having the generic formula:



wherein R is an aliphatic radical containing from about 8 to about 18 carbon atoms selected from the group consisting of said non-ionic ether containing surfactant wherein (n) is an integer having a value of from about 10 to about 18, and a mixture of said ether surfactant wherein (n) varies from 2 to about 30 for each member of the mixture with the average value for (n), based on the weight of the ether employed, being from about 10 to about 18 and (e) from about 2% to about 4% of lanolin alcohols.

2. The gel composition of claim 1 wherein the non-ionic ether surfactant is a mixture wherein (n) varies from 2 to about 30 for each member of the mixture, with the average value for (n), based on the weight of the ethers employed, being from about 10 to about 18.

3. The clear transparent gel composition of claim 1, consisting essentially of: (a) from about 15% to about 25% of mineral oil; (b) from about 50% to about 65% of water; (c) from about 6% to about 10% of the said higher fatty acid alkylolamide; (d) from about 8% to about 15% of the non-ionic ether containing surfactant and (e) about 3% of lanolin alcohols.

4. A clear transparent gel composition consisting essentially of, by weight: (a) from about 15% to about 30% of mineral oil; (b) from about 40% to about 70% of water; (c) from about 5% to about 12% of lauric diethanolamide; (d) from about 6% to about 20% of a polyoxyethylene ether of an alkyl alcohol having 12 carbon atoms selected from the group consisting of a polyoxyethylene ether of a 12 carbon atom alkyl monohydric alcohol having from about 10 to about 18 oxyethylene units, and a mixture of polyoxyethylene ethers of an alkyl monohydric alcohol having 12 carbon atoms wherein each member of said mixture contains from 2 to about 30 oxyethylene units with the average number of oxyethylene

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units being from about 10 to about 18; and (e) from about 2% to about 4% of lanolin alcohols.

5. The gel composition of claim 4 wherein the ether of an alkyl monohydric alcohol is that of lauryl alcohol.

6. The gel composition of claim 4 wherein the mixture of polyoxyethylene ethers of an alkyl alcohol having 12 carbon atoms is a mixture of polyoxyethylene ethers of lauryl alcohol in a weight ratio of about 5:6 respectively of a polyoxyethylene ether of lauryl alcohol having about 3 oxyethylene units and a polyoxyethylene ether of lauryl alcohol having about 23 oxyethylene units.

7. A clear transparent gel composition consisting essentially of, by weight: (a) from about 15% to about 25% of mineral oil; (b) from about 50% to about 65% of water; (c) from about 6% to about 10% of lauric diethanolamide; (d) from about 8% to about 15% of a mixture of polyoxyethylene ethers of lauryl alcohol in a weight ratio of about 5:6 respectively of a polyoxyethylene ether of lauryl alcohol having about 3 oxyethylene units and a polyoxyethylene ether of lauryl alcohol having about 23 oxyethylene units; and (e) about 2.7% of lanolin alcohols.

8. A clear transparent gel composition for grooming the hair consisting essentially of, by weight: (a) 20% of mineral oil; (b) 60.3% of water; (c) 6% of lauric diethanolamide; (d) 5% of polyoxyethylene ether of lauryl alcohol having 3 oxyethylene units and 6% of polyoxyethylene ether of lauryl alcohol having 23 oxyethylene units; and (e) 2.7% of lanolin alcohols.

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