United States Patent Office 3,101,301 Patented Aug. 20, 1963

3,101,301

TRANSPARENT WATER AND MINERAL OIL GELS AS HAIR CONDITIONERS

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No Drawing. Filed May 11, 1962, Ser. No. 194,201
13 Claims. (Cl. 167—87)

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

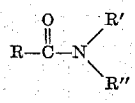
Hair grooming preparations in the form of highly viscous or solid creams or gels of mineral oil in water are well known. These solid preparations have many advantages over other types of hair grooming preparations such as the solid or highly viscous preparations comprising water in oil, brilliantines 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 grooming agents such as lanolin alcohol are added to the gel, the gel again becomes opaque.

It has now been found that clear transparent gels comprising substantial quantities of mineral oil in water can be produced wherein the quantity of surfactant employed in the gel need not be in substantial excess from the quantity of mineral oil employed and can even be present in quantities of less than that of mineral oil. The gels of this invention do not possess any of the above enumerated disadvantages of the prior art hair preparations. 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 skin or hair.

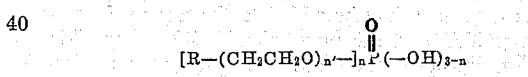
The essential ingredients of the clear transparent gels of this invention are mineral oil, water, a higher fatty acid alkylolamide, an aliphatic polyglycol ether phosphate and lanolin alcohols. In addition to the essential ingredients, various cosmetic or medicinal adjuvants can also be added to the clear transparent gels without destroying their clarity and transparency.

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, e.g. mono- or di-olefinically unsaturated, and which contains from about 9 to about 18 carbon atoms and preferably about 9 to 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 4 carbon atoms. The higher fatty acid alkylolamide surfactant is also referred to herein as simply the amide surfactant. The total quantity of amide surfactant employed in the composition can be composed of one or a mixture of such surfactants. Illustrative of the amide surfactant there can be mentioned: lauric diethanolamide, lauric monoethanol amide, undecyclic dimethanolamide, myristic diethanolamide, linoleic diethanolamide, oleic 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.

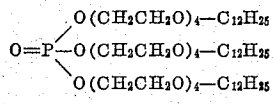
The aliphatic polyoxyalkylene glycol phosphate surfactants, also referred to herein simply as the phosphate surfactant, are organic phosphorus compounds in which substances from the aliphatic series are combined with orthophosphoric acid by means of alkylene oxide, e.g., ethylene oxide, linkages. Either one, two or all three of the phosphoric acid hydroxyl groups can be condensed with an aliphatic-poly(alkylene oxide). When less than all of the phosphoric acid hydroxyl groups are condensed, it is preferable that the free hydroxyls be neutralized with a basic reacting substance, e.g., sodium hydroxide, triethanolamine, etc., so that a 1% solution of the phosphorus compound in water has a pH of about 5.5 to about 6.0. As already indicated, the neutralizing or salt forming group can be inorganic, e.g., alkali metal or organic, e.g., triethanolamine. The alkylene portion of the phosphate surfactant can be that of a lower alkylene radical such as ethylene or propylene. The preferred phosphate surfactant can be represented by the following formula:



wherein R is an aliphatic radical having from about 8 to about 18 carbon atoms; n' is an integer having a value of 2 to about 15 and n is an integer having a value of 1 to 3. The R of the above generic formula can be saturated or unsaturated, e.g., mono-olefinic. It is preferable that n' have a value of about 4 to 8 and that n be 3. The total quantity of phosphate surfactant employed in the composition can be composed of one or a mixture of such surfactants. Illustrative of the aliphatic polyoxyalkyleneglycol phosphates there can be mentioned: tri(lauryltetraglycolether) phosphate; di(lauryltetraglycolether) phosphate; mono(lauryltetraglycolether) phosphate; tri(lauryloctaglycolether) phosphate; di(lauryltetradecylglycolether) phosphate; di(oleyloctaglycolether) phosphate; tri(oleyloctaglycolether) phosphate; di(myristyltetraglycolether) phosphate; tri(palmityloctaglycolether) phosphate; mono(palmityldecaglycolether) phosphate; di(cetyldodecaglycolether) phosphate; the triethanolamine salt of di(lauryltetraglycolether) phosphate, the triethanolamine salt of di(oleyloctaglycolether) phosphate and the like. The phosphate surfactant aids in the moisture retention of the scalp to prevent dryness; facilitates the application of mineral oil in a thin uniform film and is an antistatic agent.

Phosphate surfactants, as described herein, are sold by Carbic-Hoechst Corp. under the trademark Hostaphat, e.g., Hostaphat KL340, KO280 or KL240, and under the trademark GAFAC, e.g. GAFAC MC-470, GB520, by the Antara Division of General Aniline and Film Corp.

The preferred phosphate surfactant is:



tri(lauryltetraglycolether) phosphate, which is a clear, almost colorless viscous liquid having a viscosity at 50° C. of 50±5 cp. and a pH for a 1% solution of the phosphorus compound in water of about 5.5 to 6.0

Lanolin alcohols is a well known material which represents the alcohol fraction of lanolin. A description and a typical chemical composition of lanolin alcohols can be found on pages 150 and 151 of Sagarin, Cosmetics, Science and Technology (1957). Lanolin alcohols 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 clear gels of this invention are produced by mixing the requisite quantities of mineral oil, phosphate surfactant, amide surfactant and lanolin alcohol. This mixture is heated at a temperature of at least 175° F. and preferably below 212° F. Water is also heated to this temperature and is then stirred into the mixture of mineral oil and surfactants. The gel is then permitted to cool 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-surface active agent portion prior to mixing and gelling. The temperature at which the materials are heated and initially combined is critical for the production of a clear gel. It is necessary that the temperature of both the water portion and the mineral oil-surface active agent portion be heated above about 175° F. Otherwise the gel will not be completely clear and transparent. Illustratively, when the materials are heated at 160° F. the gel produced has a translucent appearance.

Various materials may be added to the clear gel composition provided that the material added is compatible with the composition and does not destroy its clarity. Illustratively, minor amounts, e.g., less than about 15% or 25% by weight of the composition, of additional surfactants, cosmetic or pharmaceutical adjuvants such as the following can be added to the compositions: humectants, e.g., glycerine, propylene glycol and the like; bactericides, e.g., hexachlorophene; hair grooming resins, e.g., dimethylhydantoin or polyvinylpyrrolidone; silicones and other hair conditioning agents such as lanolin, beeswax, isopropylpalmitate and the like.

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 susbtantially clear and transparent. The gels can be uniformly tinted, e.g. yellow, blue, etc. by addition of minor quantities of a compactible dye. When extruded through conventional collapsible tubes which have an orifice or passageway of about 3/16 of an inch 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 anticorrosion agents and as lubricants, e.g., anti-friction agents in the processing of wool.

The clear gel compositions of this invention comprise, by weight, from about 40% to about 75% or 85% of water and preferably from about 50% or 55% to about 75% of water, based on the entire composition; from about 10% to about 35% of mineral oil and preferably from about 15% to about 25% of mineral oil, based on the entire composition; from about 10% to about 60% of the amide surfactant, based on the weight of mineral oil employed; from about 10% to about 60% of the phosphate surfactant, based on the quantity of mineral oil employed, with the total quantity of the amide and phosphate surfactants being about 40% to about 80%, based on the quantity of mineral oil employed and from about 15% to about 30% of lanolin alcohols, based on the total quantity of the amide and phosphate surfactants employed.

As mentioned previously, the preferred compositions are those for use as hair conditioning agents. For such use it has been found advantageous to employ, by weight based on the entire composition, from about 25% to about 35% of mineral oil; from about 50% to about 75% of water; from about 3% to about 9% of the amide surfactant; from about 3% to about 12% of the phosphate surfactant, with the total of the phosphate and amide surfactants being about 10% to about 16% and the lanolin alcohol being in the range of about 2% to about 4%.

The clarity of the gels is destroyed by removing either the amide surfactant, phosphate surfactant or the lanolin alcohols. The substitution of lanolin, lanolin esters, acetylated lanolin, acetylated lanolin alcohol, ethoxylated lanolin esters, ethoxylated lanolin alcohols or ethoxylated acetylated lanolin alcohols in place of the lanolin alcohols destroys the clarity and transparency of the gel. Substituting other emulsifiers for the fatty acid alkylolamides such as other non-ionic, or anionic, or cationic emulsifiers destroys the clarity of the gels. Also, a substantial change in the relative concentrations or total quantity of the three emulsifiers destroys the clarity, transparency or gel structure of the compositions. Although it has been found that clear transparent gels can be produced containing mineral oil, water and the phosphate surfactant when the quantity of the phosphate surfactant is equal to or greater than the quantity of mineral oil, the gels lose their clarity and transparency when the quantity of the phosphate surfactant employed is less than the quantity of mineral oil, unless the system also contains the amide and lanolin alcohol and all the essential ingredients are within the concentrations set forth in this application. Thus, another advantage of the compositions of this invention is that small quantities of the relatively expensive phosphate surfactant are required to produce the clear transparent gels.

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 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, 9% of tri(lauryltetraglycolether) phosphate (Hostaphat KL340); 2.7% of Ceralan (a lanolin alcohol manufactured by Robinson-Wagner Co. Inc.); 20% of mineral oil; 3% of lauric diethanolamide and 65.3% of water. There was thoroughly mixed 20 grams of mineral oil, 2.7 grams of Ceralan, 9 grams of tri(lauryltetraglycolether) phosphate and 3 grams of lauric diethanolamide. This mixture was heated to about 180° F.; water was also heated to about 180° F. The hot water (65.3 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 tarnsparent. The gel had a viscosity of 184,000 to 200,000 cps. at 25° C. when tested with the Brookfield RVF instrument with spindle No. 7 at 10 r.p.m. An attempt to form a clear gel by the process of Example 1 but by replacing the 3 grams of lauric diethanolamide with an additional 3 grams of the phosphate surfactant was unsuccessful since the product lost clarity and transparency. Also, by using the process of Example 1 the following formulation produced a gel which was not clear and transparent: 20% mineral oil, 18% of the phosphate surfactant and 62 parts of water. Still another experiment showed that the substitution of lauric diethanolamide in place of all of the phosphate surfactant employed in Example 1 fails to produce 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	C
Tri(lauryltetraglycolether) phosphate	7	8	6
Mineral oil	15	20	15
Lauric diethanolamide	3	5	5
Lanolin alcohol	2.1	2.7	1.8
Water	72.9	64.3	72.2

Example 3

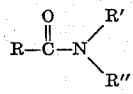
Stiff, non-greasy, clear, transparent oil in water gels were produced by employing the process of Example 1 with the following ingredients:

	Formulation (parts by weight)		
	A	B	C
Triethanolamine salt of di (lauryltetraglycolether) phosphate	9		12
Triethanolamine salt of di (oleyloctaglycolether) phosphate		9	
Mineral oil	20	20	32
Lauric diethanolamide	3	3	4
Lanolin alcohol	2.7	2.7	3.6
Water	65.3	65.3	48.4

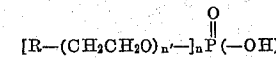
This application is a continuation-in-part of our application Serial No. 5,589, filed on February 1, 1960.

What is claimed is:

1. A clear transparent gel composition comprising by weight: (*a*) from about 10% to about 35% of mineral oil; (*b*) from about 50% to about 85% of water; (*c*) from about 10% to about 60%, based on the quantity of mineral oil, of a higher fatty acid alkylolamide having the following formula:

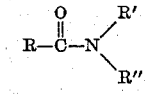


wherein R is a fatty acid residue containing from about 9 to about 13 carbon atoms, R′ is a member selected from the group consisting of hydrogen and a lower alkyl monohydric radical having from 1 to 4 carbon atoms, and R″ is a lower alkyl monohydric radical having from 1 to 4 carbon atoms; (*d*) from about 10% to about 60%, based on the quantity of mineral oil, of an aliphatic polyoxyalkylene glycol phosphate wherein the total quantity of said amide and said phosphate is about 40% to about 80%, based on the quantity of mineral oil and wherein the said phosphate has the following formula:

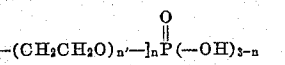


wherein R is an aliphatic radical having from about 8 to about 18 carbon atoms, *n′* is an integer having a value of 2 to about 15 and *n* is an integer having a value of 1 to 3 and (*e*) from about 15% to about 30% based on the sum total quantity of said amide and said phosphate, of lanolin alcohols.

2. A clear transparent gel composition, consisting essentially of, by weight: (*a*) from about 10% to about 35% of mineral oil; (*b*) from about 40% to about 75% of water; (*c*) from about 10% to about 60%, based on the quantity of mineral oil, of a higher fatty acid alkylolamide having the following formula:



wherein R is a fatty acid residue containing from about 9 to about 18 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 10% to about 60%, based on the quantity of mineral oil, of an aliphatic polyoxyalkylene glycol phosphate wherein the total quantity of said amide and said phosphate is about 40% to about 80%, based on the quantity of mineral oil and wherein the said phosphate has the following formula:



wherein R is an aliphatic radical having from about 8 to about 18 carbon atoms, *n′* is an integer having a value of 2 to about 15 and *n* is an integer having a value of 1 to 3 and (*e*) from about 15% to about 30% based on the sum total quantity of said amide and said phosphate, of lanolin alcohols.

3. The composition of claim 2 wherein the said amide is lauric diethanolamide.

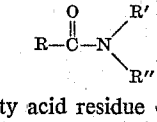
4. The composition of claim 2 wherein the said phosphate is tri(lauryltetraglycolether) phosphate.

5. The composition of claim 2 wherein the said amide is lauric diethanolamide and the said phosphate is tri-(lauryltetraglycolether) phosphate.

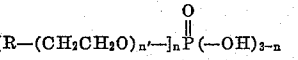
6. The composition of claim 2 wherein the integer *n* in the formula for the phosphate compound is an integer from 1 to 2 and the free hydroxyl portion of the phosphate compound has been neutralized with triethanolamine.

7. The composition of claim 2 wherein R of the formula for the higher fatty acid alkylolamide has from about 9 to 13 carbon atoms.

8. A clear transport gel composition, consisting essentially of, by weight: (*a*) from about 25% to about 35% of mineral oil; (*b*) from about 50% to about 75% of water; (*c*) from about 3% to about 9% of a higher fatty acid alkylolamide having the following 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 3% to about 12% of an aliphatic polyoxyalkylene glycol phosphate, wherein the total quantity of said amide and said phosphate is from about 10% to about 16% and wherein the said phosphate has the following formula:



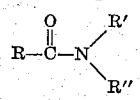
wherein R is an aliphatic radical having from about 8 to about 18 carbon atoms, *n′* is an integer having a value

of 2 to about 15 and n is an integer having a value of 1 to 3 and (*e*) about 2% to about 4% of lanolin alcohols and wherein the total quantity of said amide, phosphate and lanolin alcohols is less than the total quantity of mineral oil.

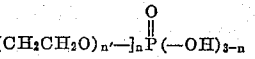
9. The composition of claim 8 wherein the said amide is lauric diethanolamide and the said phosphate is tri-(lauryltetraglycolether) phosphate.

10. A clear transparent gel composition for grooming the hair, consisting essentially of: (*a*) about 20% of mineral oil; (*b*) about 65% of water; (*c*) about 3% of lauric diethanolamide; (*d*) about 9% of tri(lauryltetraglycol ether)phosphate; and (*e*) about 3% of lanolin alcohols, said quantities being by weight based on the entire composition.

11. A method for producing a clear transparent gel composition which comprises heating to a temperature of at least 175° F. a mixture of: (*a*) from about 10% to about 35% of mineral oil, based on the weight of said composition; (*b*) from about 10% to about 60%, by weight based on the quantity of mineral oil, of a higher fatty acid alkylolamide having the following formula:



wherein R is a fatty acid residue containing from about 9 to about 18 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; (*c*) from about 10% to about 60%, based on the weight of mineral oil, of an aliphatic polyoxyalkylene glycol phosphate wherein the total quantity of said amide and said phosphate is about 40% to about 80%, based on the quantity of mineral oil, and wherein the said phosphate has the following formula:



wherein R is an aliphatic radical having from about 8 to about 18 carbon atoms, n' is an integer having a value of 2 to about 15, and n is an integer having a value of 1 to 3; and (*d*) from about 15% to about 30%, based on the sum total quantity of said amide and said phosphate, of lanolin alcohols; mixing water heated at a temperature of at least 175° F. in a quantity of from about 40% to about 75%, by weight of said composition, with said mineral oil, amide, phosphate, and lanolin alcohols, and finally permitting the entire mixture to cool to about room temperature, until a clear gel is formed.

12. The method of claim 11 wherein the said amide is lauric diethanolamide.

13. A method for producing a clear transparent gel composition which comprises mixing at a temperature of at least 175° F.: (*a*) from about 50% to about 75% of water; (*b*) with a mixture comprising: (*c*) from about 25% to about 35% of mineral oil; (*d*) from about 3% to about 9% of lauric diethanolamide; (*e*) from about 3% to about 12% of tri(lauryltetraglycolether) phosphate, wherein the total quantity of said amide and said phosphate is from about 10% to about 16%; and (*f*) about 2% to about 4% of lanolin alcohols, said quantities based on the weight of the entire composition and finally permitting the entire mixture to cool to about room temperature, until a clear transparent gel is produced.

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