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NONFOAMING SOAP COMPOSITION

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The present invention relates to an improved detergent composition which, on mixing with water, produces little or no foam and is thus particularly adapted for use in mechanical dishwashing machines.

The advent of commercial dishwashers has necessitated the use in them of detergents which produce little or no foam, as the presence of foam reduces very markedly the efficiency of these dishwashers. Thus, the amount of foam produced by the usual alkali metal soaps of higher fatty acids makes these soaps unsuitable for use in mechanical dishwashers. Also certain synthetic detergents such as the synthetic detergents containing a polyalkylene oxide group, produce too much foam to be satisfactory for use in dishwashing machines.

I have made the surprising discovery that if synthetic detergents containing a polyalkylene oxide group, which themselves are foaming agents, are mixed with water-soluble soaps of higher fatty acids, which are also foaming agents, the amount of foam produced by the mixture is far less than that produced by either component alone, while the detergent action of the mixture remains excellent, so that the novel mixture is suitable for use in dishwashing machines.

The present invention, therefore, is directed to a novel detergent composition which comprises a mixture in suitable proportions of a non-ionic water-soluble synthetic detergent containing a polyalkylene oxide group with a soap.

The types of non-ionic water-soluble synthetic detergents containing a polyalkylene oxide group which are employed as one component of the novel composition of the present invention are the derivatives of a water-insoluble organic compound selected from the group consisting of hydroxyl, carboxyl, amino and mercapto compounds containing at least 6 carbon atoms and 1 reactive hydrogen atom and which derivatives contain a polyalkyleneoxy radical with a sufficient number of alkyleneoxy groups (at least 4) to impart water solubility thereto. The compounds of this type which are described in U. S. Patents Nos. 1,970,578 to Schoeller et al., 2,174,761 to Schuette et al. and 2,213,477 to Steindorff et al. are broadly suitable for use in the present invention. I particularly prefer, however, the polyalkylene oxide derivatives of water-insoluble higher aliphatic alcohols and the polyalkylene oxide derivatives of phenolic compounds which contain one or more alkyl substituents in which the total number of alkyl carbon atoms is at least six.

As examples of these preferred polyalkylene

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oxide derivatives may be mentioned the polyalkylene oxide derivatives of aliphatic alcohols containing from 12 to 18 carbon atoms—for example, the polyalkylene oxide derivatives of such alcohols as lauryl, oleyl, cetyl, octadecyl and the like, or mixtures of the same—for instance, the alcohols obtainable by hydrogenation of the fatty acids or glycerides present in animal and vegetable fats, oils and waxes such as cocoanut oil, castor oil and the like. As examples of suitable phenolic compounds containing one or more alkyl substituents in which the total number of carbon atoms in the alkyl substituents is between 6 and 18, may be mentioned isomeric, dibutyl and diamyl phenols and cresols, normal, secondary or tertiary isomeric heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tetradecyl, cetyl, oleyl, octodecyl, isooctyl and the like phenols and cresols. I particularly prefer the polyalkylene oxide derivatives of secondary and tertiary alkyl substituted phenols obtained by condensing olefines of the type obtained from petroleum refinery gases with phenols or cresols. In the case of products obtained by condensing olefines containing from 3 to 5 carbon atoms, such as propylene, butylene and amylene, it is desirable to produce the dialkyl substituted phenols while in the case of products obtained by condensing a phenol or cresol with an olefine containing 8 or more carbon atoms, the mono-substituted derivatives are preferred. Particularly desirable derivatives can be obtained from the phenols and cresols containing a substituent derived from olefines containing 8 to 12 carbon atoms, such as di-isobutylene and other alkylenes, as nonylene, decylene, undecylene and dodecylene.

The polyalkyleneoxy radical present in the substituent must contain a sufficient number of alkyleneoxy groups to impart water solubility to the polyalkylene oxide derivative employed in the invention. At least four alkyleneoxy groups are necessary to impart water solubility and generally 10 to 30 or more such groups should be present for best results.

The other essential component of the novel composition of the present invention is, as stated, a usual water-soluble soap, such as the alkali metal, sodium or potassium, ammonium and amine, such as monoethanolamine, diethanolamine and triethanolamine, salts of such acids as lauric, oleic, palmitic, stearic, linoleic, ricinoleic acid, and the like, or mixtures of such acids such as may be obtained from animal or vegetable glycerides; also soaps of naphthenic acids and synthetic acids obtained by oxidation of petro-

leum oils and waxes or rosin soaps and the like. I have found that potassium soaps such as are sold in the form of liquid soaps generally give somewhat less foam. However, sodium soaps result in a very marked decrease in the amount of foam and due to the fact that they are somewhat less expensive may be employed to good advantage in practicing the present invention.

The optimum proportion of soap to the polyalkylene oxide derivative depends on the derivative itself and also on the type of soap employed. I have found that in general, compositions containing from 90% to 40% of the polyalkylene oxide derivative and from 10% to 60% of soap are satisfactory and produce little foam and any foam which is produced is very quick-breaking. The optimum proportions within this range for any specific polyalkylene oxide derivative and soap may readily be determined by those skilled in the art by simple experiment. My preferred range of proportions of polyalkylene oxide derivative to soap is within the range of 2:1 to 4:1.

I have also found that the degree of foam produced is somewhat dependent on the character of the water employed. In distilled water the degree of foam reduction is somewhat less than in water of 50 to 300 P. P. M. hardness. It may therefore be advantageous, particularly in the case of compositions intended for use in areas having relatively soft water, to incorporate in the composition of the present invention a minor amount of an alkaline earth metal compound which imparts hardness to the water, for instance, in an amount of from 0.01% to 10%. It has also been found, as would be expected, that in the presence of small amounts of fats or oils such as would be washed off the dishes, the amount of foam formed decreases still further.

The details of the present invention will be apparent to those skilled in the art after consideration of the following specific examples:

Example 1

66 parts of a water-soluble polyethylene glycol ether of diisoamyl phenol were mixed with 89 parts of an aqueous liquid potassium soap containing 38% soap (34 parts 100% soap) known as Hollingshead liquid soap. This mixture was employed in an electric dishwashing machine and performed satisfactorily as a good detergent. Only a small amount of foam was formed and this broke quickly.

A similar mixture was made up and diluted with 245 parts of water, making a 25% concentration of the soap-polyethylene glycol ether. This aqueous solution was somewhat easier to handle and on using it in an electric dishwasher, it performed satisfactorily.

Example 2

17.5 parts of a polyethylene glycol ether of diisoamyl phenol were mixed with 7.5 parts of a commercial sodium soap (Swift's White Ribbon Soap), and this mixture diluted with 75 parts of water to give a liquid soap having a 25% concentration of soap-polyethylene glycol ether. This solution was used in an electric dishwasher in the usual manner and gave very little foam and performed satisfactorily.

Example 3

17.5 parts of the polyethylene glycol ether of isooctyl phenol in which the isooctyl group was the diisobutyl radical were mixed with 7.5 parts of sodium oleate. The mixture was then diluted with 75 parts of water to give an aqueous solution

having a 25% concentration of soap-polyethylene glycol ether. On using this mixture in an electric dishwasher, it performed satisfactorily and foamed very little.

Similar results were obtained when the polyethylene glycol ether of 3-methyl-4,6-di-tertiary butyl phenol, nonyl phenol and a mixture of alkyl phenols obtained by alkylating phenol with an olefin fraction consisting of a mixture of olefins containing from 8 to 12 carbon atoms, obtained in petroleum refining, were employed in place of the polyethylene glycol ether of isooctyl phenol.

Example 4

25 parts of the polyethylene glycol ether of oleyl alcohol were mixed with 7.5 parts of potassium oleate and 75 parts of water. This mixture was employed in an electric dishwasher in the usual manner and performed satisfactorily.

While a substantial amount of water was present in each of the mixtures described in the foregoing examples, its purpose was principally to produce a solution which could be readily poured from a bottle into an electric dishwashing machine in economical amounts. If desired, however, the mixture of a polyethanoxy derivative or other polyalkyleneoxy derivative and soap need not be diluted with water before using, since sodium and potassium soaps are compatible with polyalkeneoxy derivatives and form solutions therewith The mixture is quite readily water soluble and, if desired, may be prepared in an anhydrous or substantially anhydrous condition and added to water only when used.

It will also be noted that in the foregoing specific examples the polyethanoxy derivatives of various organic hydroxy compounds have been specified as illustrative of one of the components of the composition of the present invention, since these derivatives are at present commercially available. However, the corresponding derivatives of other alkylene oxides, such as propylene oxide, butylene oxide and the like, have similar properties and may be substituted for the specific derivatives mentioned as illustrations in these examples.

I claim:

1. A non-foaming detergent composition consisting essentially of a mixture in proportions of from about 1:2 to about 1:4 of, respectively, an alkali metal soap and a water-soluble synthetic non-ionic surface active polyalkylene glycol ether of a compound selected from the group consisting of long chain aliphatic alcohols containing at least twelve carbon atoms and alkyl phenols containing at least six alkyl carbon atoms, said polyalkylene glycol ether radical containing at least four alkyleneoxy groups.

2. A non-foaming detergent composition consisting essentially of a mixture, in proportions of from 1:2 to 1:4, of, respectively, an alkali metal soap and a water-soluble non-ionic synthetic surface active polyalkylene glycol ether of a long chain aliphatic alcohol said polyalkylene glycol ether radical containing at least 4 alkyleneoxy groups.

3. A non-foaming detergent composition consisting essentially of a mixture, in proportions of from 1:2 to 1:4, of, respectively, an alkali metal soap and a water-soluble non-ionic surfact active polyethylene glycol ether of a long chain aliphatic alcohol said polyethylene glycol ether radical containing at least 4 ethanoxy groups.

4. A non-foaming detergent composition consisting essentially of a mixture, in proportions of from 1:2 to 1:4, of, respectively, an alkali metal soap and a water-soluble synthetic nonionic surface active polyalkylene glycol ether of an alkyl phenol containing at least six alkyl carbon atoms said polyalkylene glycol ether radical containing at least 4 alkyleneoxy groups.

5. A non-foaming detergent composition consisting essentially of a mixture, in proportions of from 1:2 to 1:4, of, respectively, an alkali metal soap and a water-soluble synthetic nonionic surface active polyethylene glycol ether of an alkyl phenol containing at least six alkyl carbon atoms said polyethylene glycol ether radical containing at least 4 ethanoxy groups.

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