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SYNTHETIC DETERGENT COMPOSITION

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The present invention relates to a synthetic detergent composition.

An object of the invention is to provide an improved synthetic detergent composition for general application.

A specific object of the invention is to provide a synthetic detergent composition that is particularly effective for washing cotton fabrics.

The above and other objects will become apparent in the course of the following description.

Synthetic detergents are considered, at the present time, to include all of the non-soap products of synthetic chemistry which have valuable detergent properties. These may be broadly classified into cationic, anionic, and non-ionic detergents. The principal members of the anionic class are the organic sulfates or sulfonates, usually employed in the form of their alkali salts. The non-ionic detergents are exemplified by the polyoxyethylene derivatives of lipophilic organic materials. These synthetic detergents have the advantage over soap that they retain their activity to a greater extent in the presence of calcium and magnesium ions which are found in hard water. While the synthetic detergents as a group are all useful materials, each of the several types embraced in the class has certain disadvantages. One of the most useful and cheapest types of the anionic group of synthetic detergents is the series of alkylaryl sulfonates which are prepared by condensing an aliphatic hydrocarbon with 9 to 16 carbon atoms and benzene or naphthalene, and thereafter sulfonating the product. These compositions are generally used in the form of their alkali neutralized salts. One of the most readily available compositions of this type is produced by alkylating benzene with the mixture of hydrocarbons found in a petroleum distillate of the kerosene type, and thereafter sulfonating and neutralizing the product. While this material has certain valuable detergent characteristics, there are several properties that impose limitations on its usefulness. The material has limited water solubility which means that if aqueous solutions are desired, it is necessary to operate within certain concentrations. Solubility is further reduced in hard water. There is also a tendency for these alkylaryl sulfonates to separate from water on cooling and to be difficult to redissolve. There is a further limitation in that the detergent effect of the alkylaryl sulfonates on cotton is relatively poor.

On the other hand, the non-ionic synthetic detergents have the disadvantages that they are relatively more expensive and do not produce foam or suds to the extent of soap or most of the ionic type synthetic detergents. While the production of suds is not an actual criterion of detergent efficiency, the reaction of users of synthetic detergents, particularly for household use, is unfavorable toward materials that do not produce suds.

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In accordance with the present invention, it has been found that the combination of a specific group of alkylaryl sulfonates and a specific group of polyoxyethylene esters produces a synthetic detergent which has a wider range of usefulness than either of the components, and which exhibits an unexpected improvement in detergency on cotton fabrics. The advantages of this combination are found within a relatively narrow range of compounds. The alkylaryl sulfontes, which are useful in the invention, are those in which the alkyl group contains from 9 to 16 carbon atoms, and the aryl group is benzene or naphthalene. The alkylaryl base of the detergent is advantageously composed of the mixture produced by alkylating benzene with the hydrocarbons found in kerosene. The polyoxyethylene ester useful in the combination is a polyoxyethylene ester of tall oil or rosin, wherein the esters contain an average of from 12 to 30 oxyethylene groups per carboxyl group. These polyoxyethylene esters are preferably produced by the reaction of ethylene oxide and tall oil or rosin in proportions to produce esters containing an average of from 12 to 30 oxyethylene groups per molecule of the carboxylic acid. Esters of similar type can be produced by esterifying polyethylene glycols, having an average of 12 to 30 oxyethylene groups with tall oil or rosin in proportions to produce preponderantly mono-esters.

Many of the advantages of the invention can be realized in mixtures containing from 5 to 95 per cent of the alkylaryl sulfonate and 95 to 5 per cent of the polyoxyethylene ester. The preferred compositions, however, contain from 60 to 85 percent of the alkylaryl sulfonate, and 40 to 15 per cent of the polyoxyethylene ester.

The composition of the invention may be prepared in any one of several ways depending upon the characteristics, other than detergency, desired. For example, an aqueous solution may be prepared which contains the non-ionic detergent and the alkylaryl sulfonate in the desired proportions. If a powder is desired, the non-ionic detergent and alkylaryl sulfonate may be mixed with inorganic salt or alkali in the proportions best suited to the particular application. In preparing the latter type of mixture, the two detergents may be dissolved in water and spray dried or drum dried, or the two detergents may be mixed dry.

The following examples illustrate several specific compositions made in accordance with the invention. The aqueous solutions were prepared by adding the necessary quantity of water to the detergent components and warming the mixture on a steam bath and stirring occasionally until dissolved. The non-aqueous preparations

were made by dry mixing the several ingredients. In the table, the heading "Percent detergent mixture" refers to the relation of parts of the ionic or non-ionic detergent to the total parts in the mixture of the two, the relation being expressed as parts of one detergent per 100 parts of the mixture and ignoring additives such as water, salts, etc.

Example	Ionic	Parts	Percent detergent mixture	Non-Ionic	Parts	Percent detergent mixture	Other ingredients	Parts
1	Sodium alkyl benzene sulfonates, alkyl groups have chain lengths of kerosene hydrocarbons.	16	80	Polyoxyethylene ester of tall oil, average 16 oxyethylene groups per carboxyl group.	4	20	Water	80
2	do	14	84.9	Polyoxyethylene ester of tall oil, average 20 oxyethylene groups per carboxyl group.	2.5	15.1	do	83.5
3	do	14	84.9	Polyoxyethylene ester of rosin, average 20 oxyethylene groups per carboxyl group.	2.5	15.1	do	83.5
4	do	75	83⅓	Polyoxyethylene ester of tall oil, average 16 oxyethylene groups per carboxyl group.	15	16⅔	Sodium Sulfate	10
5	do	30	75	do	10	25	do	60
6	do	10	33⅓	Polyoxyethylene ester of tall oil, average 20 oxyethylene groups per carboxyl group.	20	66⅔	Sodium Sulfate and Soda Ash.	10 60
7	do	10	33⅓	do	20	66⅔	Sodium Carboxymethyl Cellulose Water Tetrasodium Pyrophosphate.	1 9 65

By way of example of the improved detergency of the compositions of the invention, the following results were obtained in a launderometer, using a standard soiled cotton in which the soil was an aqueous emulsion of mineral oil and carbon black. In reporting "Relative detergency," the results with the sodium alkylaryl sulfonate alone were taken as standards at 100%.

Composition, Per Cent			Concentration in hard water. (300 p. p. m.)	Relative Detergency
Water	Sodium Alkylaryl Sulfonate (same as Ex. 1)	Polyoxyethylene ester of tall oil, average 20 oxyethylene groups per carboxyl		
			Per cent	*Per cent*
86	14	0	0.25	100
97.5	0	2.5	0.25	108
83.5	14	2.5	0.25	138
83.5	16.5	0	0.25	100
83.5	0	16.5	0.25	120

In this tabulation it is to be noted that the addition of 14 parts of the alkylaryl sulfonate and 2.5 parts of the polyoxyethylene ester gives a detergent effect which is outstandingly superior to that obtained with either component alone.

The compositions of the invention can be made from single alkylaryl sulfonates of the class defined and single polyoxyethylene esters of the class defined. The compositions can be, and preferably are, made with mixed alkylaryl sulfonates and mixed polyoxyethylene esters of the classes defined. Additives of various types in addition to those listed in the examples can be included in the compositions or used with them to obtain some particular property, as is well understood in the detergent art. Thus, thickeners, coloring agents, perfumes, builders, solvents, etc., can be employed if desired for their known effects.

The compositions of the invention are useful as laundry and household detergents, shampoo

preparations, automobile washing compounds, textile scouring agents and the like. These compositions can be prepared for use in the form of dry mixtures, or aqueous solutions of suitable concentration.

What is claimed is:

1. A detergent composition comprising a mixture consisting of from 5 to 95% by weight of a sulfonate of alkyl substituted aromatic hydrocarbon selected from the class consisting of benzene and naphthalene, and wherein the alkyl group has from 9 to 16 carbon atoms; and from 95 to 5% of polyoxyethylene ester of organic acid material selected from the class consisting of rosin and tall oil, said ester containing an average of from 12 to 30 oxyethylene groups per carboxyl group.

2. A detergent composition as defined in claim 1 wherein the mixture consists of from 60 to 85% by weight of said sulfonate and from 40 to 15% of said polyoxyethylene ester.

3. A detergent composition as defined in claim 1 wherein the said alkyl substituted aromatic hydrocarbon is a mixture of alkyl benzenes wherein the alkyl groups have the carbon chain lengths of the mixed hydrocarbons of kerosene.

4. A detergent composition comprising a mixture consisting of from 60 to 85% by weight of a sodium sulfonate of a mixture of alkyl benzenes wherein the alkyl groups have the carbon chain lengths of the mixed hydrocarbons of kerosene, and 40 to 15% of a polyoxyethylene ester of tall oil containing an average of 12 to 30 oxyethylene groups per carboxyl group.

5. A detergent composition as defined in claim 4 wherein the said polyoxyethylene ester contains an average of about 20 oxyethylene groups per carboxyl group.

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