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SOAP COMPOSITIONS CONTAINING ALKYL AMINO DIACETATES AS LIME SOAP DISPERSANTS

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ABSTRACT OF THE DISCLOSURE

The tendency of natural soap compositions to deposit precipitates in hard water is inhibited by addition of 5 to 70% by weight alkali metal alkyl amino diacetates wherein the alkyl group contains from 10 to 24 carbon atoms.

BACKGROUND OF THE INVENTION

This invention relates to cleansing compositions. More particularly, the invention relates to improved soap compositions suitable for use in hard water.

The excellent performance characteristics of soaps derived from animal fats and vegetable oils, e.g., lauric, myristic, palmitic, stearic, tallow and coconut oil acid soaps are well-known. However, when such soaps are employed in hard water, (i.e., water containing substantial quantities of alkaline earth metal ions—particularly, calcium or magnesium) they interact with the ionic constituents of such water to form insoluble precipitates which tend to deposit on washing vessels and items being washed. Such undesirable effects are exemplified by "the ring around the tub" which frequently demarcates the water line of washing vessels utilized in geographical localities having hard water supplies.

Although deposition of precipitates by such compositions can be inhibited by use of sequestrants to "soften" the water, such sequestrants are inert components which do not contribute to the cleansing power of the compositions in soft water. Further, such additives sometimes impair physical characteristics of bar soap compositions in terms of hardness, gloss, solubility, etc., and therefore are not desired for use therein.

SUMMARY OF THE INVENTION

It is an object of this invention to provide improved soap compositions particularly suited for use in hard water.

Basically, the improved soap compositions of this invention comprise natural soaps in combination with minor amounts of alkyl amino diacetates hereinafter described.

The invention will be understood from the following description of the preferred embodiments.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The soap compositions of this invention comprise a soap derived from natural products or synthetic products corresponding thereto (hereinafter referred to in the specification and claims as natural soaps) in combination with alkyl amino diacetates which function as "lime soap dispersants."

Any of the well-known natural soaps conventionally employed in soap bars and/or powders, can be utilized in the compositions of this invention. Such natural soaps include sodium and potassium salts of acids obtained by saponification of animal fats and vegetable oils, for example, lauric, myristic, palmitic, stearic, tallow and coconut oil acids and mixtures thereof. As is well-known to

those skilled in the art, the selection of natural soap constituents is based on the physical and performance characteristics desired as well as cost and availability of the natural products from which the soaps are derived. Generally, soaps based on tallow or coconut oil acids or mixtures thereof are preferred.

The alkyl amino diacetates employed in the compositions of this invention are represented by the formula: $R—N(CH_2COOM)_2$ wherein R is an alkyl chain containing from 10 to 24 carbon atoms and M is sodium, potassium, ammonium, or a basic cation of an organic nitrogen compound, for example, tetramethyl ammonium.

The alkyl chain length is particularly critical since shorter alkyl chain lengths do not provide effective lime soap dispersant action (inhibit precipitate deposition) and longer chain lengths tend to decrease the solubility of the alkyl amino diacetate to an undesirable degree. Alkyl chain lengths of from 14 to 20, particularly about 16 to 18 carbon atoms are preferred.

Alkyl amino diacetates of the above type can be made by a number of known processes. For example, an alkyl amine can be reacted with chloracetic acid as described in U.S. Pat. 2,804,474 to yield the corresponding amino diacetate. Other known processes include reaction of an alkyl amine with sodium cyanide and formaldehyde as described in U.S. Pat. 2,500,109 or formation of a nitrile intermediate as described in U.S. Pat. 2,589,208, which is then hydrolyzed.

The alkyl chain can be linear or branched and the amino diacetate group can be attached to a terminal or internal carbon atom. Linear alkyl amino diacetates are preferred, the normal (terminally substituted) compounds being particularly preferred. Mixtures of various alkyl amino diacetates can be utilized if desired.

The alkyl amino diacetates used in this invention are generally solids at room temperature, and at temperatures through about 50° C. have a "soap feel" and dissolve relatively slowly in a bar soap foam, making them particularly suited for use in bar "soap" compositions. In addition, these compounds are, themselves, effective surfactants and do not diminish the cleansing performance of the soap compositions in which they are used.

The compositions of this invention must contain at least 1% by weight diacetate (based on the combined weight of the diacetate and natural soap) to effectively inhibit precipitate deposition. The use of greater than 70% by weight diacetate sometimes presents undesirable difficulties in milling the soap mixtures to the desired form. A diacetate content of from 5 to 70% by weight is particularly preferred.

In addition to the foregoing essential components, the compositions of this invention may contain minor amounts of perfumes, dyes, abrasives, antiperspirants, germicides, or other additives conventionally employed in soap compositions.

The invention is further illustrated by the following examples wherein all percentages are by weight unless otherwise indicated.

EXAMPLE I

A cleansing composition is prepared by admixing 16% octadecyl amino diacetate (sodium salt), and 84% of a natural soap formulation comprising 20% coconut oil soap and 80% tallow soap.

To compare precipitate deposition properties of this composition with those of conventional natural soaps, a 1% solution of the foregoing composition and a 1% solution of a natural soap composition consisting of 20% coconut oil soap and 80% tallow soap are prepared. The water used in the preparation of these solutions contains 200 parts per million calcium.

Black tile plates are immersed in each solution for about 10 seconds, removed and allowed to drain and dry at ambient temperatures. Visual observation indicates substantially less, in fact, almost no precipitate deposition on the plate immersed in solution of soap containing diacetate as compared to heavy deposition on the plate immersed in the solution of soap composition containing no diacetate.

The procedure is repeated using compositions containing alkyl amino sodium diacetates having alkyl chain lengths of 8, 10, 12, 14, 18, 20, 22, and 24 carbon atoms. The compositions containing alkyl amino diacetates having alkyl chain lengths of 12 to 20 carbon atoms exhibit high reductions (as compared to the compositions containing no diacetate) in precipitate deposition. The diacetates having alkyl chain lengths of 10, 22 and 24 carbon atoms also reduce precipitate deposition but not as great a degree. The 8 carbon alkyl chain amino diacetate produces little improvement.

EXAMPLE II

The procedure of Example I is repeated using compositions containing $C_{18}H_{35}N(CH_2COOK)_2$; $C_{18}H_{35}N(CH_2COONH_4)_2$; and $CH_2N[COON(CH_3)_4]_2$, respectively, in place of the sodium salts. Comparable results are obtained.

EXAMPLE III

Soap bars are formed from the compositions of Example I containing alkyl amino diacetates having 10, 14, 16, 18 and 20 carbon atoms in the alkyl chain by thoroughly blending the ingredients of these compositions with about 18 parts by weight water and pressing the blended mass in a 2¼ inch diameter die at about ten thousand pounds per square inch. All bars were found to have acceptable physical properties.

What is claimed is:

1. A cleansing composition consisting essentially of:

(a) a soap selected from the group consisting of alkali metal salts of fatty acids derived from vegetable oils, animal fats and mixtures therefor; and

(b) as a lime soap dispersant an alkyl amino diacetate represented by the formula: $R—N(CH_2COOM)_2$, wherein R is an alkyl group containing from 10 to 24 carbon atoms and M is selected from the group consisting of sodium, potassium, ammonium, and basic cations of organic nitrogen compounds,

said alkyl amino diacetate constituting from 1 to 70% of the total dry weight of said diacetate and said soap.

2. The composition of claim 1 wherein said diacetate constitutes from 5% to 70% of the total dry weight of said diacetate and said soaps.

3. The composition of claim 2 wherein R is a linear alkyl chain containing from 14 to 20 carbon atoms.

4. The composition of claim 3 wherein R is a linear alkyl chain containing from 15 to 18 carbon atoms.

5. The composition of claim 4 wherein the alkyl amino diacetate is a normal alkyl amino diacetate.

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