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**COMPOSITION FOR PRE-WASHING
TREATMENT OF TEXTILES**

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7 Claims 10

ABSTRACT OF THE DISCLOSURE

A jellylike composition for the pre-washing treatment of textiles, comprising 8–30 wt. percent of a straight chain or branched chain alkylbenzenesulfonate, 10–62 wt. percent of a nonionic surfactant of the amphiphilic polyoxyethylene type and the remainder is water, the sum of said alkylbenzenesulfonate and said nonionic surfactant of the amphiphilic polyoxyethylene type being 25–70 wt. percent of the total weight of the composition.

BACKGROUND OF THE INVENTION**Field of the invention**

The present invention relates to jellylike or semisolid detergent compositions containing, as essential ingredients, straight chain or branched chain alkylbenzenesulfonate, nonionic surfactant of the amphiphilic polyoxyethylene type and water. These compositions are suitably used by applying them to heavily stained portions of clothing, such as collars, cuffs, socks and underwear by a brush or by the user's fingers and then placing the goods into a washing machine. The compositions can also be used by applying them to materials which cannot be washed by vigorous hand washing or in a washing machine, such as frilly materials, laces and sweaters and then washing the materials gently with a brush or by light pressing.

Description of the prior art

As is well known, general purpose household detergents comprising a surfactant and a builder do not have sufficient power to remove oily dirt and, therefore, soiled materials washed therewith may yellow after storage for a long period of time. Heavily stained portions cannot be cleansed sufficiently by the usual washing process and, therefore, a more concentrated detergent solution is sometimes used. However, such a treatment is not preferred for general household use because of the difficulty of using same and/or it may damage the fabric or damage the shape of the clothing.

On the other hand, cleaning with solvents (dry cleaning) is suitable for removing oily dirt. However, this method has the disadvantage that water-soluble dirt and inorganic solid dirt cannot be removed. A system has been developed wherein a W/O detergent comprising a surfactant, a small quantity of water and a solvent is used. However, this system is not suitable for general household use, because a large quantity of a solvent is required.

We have desired to incorporate in a detergent composition an amphiphilic substance having a high affinity for oily dirt, as an agent for positively removing oily dirt from clothing, thereby contributing to the effective cleaning of clothing.

It has been found, however, that the effect of the amphiphilic substances cannot be obtained if the amphiphilic substances are incorporated in an ordinary synthetic detergent composition and such composition is used for washing in the form of an aqueous detergent solution of a low

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concentration in the usual manner, because the amphiphilic substances can be used only in small amounts and they are difficultly soluble in water.

We have discovered the present invention after intensive investigations. We employ jellylike compositions, which are generally in the form of liquid crystals and which comprise a surfactant/amphiphilic substance/water system, and in which the amphiphilic substance exhibits an improved effect of removing oily dirt from textiles.

SUMMARY OF THE INVENTION

The present invention provides jellylike or semisolid compositions containing three essential ingredients, namely, (1) 8–30 wt. percent, preferably 10–20 wt. percent, of straight chain or branched chain alkylbenzenesulfonate as a surfactant, (2) 10–62 wt. percent, preferably 15–50 wt. percent, of a nonionic active agent of the polyoxyethylene type as the amphiphilic substance and (3) the remainder is water. The sum of said alkylbenzenesulfonate and said amphiphilic nonionic active agent of the polyoxyethylene type in the composition is 25–70 wt. percent, preferably 35–50 wt. percent, based on the total weight of the composition.

The straight chain or branched chain alkylbenzenesulfonates used in the present invention are, for example, the alkali metal salts such as the sodium or potassium salts, or the organic amine salts such as the monoethanolamine and diethanolamine salts, of alkylbenzenesulfonates containing alkyl groups having 8–18 carbon atoms. Sodium salts of straight chain alkylbenzenesulfonates in which the alkyl group has 10–15 carbon atoms are particularly preferred.

The nonionic active agents of the amphiphilic polyoxyethylene type used in the present invention are those having an HLB value in the range of 5–11 including, for example, polyoxyethylene alkyl ethers containing alkyl groups of 8–22 carbon atoms and 1–8 oxyethylene units and polyoxyethylene alkylphenyl ethers containing alkyl groups of 8–18 carbon atoms and 1–8 oxyethylene units. Polyoxyethylene (4–6) nonylphenyl ethers and polyoxyethylene (3–5) dodecyl ethers are particularly preferred.

In order to obtain the synergistic effect on the detergent power of the compositions of the present invention and to obtain a jellylike or semisolid form, the amount of the surfactant is generally in the range of 8–30 wt. percent, preferably 10–20 wt. percent, and the amount of the amphiphilic substance is generally in the range of 10–62 wt. percent, preferably 15–50 wt. percent, both percentage ranges being based on the total weight of the composition. The amounts of each component vary within the above-stated ranges depending on the particular compounds of both components that are used. The sum of both components is 25–70 wt. percent, preferably 35–50 wt. percent, based on the total weight of the composition.

The jellylike detergent compositions according to the invention can be prepared by (A) dissolving the alkylbenzenesulfonate surfactant in water to obtain a homogeneous solution and then adding the amphiphilic substance to the solution with stirring, or (B) by stirring together the surfactant, the amphiphilic substance and water. The former method is preferred to the latter, because it yields a more homogeneous mixture and thereby provides a harder or more viscous gel.

The jelly composition of the present invention is used by applying it to cloth, in an amount in the range of 0.3–1.0 g., preferably 0.5 g., per one piece of cloth of a size of 50 cm.², by the user's fingers or with a brush. The cloth may be washed in a washing machine immediately after application of the composition. However, improved results are obtained by allowing the treated cloth to stand for about 30 minutes before washing it. Further, even better results are obtained by brushing

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the surface after it has been treated with the composition according to the invention.

A part of the amphiphilic substance contained in the jelly composition of the present invention may be replaced with a solvent such as ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, ethylene glycol monobutyl ether, ethylene glycol monophenyl ether or diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, diethylene glycol monobutyl ether, a wetting agent or a wetting promotor such as a dialkylsulfosuccinate. The dialkylsulfosuccinates to be optionally used in the present invention are, for example, the alkali metal salts such as the sodium or potassium salts, or the organic amine salts such as the monoethanolamine and diethanolamine salts, of dialkylsulfosuccinates containing straight chain or branched chain alkyl groups having 6-10 carbon atoms. Sodium diethylhexylsulfosuccinate is particularly preferred. The solvent can be used in an amount of up to 6 wt. percent of the composition and also the wetting agent or promotor can be used in an amount of up to 5 wt. percent of the composition.

By using the jelly detergent of the present invention, heavy dirt, particularly oily dirt on collars, cuffs, socks and underwear, can be removed easily as a result of the synergism of the amphiphilic substance and the alkylbenzenesulfonate surfactant and troublesome repetition of washing procedure is not required. The jelly detergent is suitable for washing materials which cannot be hand-washed by a vigorous crumpling action or which cannot be washed in a washing machine such as frilly materials, laces and sweaters, by spreading the composition of the invention on said materials and then washing them lightly with a brush or by light pressing.

The present invention will be further illustrated in the following representative Examples. In the Examples, parts are all by weight.

EXAMPLE 1

A variety of samples were prepared. In each sample a mixture of sodium alkylbenzenesulfonate, containing straight chain alkyl groups of 12 carbon atoms on the average, was dissolved in a quantity of water to obtain a homogeneous solution. To the solution was then added an amphiphilic, nonionic surfactant obtained by adding 3 moles of ethylene oxide to a mixed alcohol comprising 70 wt. percent of lauryl alcohol and 30 wt. percent of myristyl alcohol. The mixture was stirred. The three-component system comprising the alkylbenzenesulfonates, amphiphilic substance and water was examined. The results were as follows:

GELATION RANGE

Ingredients	Range in which transparent gels are formed, weight percent	Range in which also opaque gels are formed, weight percent
Sodium alkylbenzenesulfonate.....	5-25	5-35
Amphiphilic substance.....	10-30	5-50
Water.....	60-85	30-85

EXAMPLE 2

Three-component systems each comprising various amounts of a mixture of sodium alkylbenzenesulfonates having branched chain alkyl groups of 12 carbon atoms on the average, a polyoxyethylene (5) nonylphenyl ether (amphiphilic substance) and water were prepared. The results were as follows:

GELATION RANGE

Ingredients	Range in which transparent gels are formed, weight percent	Range in which also opaque gels are formed, weight percent
Sodium alkylbenzenesulfonate.....	5-35	0-55
Amphiphilic substance.....	5-70	5-70
Water.....	30-70	20-75

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EXAMPLE 3

Sixteen (16) wt. percent of sodium alkylbenzenesulfonates containing straight chain alkyl groups of 12 carbon atoms on the average, 2.5 wt. percent of sodium diethylhexylsulfosuccinate and 0.0025% of a blueing agent were dissolved in a quantity of water with heating. To the resulting solution was added 24 wt. percent of polyoxyethylene (5) nonylphenyl ether. The mixture was cooled to obtain a blue, transparent jelly composition.

EXAMPLE 4

Fourteen (14) wt. percent of sodium alkylbenzenesulfonate containing straight chain alkyl groups of 13 carbon atoms on the average and 0.0025% of a blueing agent were dissolved in a quantity of water with heating. To the resulting solution was added 26 wt. percent of polyoxyethylene (3) lauryl ether. The mixture was cooled to obtain a blue, transparent jelly composition.

EXAMPLE 5

Twenty (20) wt. percent of sodium alkylbenzenesulfonate containing branched alkyl groups of 12 carbon atoms on the average and 0.0025% of a blueing agent were dissolved in a quantity of water with heating. To the resulting solution was added 20 wt. percent of polyoxyethylene (4) myristyl ether. The mixture was cooled to obtain a blue, transparent jelly composition.

EXAMPLE 6

Sixteen (16) wt. percent of sodium alkylbenzenesulfonate containing straight chain alkyl groups of 12 carbon atoms on the average and 0.0025% of a blueing agent were dissolved in a quantity of water with heating. To the resulting solution was added 9 wt. percent of polyoxyethylene (4) nonylphenyl ether and 5 wt. percent of butylcellosolve. The mixture was cooled to obtain a blue, transparent jelly composition.

For confirming the effects of the compositions of the present invention on cotton cloths stained with oily dirt, the degreasing and cleansing rates obtained by the use of the compositions were measured. The results were as shown in Table 1.

(1) Preparation of cloth samples

Composition of oily soil:	Wt. percent
Liquid paraffin	5
Squalene	10
Lanolin	20
Triglyceride	30
Oleic acid	15
Stearic acid	15
Lauryl alcohol	5

0.1 Gram of oily soil of the above composition was embedded in 5 x 10 cm. samples of white cotton cloth.

(2) Rate of cleaning (percent)

Washing was effected with a Terg-O-Tometer in hard water of 4° DH under the conditions of a temperature of 25° C., a bath ratio of 10 sheets/500 ml. of solution and rotation at 65 r.p.m. for 10 minutes. Then the sheets were washed once in clean water for 5 minutes. The reflectivity was measured to evaluate the rate of cleaning.

(3) Rate of degreasing (percent)

The oily soil remaining in the cloths after the washing was extracted with ethanol/benzene (50/50) in a Soxhlet's extractor to measure the quantity of the remaining oily dirt. The rate of degreasing (W) was calculated according to the following equation:

$$W = \frac{W_0 - W_s}{W_0}$$

wherein W_0 represents the quantity of dirt before washing and W_s represents the quantity of dirt after washing.

TABLE 1.—RATES OF DEGREASING AND CLEANING

Detergent	Rate of degreasing (percent)	Rate of cleaning (percent)
Example:		
3.....	85	77
4.....	87	78
5.....	88	79
6.....	88	78
Commercial household detergent*	60	58

*The commercial household detergent had a composition of:

	Weight percent
Sodium alkylbenzene sulfonates having alkyl groups of 12 carbon atoms on the average.....	20
Sodium tripolyphosphate.....	30
Soda ash.....	1
Sodium silicate.....	3
CMC.....	1
Glauber's salt.....	45

(2) Conditions of cleaning power test

Tester: Terg-O-Tometer

Water: 4° DH, 10 sheets of stained cloths/500 cc. (6 sheets of test samples and 4 sheets of bath ratio-regulating cloths)

Quantity of detergent used: 0.5 g./sheet

Temperature: 25° C.

Rotation: 100 r.p.m.

Washing time: 10 minutes, once

Washing in clean water: 5 minutes, once

(3) Rate of cleaning

The reflectivities of the washed test samples were measured to determine the rate of cleaning. Six pieces of the stained cloths were used in each test and the mean value of 4 samples, omitting the highest and the lowest values, was taken.

TABLE 2

Surfactant/amphiphilic substance;	Amphiphilic substance			
	Polyoxyethylene (3) dodecyl ether		Polyoxyethylene (5) nonylphenyl ether	
	Rate of cleaning (percent)	Appearance of composition	Rate of cleaning (percent)	Appearance of composition
100/0.....	72.5	White turbid solution.....	72.5	White turbid solution.
90/10.....	71.5	do.....	70.3	Do.
80/20.....	64.1	White, soft jelly.....	63.0	White, soft jelly.
70/30.....	60.2	do.....	59.2	Transparent jelly.
60/40.....	70.5	Transparent jelly.....	68.5	Do.
50/50.....	85.9	do.....	84.2	Do.
40/60.....	87.3	do.....	88.7	Do.
30/70.....	85.9	do.....	86.5	Do.
20/80.....	84.3	do.....	85.7	Do.
10/90.....	65.1	do.....	63.1	Do.
0/100.....	43.3	White, turbid solution.....	62.1	White, turbid solution.
Commercial household detergent*				

*The commercial household detergent was used in a concentration of 4 g./l. The composition of the detergent was the same as in Table 1.

EXAMPLE 7

Sodium alkylbenzenesulfonates containing straight chain alkyl groups of 12 carbon atoms on the average were dissolved in a quantity of water to obtain a homogeneous solution. To the solution was then added polyoxyethylene (3) dodecyl ether or polyoxyethylene (5) nonylphenyl ether as the amphiphilic substance. The mixture was stirred to obtain a detergent composition. The ratio of the sodium alkylbenzenesulfonates to the amphiphilic substance was varied in the range of 0/100–100/0, the sum of both being 40 wt. percent based on the total weight of the detergent composition. The appearances of the thus obtained compositions were observed and the rates of cleaning of artificially stained cotton cloths with the compositions were measured. The results were as shown in Table 2.

The composition of the soil, the preparation of the stained cloths, the conditions of the cleaning power test and the determination of the rate of cleaning were as follows:

(1) Composition of oily soil and stained cloth

	Wt. percent
Cotton seed oil.....	58
Cholesterol.....	11
Cetyl alcohol.....	2
Cleic acid.....	11
Palmitic acid.....	8
Liquid paraffin.....	5
Solid paraffin.....	5

Twenty-six (26) grams of oily soil of the above composition and 0.64 g. of carbon black were dispersed in 1.6 liters of ethylene tetrachloride by ultrasonic waves to obtain a bath. Bleached cotton cloths of a size of 5 x 10 cm. were immersed in the bath and were dried to obtain stained cloths.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A transparent gel, liquid crystal, detergent composition consisting essentially of

(1) from about 8 weight percent to about 30 weight percent of straight chain or branched chain alkylbenzenesulfonate detergent selected from the group consisting of the alkali metal salts, monoethanolamine salts and diethanolamine salts of alkylbenzenesulfonates in which the alkyl groups have from 8 to 18 carbon atoms and mixtures thereof,

(2) from about 10 weight percent to about 62 weight percent of amphiphilic polyoxyethylene nonionic surfactant having an HLB value in the range of from 5 to 11 and selected from the group consisting of (a) polyoxyethylene alkyl ethers having alkyl groups of 8–22 carbon atoms and 1–8 oxyethylene units and (b) polyoxyethylene alkylphenyl ethers having alkyl group of 8–18 carbon atoms and 1–8 oxyethylene groups, and

(3) the balance is water,

the sum of ingredients (1) plus (2) being in the range of from about 25 weight percent to 70 weight percent of the total composition.

2. A detergent composition according to Claim 1, in which the amount of ingredient (1) is in the range of from 10 weight percent to 20 weight percent, the amount of ingredient (2) is in the range of from about 15 weight percent to about 50 weight percent, and the sum of (1) plus (2) is in the range of from 35 weight percent to 50 weight percent, all percentages being based on the total weight of the composition.

3. A detergent composition according to Claim 1, containing up to 6 weight percent of solvent selected from the

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group consisting of ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, ethylene glycol monobutyl ether, ethylene glycol monophenyl ether, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether and diethylene glycol monobutyl ether.

4. A detergent composition according to Claim 1, containing up to 5 weight percent of wetting agent selected from the group consisting of alkali metal salts, monoethanolamine salts and diethanolamine salts of dialkyl-sulfosuccinates containing alkyl group having 6 to 10 carbon atoms.

5. A detergent composition according to Claim 1, in which ingredient (2) is selected from the group consisting of polyoxyethylene (4-6) nonylphenyl ethers and polyoxyethylene (3-5) dodecyl ethers.

6. A detergent composition according to Claim 1, in which ingredient (1) is a sodium salt of straight chain alkylbenzenesulfonate wherein the alkyl has 10 to 15 carbon atoms.

7. A method of cleaning soiled cloth, which comprises manually applying the composition of Claim 1 directly to soiled cloth at the rate of 0.3 to 1.0 gram of composition per 50 cm.² of said cloth and then washing the cloth in water.

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