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[54] **SOAP BARS CONTAINING SALTS OF FATTY ACIDS DERIVED FROM THE GUERBET REACTION**
5 Claims, No Drawings

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[50] **Field of Search** 252/110, 108, 367, 368, 369, 370; 260/413, 417, 418

[56] **References Cited**

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ABSTRACT: A detergent bar comprising an alkali metal salt or a blended magnesium-alkali metal salt of blends of C_{12} to C_{16} acids derived from the oxidation of alcohols produced by the Guerbet reaction and an alkali metal soap or a blended magnesium-alkali metal soap of a C_{16}–C_{18} fatty acid.

SOAP BARS CONTAINING SALTS OF FATTY ACIDS DERIVED FROM THE GUERBET REACTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to am improved detergent bar composition. In another aspect this invention relates to a detergent bar composition which has excellent washing property characteristics in both hard and soft water and which can be milled, plodded, and pressed on soapmaking equipment and possesses many of the more desirable products characteristics of soap. More particularly, this invention relates to a detergent bar comprising a major portion of an alkali metal soap or a blended magnesium-alkali metal soap of a C_{16} to C_{18} fatty acid, and a minor portion of an alkali metal salt or a blended magnesium-alkali metal salt of a blend of C_{12} to C_{16} acids derived from the oxidation of alcohols produced by the Guerbet reaction.

2. Brief Description of the Prior Art

Toilet bars are conventionally of tallow and coconut oil fatty acid soaps. The ratio of the tallow and coconut oil fatty acid soaps present in the toilet bars are usually about 80 percent tallow to 20 percent coconut oil fatty acid soaps in order to form a toilet bar having desirable lathering characteristics in both warm and cold water. The cost of the coconut oil fatty acid soap is usually much greater than that of the tallow fatty acid soap because of the nature of its source and limited supply. Therefore, it is desirable to reduce or eliminate the quantity of the higher priced coconut oil fatty acid soap component in the milled toilet soap for economical reasons. However, problems have occurred in providing detergent bar compositions from synthetic detergents which produce the same desirable characteristics as the soap bar formed from the tallow and coconut oil fatty acid soap blends.

In recent years much time and money have been expended in an effort to produce bar and cake detergents based on synthetic organic detersive materials, or bar or cake detergents containing a synthetic organic detersive material as one of the components. However, in the manufacture of detergent bars, problems have occurred in that the final shape, appearance, cohesiveness and solubility properties of the products produced wherein synthetic organic detergents employed in the detergent blend are not comparable to those obtained with soap. Further, the use of synthetic organic detersive materials as one of the components in the detergent bar has often resulted in that the finished bar is very tacky and, consequently, unattractive for use. Further, the prior art synthetic organic detergent bars are not of the same character as the toilet bars formed from the conventional coconut-tallow fatty acid soap blends. Thus, the above-mentioned defects in the final shape, appearance, cohesiveness, and solubility properties of the detergent bars wherein a synthetic organic detersive material is employed as one of the components have had a substantial effect on the marketability of such detergent bars.

Therefore, in order to produce an acceptable toilet bar composition containing a synthetic organic detersive material as one of the components, the detergent bar composition must be capable of being milled, plodded, and pressed so as to obtain a bar of satisfactory appearance and suitable structure. Also, it is necessary that the compositions employed to produce the detergent bar be capable of being worked and readily shaped. In the consideration of the acceptability of a detergent bar composition designed for personal use on the hands, face, and body of the user, it is also necessary to consider objective factors, such as scum, dispersion, and soil removal with a multitude of subjective considerations such as the many personal considerations of feel, effect on the skin, and the like. Thus, new and novel detergent bar compositions are constantly being sought which are equal to or superior to the washing properties of the conventional coconut-tallow fatty acid soap blend and, at the same time, are equivalent or better than such soap in their physical characteristics, such as

hardness, plasticity under pressure, workability, extrusion, film formation, solubility rate, reduced curd formation, rehardening after moisture, and the like.

OBJECTS OF THE INVENTION

An object of the invention is to provide a detergent bar which possesses desirable physical characteristics. Another object of the invention is to provide a detergent bar which exhibits the excellent washing property characteristics of detergents while still possessing favorable appearance and processing properties of soap. Another object of the invention is to provide a detergent bar which functions equally well in hard water and soft water and which can be manufactured in suitable milled and plodded form. Other objects and advantages of the invention will become apparent to those skilled in the art from a study of the following detailed description and appended claims.

SUMMARY OF THE INVENTION

A novel, satisfactory detergent bar is prepared from a mixture of about 10 to 15 weight percent of an alkali metal salt or a blended magnesium-alkali metal salt of a blend of a C_{12} to C_{16} acids derived from the oxidation of alcohols produced by the Guerbet reaction and from about 90 to 85 weight percent of an alkali metal soap or a blended magnesium-alkali metal soap of a C_{16} to C_{18} fatty acid. More specifically, the alkali metal soap of the detergent bar is a sodium soap of a C_{16}–C_{18} fatty acid, or a blended magnesium-sodium soap of a C_{16} to C_{18} carbon fatty acid containing from about 25 to 40 weight percent magnesium soap constituent, and the alkali metal salt of the blend of C_{12} to C_{16} acids is the sodium salt or a blended magnesium-sodium salt. The detergent bar of the invention forms a plastic, cohesive mass from which a bar having a low slough loss, good lathering characteristics, and low wear can be produced. Moreover, the aforesaid mixtures can be shaped or pressed into a bar that has a pleasant feel on contact with the skin, is harmless to the human body, and is nonsticky.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preparation of a detergent bar containing a mixture of a metal soap of a C_{16} to C_{18} fatty acid wherein the metal constituent of the soap is an alkali metal, magnesium, and mixtures thereof, and a blend of C_{12} to C_{16} metal salts of acids derived from the oxidation of alcohols produced by the delayed reaction wherein the metal constituent of the salt is an alkali metal, magnesium, and mixtures thereof, produces a detergent bar having the desirable features of a toilet bar formed from the conventional blends of tallow and coconut oil fatty acids.

The alkali metal salts of the C_{16} to C_{18} fatty acids employed in the detergent bar of the present invention may be derived from any convenient source. The only criteria is that the C_{16} to C_{18} fatty acids be straight chain fatty acids. However, it is preferred ordinarily to use the alkali metal salts of C_{16} to C_{18} fatty acids derived from tallow. Desirable results have been obtained wherein the sodium salts or a mixture of sodium salt and magnesium slat of the C_{16} to C_{18} fatty acids derived from tallow are employed as one of the constituents of the composition employed to produce the detergent bar of the present invention.

The alkali metal salts or the blends of alkali metal salt and magnesium of C_{12} to C_{16} acids which are employed as the other constituent of the detergent bar composition of the present invention are derived from the oxidation of alcohols produced by the Guerbet reaction and the subsequent neutralization of the resulting acids. The process of neutralization of the acid components of both the C_{16} to C_{18} fatty acids and the blends of C_{12} to C_{16} acids produced by the oxidation of the product resulting from the Guerbet reaction are well known in the art and, in view of such, further detail is believed unnecessary.

The Guerbet reaction involves the dimerization of straight chain alcohols in the presence of an alkali or metallic catalyst to form a single molecule containing 1-hydroxyl group. The resulting molecule has twice the number of carbon atoms as the original straight chain alcohol. The oxidation of the resulting alcohol thus produces the desired acids. The number of carbon atoms present in the resulting acid can be readily controlled by employing the proper straight chain alcohol or alcohols which are to be dimerized. However, we have found that the amount and type of acids derived from the oxidation of alcohols produced by the Guerbet reaction must be closely controlled in order to provide a detergent bar containing same which possesses satisfactory characteristics. For example, we have found that blends of alkali metal salt of magnesium alkali metal salts of C_{12} to C_{16} carbon acids derived from alcohols which are produced by the Guerbet reaction when incorporated into the alkali metal or magnesium alkali metal salt of tallow acid, commonly referred to as tallow soap, that the resulting composition can be readily plodded, milled, and shaped into a desirable detergent bar which has good lathering, and the advantages of conventional soap formed from the tallow-coconut oil fatty acid soaps. Further, we have found that it is necessary to restrict the chain lengths of the acids produced by the oxidation of the alcohols produced by the Guerbet reaction because branched C_{16} carbon acids and higher are not satisfactory for introduction into the composition due to the poor lathering properties of the resulting detergent bar.

We have unexpectedly found, however, that by employing a blend of *n*-hexanol and *n*-octanol as the straight chain alcohol to undergo dimerization and subsequent oxidation and neutralization a salt of a blend of C_{12}, C_{14}, and C_{16} salts was produced, which, when employed in the composition produces a very desirable detergent bar. It is preferred that the blend contains from about 25 to 65 weight percent of the C_{12} constituent, from about 37.5 to 17.5 weight percent of the C_{14} constituent, and from about 37.5 to 17.5 weight percent of the C_{16} constituent. Further, we have found that it is desirable to employ from about 10 to 15 weight percent of the blend described above with from about 85 to 90 weight percent of the salt of the tallow acid in order to produce a detergent bar having the required characteristics to produce good lathering, and appearance which is required of all toilet bars.

As previously stated, the toilet detergent bar of the present invention comprises from about 10 to 15 weight percent of salts of blends of C_{12} to C_{16} acids derived from the oxidation of alcohols produced by the Guerbet reaction wherein the salts of the blends are selected from the group consisting of alkali metal salts, and blends of alkali metal salts and magnesium salts, and from about 90 to 85 weight percent of a salt of a C_{16} to C_{18} fatty acid wherein the salts of the C_{16} to C_{18} fatty acids are also selected from the group consisting of alkali metal salts, and mixtures of alkali metal salts and magnesium salts. Desirable results, however, have been obtained wherein the salt for both constituents described above is the sodium salt of the blends of the C_{12} to C_{16} carbon acids and the sodium salt of the C_{16} to C_{18} fatty acids. The amounts of magnesium salt incorporated when the salt constituents are a mixture of magnesium and sodium salt must be carefully controlled in order to provide a resulting product which is not tacky and possesses the desirable foaming properties of the detergent bar. We have thus found that when employing a salt mixture of an alkali metal salt, such as sodium, and a magnesium salt it is necessary that the mixture contain about 25 to 40 weight percent magnesium salt in order to provide a composition which is not tacky and possesses the desirable foam characteristics, while at the same time preventing the problem of extreme brittleness in the resulting bar. However, if the amount of the magnesium constituent exceeds about 25 to 40 weight percent, one is faced with the problem of extreme brittleness of the resulting bar.

In order to further illustrate the detergent bar of the present invention the following specific examples are given. These examples are presented primarily for the purpose of illustration and any enumeration or details contained therein are not to be interpreted as a limitation on the invention except as indicated in the appended claims. All parts and percentages of constituents referred to in the following examples are by weight unless otherwise indicated.

Example 1

Detergents bars were formed from blends of 12 to 16 carbon acids derived from the oxidation of the alcohol resulting from the dimerization of normal hexanol and normal octanol by the reaction known as the Guerbet reaction. The resulting blends contained the carbon atom distribution shown as follows:

	Blend 1	Blend 2
C_{12} acids	65	25
C_{14} acids	17.5	37.5
C_{16} acids	17.5	37.5

Each of blend 1 and blend 2 was then converted to the sodium soaps and the resulting soaps were added at both a 10 weight percent and 15 weight percent level to the sodium soap of tallow acid so as to form compositions which could be stamped into toilet bars. The toilet bars so produced were not tacky, stamped without mold release, and lathered as well as the conventional soap made from the slats of natural coconut oil acids and tallow acids. Further, the slough, i.e., the weight loss after removing soap softened from soaking in water, was essentially the same for the detergent bar of the present invention as for toilet bars employing the conventional blends of tallow and coconut oil fatty acid soaps. Thus, it is clearly evident that the sodium salts of the two blends described can be satisfactorily substituted for the costly coconut oil derived acids, while, at the same time, producing a detergent bar from a blend of tallow soap and the salts of blends of C_{12} to C_{16} acids which can be processed with ease, are not tacky and which possesses the desirable characteristics of the conventional toilet bars made from conventional coconut oil-tallow fatty acid soaps.

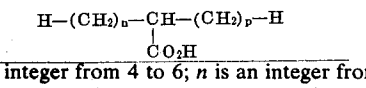
EXAMPLE 2

A number of detergent bars were made wherein the sodium soap of the tallow acid and the sodium soap of the blends of C_{12} to C_{16} acids were partially converted to a magnesium soap by blending in magnesium sulfate immediately after neutralization. Having a level of 20 weight percent magnesium-80 weight percent sodium soap the product was tacky and had unusually poor foaming characteristics. However, at 36 percent magnesium soap, the product was hard, more soaplike, and exhibited improved foaming characteristics. The bars made containing the mixed sodium and magnesium salts were harder than the 100 percent sodium-containing detergent toilet bars. However, when controlling the amount of magnesium constituent present in the magnesium-sodium salt soaps within the range of about 25 to 40 weight percent magnesium soap produced a harder bar, while at the same time did not result in a brittle bar. Further, the resulting bar was more soaplike.

Therefore, it is clearly evident from the above description that detergent bars can be formed wherein the coconut oil fatty acids soaps are replaced by salts of blends of C_{12} to C_{16} acids derived by the oxidation of the reaction product formed by the Guerbet reaction without sacrificing the desirable properties of the toilet bars prepared from the conventional blends of tallow and coconut oil fatty acid soaps.

Having thus described the invention, we claim:

1. A toilet detergent bar consisting essentially of about 10 to 15 weight percent of salts of blends of C_{12}, C_{14} and C_{16} acids derived from the oxidation of alcohols produced by the Guerbet reaction having the general formula:



where p is an integer from 4 to 6; n is an integer from 6 to 8 and $N+p$ is always equal to an even number, said blends consisting of about 30 to 70 percent of the C_{12} acids, from about 40 to 15 weight percent of the C_{14} acids and from about 40 to 15 weight percent of the C_{16} acids wherein said salts of said blends are selected from the group consisting of the sodium salts of said acids and blends of sodium and magnesium salts of said acids and from about 90 to 85 weight percent of a salt of a C_{16} to C_{18} straight chain fatty acid wherein said salt of said C_{16} to C_{18} straight chain fatty acid is selected from the group consisting of the sodium salts of said acids and blends of the sodium and magnesium salts of said acids.

2. The toilet detergent bar of claim 1 wherein said salts of blends of said C_{12}, C_{14} and C_{16} acids and said salts of said C_{16} to C_{18} straight chain fatty acids are the sodium salt or a blended magnesium-sodium salt of said acids containing from about 25 to 40 weight percent magnesium salt.

3. The toilet detergent bar of claim 2 wherein said magnesium salt is present in an amount of about 36 weight percent.

4. The toilet detergent bar of claim 1 wherein said blend of C_{12}, C_{14} and C_{16} acids contains about 65 weight percent C_{12} acids, about 17.5 weight percent C_{14} acids and about 17.5 weight percent C_{16} acids and said salt of said acid is a sodium salt.

5. The toilet detergent bar of claim 1 wherein said blend of said C_{12}, C_{14} and C_{16} carbon acids contains about 25 weight percent C_{12} acid, about 37.5 weight percent C_{14} acid and about 37.5 weight percent C_{16} acid and said salt of said acid is a sodium salt.