

UNITED STATES PATENT OFFICE

2,683,692

NONFOAMING SURFACE-ACTIVE ALKYL
BENZENE SULFONATE COMPOSITION

Jay C. Harris, Dayton, Ohio, assignor to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware

No Drawing. Application December 23, 1949,
Serial No. 134,850

4 Claims. (Cl. 252-152)

1

It is known that the alkylbenzene sodium sulfonates, wherein the alkyl chain contains from 8 to 14 carbon atoms, have the property of foaming in water solutions. In general, it may be stated that the important surface-active properties, such as detergency and wetting speed, as well as the production of foam, are concomitant in these particular products.

For a great many industrial operations which employ aqueous solutions of alkylbenzene sodium sulfonates, the production of foam is undesirable. For example, such operations as electrocleaning, dyeing, bleaching of textiles, dishwashing, etc. are desirably conducted in the presence of a surface-active solution, but in the absence of foam. The reason for this is that it has been found that the presence of foam in many of these operations results in imperfect work, due to flotation of some of the bath components. There is, therefore, a demand for a non-foaming, surface-active composition containing alkylbenzene sodium sulfonates, and particularly compositions having approximately the same degree of surface-activity as that exhibited by the alkylbenzene sodium sulfonates per se.

I have now found that alkylbenzene sodium sulfonates, wherein the alkyl group contains from 8 to 14 carbon atoms, may be combined with acetic acid salts of alkylamines, the alkyl group of said amines containing from 14 to 16 carbon atoms, with the result that non-foaming compositions are obtained which have approximately the same degree of surface-activity as does the alkylbenzene sodium sulfonate, itself.

The alkylamine acetates have the formula:



where R is an alkyl radical having from 14 to 16 carbon atoms. These materials may be made by adding the stoichiometric amount of acetic acid to the alkylamine.

The alkylbenzene sodium sulfonates may contain between 8 and 14 carbon atoms in the alkyl group and may be prepared as described in U. S. Patents Nos. 2,232,117 and 2,232,118, wherein benzene is alkylated with a polymer olefin having a boiling point in excess of 140° C. Either a propylene polymer or isobutylene propylene copolymer may be employed. Alternatively, the alkylation of the benzene may also be carried out employing a chloroalkane having at least 8 carbon atoms which is obtained by monochlorinating a suitable petroleum hydrocarbon fraction.

The present non-foaming surface-active composition may be prepared either in solid form or

2

the composition may be prepared in water solution. For the latter purpose, an alcoholic solution of the acetic acid salt of the alkylamine may be first prepared (a 50% by weight solution in isopropanol is convenient) and such solution then added to a foaming water solution of alkylbenzene sodium sulfonate in amount sufficient to render the solution non-foaming. Irrespective of the method by which the constituents are combined, I have found that the proportion of active ingredients therein, while somewhat dependent upon the type of alkylbenzene sodium sulfonate employed and also upon the degree of agitation or aeration, temperature, etc. to which the solutions are subjected, will in general lie between 3% and 15% by weight of amine salts based upon the solids content of the solution.

The present invention is effective in suppressing foam under a large variety of conditions (acidity or alkalinity) and to various temperature conditions including temperatures up to and including the boiling temperature.

The following examples illustrate my invention:

Example 1

To a dye bath, maintained at the boiling point and containing in addition to dyestuff, 0.2% by weight of a decylbenzene sodium sulfonate, there is added sufficient of the acetic acid salt of myristyl amine to furnish 8.5% by weight based upon the combined weight of said sodium sulfonate and amine salt. Textile fabrics dyed in the bath will be found to be free of dye specks and will be found to exhibit even dyeing.

The present compositions may be employed in any industrial operation in which the wetting activity is desired, but where the production of foam is objectionable. A further example of such an operation is in the electro-cleaning of metals. In this process the metal to be cleaned is suspended in an electrolytic bath, either as the cathode or anode, the bath electrolyte containing from 3 to 10 ounces per gallon or mixtures of the various salts, such as soda ash, trisodium phosphate, tetrasodium pyrophosphate, caustic soda or sodium metasilicate. The bath may be operated at elevated temperatures, such as for example, 160° to 210° F. Electrolysis is carried out at a current density of 25 to 100 amperes per square foot and causes gas liberation on the piece which gas rises through the solution and induces the formation of a heavy layer of foam on the bath. By employing the present combination of alkylbenzene sodium sulfonates and acetic acid salts of alkylamines, the production of foam

3

is substantially prevented. The following example illustrates such an electrolytic metal cleaning process.

Example 2

An electrolytic cleaning bath suitable for iron is prepared containing the following materials:

	Parts
Sodium metasilicate.....	50
Trisodium phosphate.....	35
Sodium hydroxide.....	8
Tetrasodium pyrophosphate.....	5
Dodecylbenzene sodium sulfonate.....	2

The above materials are added in the proportions indicated to the water at the rate of approximately 8 ounces per gallon. The iron parts to be cleaned are suspended in the solution so formed and made the cathode and then a current of 100 amperes per square foot passed through the bath. Gas evolution forms a heavy blanket of foam.

An isopropyl alcohol solution containing 50% of an acetic acid salt of tetradecylamine is added to the bath in amount until the foam breaks. It will be found that thereafter gas is freely liberated from the bath without the production of foam.

What I claim is:

1. A surface-active composition comprising an alkylbenzene sodium sulfonate containing between 8 and 14 carbon atoms in the alkyl group and sufficient of the acetic acid salt of a mono-alkylamine, wherein the alkyl group contains from 14 to 16 carbon atoms to impart non-foaming characteristics to aqueous solutions of said composition.

2. The process which comprises adding to an aqueous solution of an alkylbenzene sodium sulfonate containing between 8 and 14 carbon atoms in the alkyl group, an acetic acid salt of a mono-alkylamine, wherein the alkyl group contains

4

from 14 to 16 carbon atoms in amount sufficient to impart non-foaming properties to said aqueous solution.

3. The process which comprises adding to a foaming aqueous solution of an alkylbenzene sodium sulfonate containing between 8 and 14 carbon atoms in the alkyl group an acetic acid salt of a mono-alkylamine, wherein the alkyl group contains from 14 to 16 carbon atoms, said acetic acid salt being added in amount sufficient to impart non-foaming properties to said aqueous solution.

4. The process which comprises adding to a foaming aqueous solution of an alkylbenzene sodium sulfonate containing between 8 and 14 carbon atoms in the alkyl group a solution in isopropanol of an acetic acid salt of a mono-alkylamine, wherein the alkyl group contains from 14 to 16 carbon atoms, said isopropanol solution of amine salt being added in amount sufficient to impart non-foaming properties to said aqueous solution.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,074,380	Flett	Mar. 23, 1937
2,094,609	Kritchevsky	Oct. 5, 1937
2,161,173	Kyrides	June 6, 1939
2,274,807	Rawlins	Mar. 3, 1942
2,303,348	Freeman et al.	Dec. 1, 1942
2,363,923	Denman	Nov. 28, 1944
2,406,902	Rawlins	Sept. 3, 1946

OTHER REFERENCES

Gregory: "Uses and Applications of Chemical and Related Materials" (1939), p. 331.

Chemistry of Fatty Acids, Armour & Co. (Pamphlet), 1947, p. 8.

"Fatty Acids and Their Derivatives," Ralston (1948), pp. 650-653.