

1

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DETERGENT COMPOSITIONS

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This invention relates to novel detergent compositions in the form of a gel comprising soap, liquid non-ionic polyalkylene oxide detergent and water, as hereinafter described.

It has been suggested that soap and synthetic detergents may be compounded together to obtain certain desirable characteristics, such as improved lime soap dispersion. The proposed synthetic detergents have been usually of the anionic sulfate or sulfonate type. It has been proposed that soap may be used in admixture with certain non-ionic polyalkylene oxide detergents, particularly to produce non-foaming compositions. The addition of certain inorganic materials such as borax as an essential ingredient with these mixed detergents has been suggested for the manufacture of solid compositions.

The physical state of a detergent composition is of fundamental consideration in the specific application, economics, consumer appeal and efficiency of the product. In general, mixtures of soap and synthetic detergents broadly have been proposed for use in the form of laundry or toilet bars, flakes, and as liquid shampoos.

It has now been discovered that there may be prepared a detergent composition in the form of a gel which exhibits many desirable characteristics and consists essentially of water-soluble soap, water-soluble liquid non-ionic polyalkylene oxide detergent and water in certain proportions necessary to the formation of the gel state. More particularly, the gel composition may be formed by suitable proportioning of the ingredients so as to form a gel consisting essentially of about 40 to about 60% by weight of a mixture of said soap and non-ionic detergent in a ratio from about 4:1 to about 1:1.2 by weight. Such novel compositions are characterized by their gelled appearance and structure, their relatively dry physical form even though an appreciable amount of liquid non-ionic detergent is present therein, their ready solubility in water, efficient cleansing and lime soap dispersing properties in soft and hard water and a high level of foaming power.

The novel gel composition has as an essential ingredient water-soluble soap, particularly the water-soluble higher fatty acid soap. These soaps may be produced by the saponification of fatty materials or the like suitable for use in soap-making. Among suitable fatty materials are the fats, oils, and waxes of animal, vegetable and marine origin and the fatty acids derived therefrom or of synthetic origin. More specifically, the higher fatty acids may be derived from tallow, cottonseed oil, coconut oil, palm oil, palm kernel oil, grease, fish oils, and suitable mixtures thereof, etc. These water-soluble soaps are in the form of their alkali metal or nitrogen-containing salts. Among the alkali metal soaps it is preferred to use the sodium and potassium soaps. Examples of suitable nitrogen-containing soaps are the ammonium soaps and alkylolamine soaps, e. g., mono-, di-, and triethanolamine soaps. Further examples of suitable soaps are the sodium and potassium soaps of lauric acid, myristic acid, palmitic acid, stearic acid, oleic acid, coconut fatty acids,

2

tallow fatty acids, naphthenic and rosin acids, and the like. The soap used in the preparation of these compositions may be of any titer. For optimum effects, it is desired to use soap which is readily soluble in water, such as soap of relatively low titer, as for example, up to about 40° C. and preferably from about 8 to 30° C. titer.

The essential synthetic detergent component is a water-soluble non-ionic polyalkylene oxide detergent which is liquid at normal room temperature of the order of about 20° C. In general, these detergents are the products produced by the introduction of a controlled number of alkylene oxide groups into an organic hydrophobic compound or group, usually of an aliphatic or aromatic structure. The degree or proportion of hydrophilic groups will vary with the specific hydrophobic group, but in general will be sufficient to confer the desired water-solubility and deterative properties. These detergents are known in the art and the determination of a specific hydrophilic:hydrophobic relationship for each type is not the essential novelty of the present invention. In general, the hydrophobic organic group contains at least about 8 carbons, and preferably up to 30 carbons, condensed with at least about 5 and usually up to about 50 alkylene oxide groups. It is preferred to use the polyoxyethylene condensates derived from ethylene oxide although other lower alkylene oxides, such as propylene oxide, butylene oxide and the like have generally similar properties and may be substituted therefor.

It is preferred to use the polyalkylene oxide condensates of alkyl phenol, such as the polyoxyethylene ether of alkyl phenols having an alkyl group of at least about six, and usually about 8 to 12 carbons, and an ethylene oxide ratio (number of moles per phenol) of about 7.5, 8.5, 11.5 and 20, though the number of ethylene oxide groups will be usually from about 8 to 18. The alkyl substituent on the aromatic nucleus may be diisobutylene, diamyl, polymerized propylene, dimerized C₆-C₇ olefin, and the like.

Further suitable detergents are the polyoxyalkylene esters of organic acids, such as the higher fatty acids or tall oil acids. The polyglycol esters will contain usually from about 12 to about 30 moles of ethylene oxide and about 8 to 22 carbons in the acyl group. A suitable example is refined tall oil condensed with about 16-20 ethylene oxide groups.

The gelled detergent composition may be formed by suitable proportioning of these deterative ingredients in the proper ratio with controlled amounts of water to form the gel. Upon admixing the ingredients with stirring in order to form a substantially homogeneous mixture, the mixture solidifies to a heavy gel, the consistency of which depends upon the precise ratio of the several ingredients. This gel is substantially uniform in nature and of relatively dry form, varying in physical state from a solid to a mobile gel. It has been found that the gel may be formed by selecting the proportion of the soap to non-ionic detergent from the range of about 4:1 to about 1:1.2, and preferably from about 4:1 to 1:1 by weight. The total of these two detergents will be usually from about 40% to about 60%, and preferably about 42-52% by weight of the three essential ingredients. The formation of the gel is not dependent generally upon the temperature of the mixture and may be conducted over a wide range of suitable temperatures such as from about room temperature to about 212° F.

These gel compositions exhibit a high level of cleansing and lime soap dispersing properties in soft and hard water, and have many useful fields of application. The gels may be used as shampoos and as general washing and cleansing compositions. They may be dried in any suitable manner to reduce the water content to a pre-

determined level or to the equilibrium point to obtain substantially anhydrous material which may be subjected to mechanical working to produce a particular type of product. For example, such material may be milled to obtain flakes or ribbons, and, if desired, plodded in the usual manner using conventional soap-making machinery to form bars or cakes which have a characteristic translucent appearance.

Various adjuvant materials may be employed in the gel compositions of the present invention. Such materials may include perfume, coloring material, germicide and the like.

The following examples are additionally illustrative of the nature of the present invention and it will be understood that the invention is not limited thereto. All amounts or proportions are by weight unless otherwise indicated.

EXAMPLE I

Varying amounts of a condensate of nonyl phenol with about 12 moles of ethylene oxide per molecule (Igepal CA) are added to separate portions of a 36% potassium soap solution in water, the soap being the potassium salts of higher fatty acids derived from a mixture of 75% coconut oil fatty acids and 25% oleic fatty acids. The materials are mixed with stirring at room temperature for a short time with the obtention of varying physical states of the product depending upon the ratio of ingredients by weight, as indicated in the table below:

Table

Soap: Non-Ionic	Percent H ₂ O	Physical State
36:1	63	Liquid.
12:1	62	Two phases—small gel over liquid phase.
7:1	61	Two phases—large gel over small liquid phase.
4:1	58	Solid gel.
2:1	54	Do.
1:1	48	Do.
1:1.2	45	Mobile gel.
0.5:1	38	Liquid.
0.4:1	32	Do.
0.1:1	16	Do.

It will be apparent from the table that within certain approximate proportions of soap to non-ionic detergent in a ratio from about 4:1 to 1:1.2, the proportion of water being about 40% to 60%, the product is in the form of a gel. The solid gels which are obtained where the amount of soap to non-ionic detergent is about 4:1 to about 1:1 by weight are preferred for general use. Where there is indicated in the above table, the presence of a gel phase over a liquid phase, such gel layer may be separated from the liquid phase in any suitable manner, such as by decantation.

EXAMPLE II

131 parts of the 36% potassium soap solution used in Example I are admixed with 44 parts of the Igepal CA with stirring, resulting in the obtention of a heavy white gel solid having approximately 25% non-ionic, 27% anhydrous soap and 48% water. This gel exhibits good foaming and deterative properties.

EXAMPLE III

30 parts of roll-dried potassium soaps of coconut fatty acid and red oil in a 3:1 ratio are admixed with 53 parts water and 16.6 parts Igepal CA with stirring, resulting in the formation of a solid gel. This gel exhibits satisfactory washing power.

EXAMPLE IV

800 parts of white flaked soap comprising a mixture of sodium salts of fatty acids derived from 75% coconut oil and 25% tallow fatty acids are admixed with 720 parts of water. This aqueous soap mixture is heated to

150° F. and 200 parts of the Igepal CA are added thereto. The resulting mixture is heated at 150° F. with stirring for 15 minutes and then it was allowed to cool to a gel. The gelled mixture exhibits satisfactory washing properties. A portion of the gel is dried to equilibrium moisture, milled to form shiny transparent-like flakes which are plodded to produce a detergent bar having a translucent appearance.

EXAMPLE V

90 parts of the 36% potassium soap solution of Example I are mixed with 10 parts of a condensate of tall oil with 16–20 ethylene oxide groups, resulting in the formation of a gel. This gel had about 10% non-ionic detergent, 32% soap and 58% water, and exhibits satisfactory deterative and foaming power also.

The admixture of 95 parts of the soap solution to 5 parts of the non-ionic detergent results in an essentially liquid system having 5% non-ionic, 34% soap and 61% water. In addition the admixture of 50 parts non-ionic to 50 parts of the soap solution results in a completely liquid system also having 50% non-ionic, 18% soap and water as the balance.

Although the present invention has been described and illustrated with a reference to specific examples, it is understood that modifications and variations of composition and procedure are contemplated within the scope of the appended claims.

Having thus described the said invention, what is claimed is:

1. A detergent composition in the form of a gel having a relatively dry form and consisting essentially of water-soluble alkali metal higher fatty acid soap, water-soluble non-ionic liquid higher alkyl phenol-ethylene oxide detergent having about 8 to 18 moles of ethylene oxide and water, said soap being derived from a mixture of about 75% coconut oil fatty acids and 25% fatty acid selected from the group consisting of oleic acid and tallow fatty acids, the amount of said soap and non-ionic detergent being from about 40 to about 60% by weight of said gel and in a ratio from about 4:1 to about 1:1.2 by weight.

2. A detergent composition in the form of a gel having a relatively dry form and consisting essentially of water-soluble potassium higher fatty acid soap, water-soluble non-ionic liquid higher alkyl phenol-ethylene oxide detergent having about 8 to 18 moles of ethylene oxide and water, said soap being derived from a mixture of about 75% coconut oil fatty acids and 25% fatty acid selected from the group consisting of oleic acid and tallow fatty acids, the amount of said soap and non-ionic detergent being from about 40 to about 60% of said gel and in a ratio from about 4:1 to about 1:1 by weight.

3. A detergent composition in the form of a gel having a relatively dry form and consisting essentially of water-soluble sodium higher fatty acid soap, water-soluble non-ionic higher alkyl phenol-ethylene oxide detergent having about 8 to 18 moles of ethylene oxide and water, said soap being derived from a mixture of about 75% coconut oil fatty acids and 25% fatty acid selected from the group consisting of oleic acid and tallow fatty acids, the amount of said soap and non-ionic detergent being from about 40 to about 60% of said gel and in a ratio from about 4:1 to about 1:1 by weight.

4. A detergent composition in the form of a gel having a relatively dry form and consisting essentially of water-soluble higher fatty acid soap, water-soluble non-ionic liquid polyoxyethylene esters of tall oil detergent having about 12 to about 30 moles of ethylene oxide and water, said soap being derived from a mixture of about 75% coconut oil fatty acids and 25% fatty acid selected from the group consisting of oleic acid and tallow fatty acids, the amount of said soap and non-ionic detergent being from about 40 to about 60% by weight of said gel and in a ratio from about 4:1 to about 1:1.2 by weight.

5. A detergent composition in the form of a gel having

5

a relatively dry form and consisting essentially of water-soluble higher fatty acid soap, water and water-soluble non-ionic normally liquid polyalkylene oxide detergent selected from the group consisting of polyoxyalkylene condensates of higher alkyl phenol and polyoxyalkylene esters of higher fatty acids, said soap being derived from a mixture of about 75% coconut oil fatty acids and 25% fatty acid selected from the group consisting of oleic acid and tallow fatty acids, and said non-ionic detergent containing from 5 to 50 moles of alkylene oxide of 2 to 4 carbon atoms each, the amount of said soap and non-ionic detergent being from about 40 to about 60% by weight and in a ratio from about 4:1 to 1:1.2 by weight.

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6

References Cited in the file of this patent

UNITED STATES PATENTS

2,084,632	Ellis	June 22, 1937
2,543,744	Fox	Mar. 6, 1951

FOREIGN PATENTS

697,510	Great Britain	Sept. 23, 1953
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OTHER REFERENCES

10 "Atlas Surface Active Agents" (1948), Atlas Powder Co., Wilmington, Del., Tables I and II.

Modern Soap and Detergent Industry, Martin, Technical Press, London, 3rd ed. (1950), vol. 1, sec. 1, p. 33.