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FOAMING DETERGENT COMPOSITIONS

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This invention relates to the improvement of the foaming characteristics of detergents which are deficient in this respect and deals particularly with improved detergent compositions containing water-soluble organic sulfate and sulfonate detergents as the active ingredient together with a new type of additive which imparts to the mixture high foam stability and other desirable properties.

Although synthetic detergents of the organic sulfate and sulfonate types have gone into widespread use, they suffer from the disadvantage that in aqueous solutions under normal conditions of use they give a poorer quality of foam which is much less stable than that of the fatty acid soaps with which they compete. Various additives have been proposed for incorporation in these detergents to improve their detergency, wetting power, dispersion power, or other properties and several compounds have been found which in the case of the long chain primary alkyl sulfate salts such as are derived from hydrogenated fatty acids are effective in giving good foam stability to these otherwise poor foamers. With the secondary sulfonate and secondary sulfate type detergents having the $-SO_3M$ or $-O-SO_3M$ (M representing a cation, usually a metal, particularly an alkali metal such as sodium) attached to a carbon atom to which two other carbon atoms are directly linked, it has been more difficult, however, to find additives which will give good foaming properties.

Many theories have been proposed to account for the foaming properties of detergents, but there has been no adequate explanation, for example, for the fact that small amounts of the higher alcohols have a pronounced foam-stabilizing effect on primary alkyl sulfate salts, for instance, sodium lauryl sulfate, but are usually without substantial beneficial effect, or even may be detrimental to the foam of the corresponding secondary alkyl sulfate salts and alkyl aromatic sulfonates such as sodium dodecyl benzene sulfonate. This is shown by the following results of tests made at 55° C. with solutions containing 0.4% of the detergents.

Detergent	Additive	Foam Volume, cc.		
		Immediately After Shaking	After 10 Min.	After 20 Min.
Sodium dodecyl benzene sulfonate	None	75	35	15
	4% lauryl alcohol	70	35	18
Sodium lauryl sulfate	None	45	5	0
	4% lauryl alcohol	50	35	35

Another example of the difference in behavior of additives with these detergents is described in U.S. Patent 2,679,482.

It is pointed out in column 6, lines 56–66, that the desirable effect of long chain diols on the foam of such aliphatic primary sulfated detergents as the long chain normal alcohol sulfates, fatty acid monoglyceride sulfates, fatty acid ethanolamide sulfates, etc. is in marked contrast to the general adverse effect on foaming produced by the diols on alkyl aryl sulfonated detergents with which the diols decrease the foam stability.

We have discovered a new type of additive which is effective in stabilizing the foam of solutions of water-soluble organic sulfate and sulfonate detergents as a class including those which heretofore have not been satisfactorily improved in foaming properties. These new additives are the monoethers of glycerol and monohydric aliphatic saturated alcohols having a linear hydrocarbon chain of eight to sixteen carbon atoms wherein the hydroxyl group is linked directly to a carbon atom not more than once removed from the end of the chain. The new additives are thus the alpha- and the beta-octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl and hexadecyl glycerol monoethers having primary alkyl or secondary 2-alkyl groups attached to the ether oxygen atom. Although these ethers have practically no effective foam-forming power or detergency by themselves, they substantially improve the foam stability of organic sulfate and sulfonate detergents of all kinds.

The new types of glycerol monoether additives have high spreading pressures; in excess of 25 dynes per centimeter measured at the usual temperature at which the detergent mixtures are used, and this is believed to be one of the reasons why they benefit the foam properties of detergents which have high spreading pressures, for example, the alkyl aromatic sulfonate detergents with which very few other additives are effective. These additives also have the ability to reduce the critical concentration for micelle formation of salt-free solutions of pure water-soluble organic sulfate and sulfonate detergent salts. The critical micelle concentration (CMC) of a detergent is conveniently measured titrametrically using a dye such as pinacyanole as described, for instance, by Corrin and Harkins in the Journal of the American Chemical Society, vol. 69, pages 679–683 (March 1947). The glycerol monoethers used in the present invention reduce the critical micelle concentration of the detergents with which they are employed by at least 25% and more usually by 30% to 75% or more. They are water-insoluble compounds (i.e. have a water solubility of less than 1.0%) but are solubilized by the detergent solution and give high viscosity surface films therewith. It is believed that the effectiveness of the new additives as foam stabilizers is the result of this unique combination of properties which makes it possible for them to be solubilized into the surface layers of detergent micelles rather than into the interior, even in the case of detergents such as sodium propylene tetramer benzene sulfonate which has thin surface films of very high tendency to force additives into the interior micelles where they cannot stabilize foam.

Based upon these findings, a broad class of novel detergent compositions having improved foaming characteristics has been developed. These new detergent compositions essentially comprise water-soluble organic sulfate and sulfonate detergents, together with from about 5% to about 30% by weight of said detergent of normal-alkyl monoether of glycerol having 8 to 16 carbon atoms in alkyl group which is linked to the ether oxygen atom by

a carbon atom not more than once removed from the end of the chain. The most advantageous compositions are those in which the normal-alkyl group of the glycerol monoether is a primary alkyl group.

As indicated, the detergents which are useful in the new compositions are of two types, namely, the water-soluble salts of true sulfonic acids and those of sulfuric acid esters. Among the salts of secondary sulfonic acids which can be used, the salts of alkyl aryl sulfonic acids are particularly advantageous. Examples of sulfonates of this type which have been successfully used are salts, particularly the alkali metal salts, of sulfonic acids such as are obtained by alkylating an aromatic hydrocarbon of the benzene series, particularly benzene or toluene, with an alkylating agent having preferably 8 to 16 carbon atoms per molecule such as an olefin, an olefin polymer or an alkyl halide, and converting the alkyl aromatic hydrocarbon thus formed into the corresponding monosulfonic acid which is then neutralized. U. S. Patents 2,467,130–32 and 2,477,383, for example, describe alkyl aryl secondary sulfonate salts which can be used, as can the keryl benzene, toluene, etc. sulfonates described in U.S. Patent 2,340,654, for instance. Other specific examples of suitable alkyl aromatic sulfonate detergents are the propylated naphthalene sulfonates, the mixed butyl naphthalene sulfonates, tetrahydronaphthalene sulfonates, butylated diphenyl sulfonates and phenylphenol sulfonates, but it is preferable, as a rule, to use the higher alkyl aromatic sulfonates such as described above.

Instead of aromatic sulfonate salts, aliphatic sulfonates of about 8 to 22 carbon atoms can be used in the new compositions. Thus, secondary alkyl sulfonic acid salts such as are obtainable by the methods of U.S. Patents 2,263,312 and 2,276,090, for example, are operative in the new compositions of the invention. Particularly desirable alkyl sulfonic acid salts are the 2-alkyl sodium sulfonates having a straight carbon chain of 10 to 18 carbon atoms. The new additives are also effective in improving the foam of other sulfonate detergents, which can be either primary or secondary sulfonates, such, for instance, as salts of dodecane-1-sulfonate, salts of the higher fatty acid esters of low molecular weight alkylol sulfonic acids, for example, the oleic acid ester of isethionic acid; salts of the fatty acid amides of amino alkyl sulfonic acids, as the coconut oil fatty acid amides of taurine, and the like.

As salts of secondary sulfuric acid esters which are useful in the compositions, preference is had for those of the secondary alkyl sulfate esters of 8 to 20 carbon atoms per molecule which may, for example, be produced by reacting an olefin or a mixture of olefins or secondary alcohols with sulfuric acid and neutralizing the sulfation product. Especially good results have been obtained with the alkali metal and ammonium salts, particularly the sodium salts of secondary alkyl sulfuric acid esters of 8 to 18 carbon atoms obtained from predominantly normal, terminally unsaturated mono-olefins such as can be obtained by cracking paraffin wax as described in U.S. Patent 2,152,297. The foam of the corresponding primary alkyl sulfate salts can also be improved by the new additives of the invention. Thus salts of lauryl sulfate, the mixed salts of hydrogenated coconut oil fatty acids, salts of oxo-alcohols of 9 to 16 carbon atoms per molecule, cetyl sulfate, the salts of sulfated higher hydroxy acid esters, for example, lauric acid monoglyceride monosulfate, stearic acid diglyceride monosulfate, etc.; fatty acid alkylolamide sulfate salts, as lauryl ethanolamide sodium sulfate, and the like can be used.

The organic sulfate and sulfonate detergents are commonly used in the form of their water-soluble salts, particularly the alkali metal salts, for example, sodium and potassium salts, and ammonium salts, but amine, alkylolamine and alkaline earth metal salts, for instance, calcium and magnesium salts, can be used in the new compositions. Their concentration in these compositions can vary but is usually at least about 15% by weight of the total solids and usually in built compositions an active ingredient content of about 20 to about 50% concentration is preferred.

The organic salt detergents can be used as the individual compounds or as mixtures of two or more sulfate or sulfonate salts which can be of the same or different types. Thus, the foam quality-improving additives of the invention are effective with mixtures of one or more alkyl aryl sulfonates with one or more primary or secondary sulfuric acid ester salts, or either or both of these detergents in admixture with one or more primary or secondary alkyl sulfonate salt detergents can be improved by use of these additives. While hydrocarbon sulfate and sulfonate salts such as previously described are generally preferred in the new compositions, substituted secondary hydrocarbon sulfonate salts containing, for example, halogen, ether oxygen, carbonyl, carboxyl and like atoms or groups are also improved by use of the new additives.

As previously indicated the glycerol monoalkyl ether additives having primary n-alkyl or 2-n-alkyl groups of 8 to 16 carbon atoms in a straight chain are effective as a class in improving the foam stability of water-soluble organic sulfate and sulfonate salt detergents. However, the optimum effect on foaming will generally be obtained with glycerol monoalkyl ethers which have a straight hydrocarbon chain of about an equal number of carbon atoms to two caron atoms fewer then the straight hydrocarbon chain of the detergent with which it is used. As a group the primary alkyl glycerol monoethers are more effective than the 2-alkyl glycerol monoethers, and with the majority of the commercial organic sulfate and sulfonate detergents, primary n-alkyl glycerol monoethers with 8 to 12 carbon atoms in the alkyl group are most advantageous. n-Decyl glycerol monoether is a particularly advantageous additive. Instead of adding individual glycerol monoethers of the foregoing type, mixtures of two or more of these ethers can be successfully used. It is not necessary to use pure ethers as the commercial forms are also suitable and generally are more economical. Suitable ethers can be readily prepared by reacting glycidol with primary straight chain monohydric saturated alcohols of 8 to 16 carbon atoms per molecule or the corresponding 2-hydroxy alcohols or by other known methods.

The chosen glycerol monoalkyl ether additive or mixture thereof can be incorporated in the water-soluble organic sulfate and/or sulfonate salt detergent in a number of different ways. The detergent and glycerol monoether additive can be mixed at the time of use or the additive can be premixed with the detergent. It is often convenient to incorporate the additive during manufacture of the detergent. The additive can be mechanically mixed into the dry detergent or into a solution or slurry of the detergent, or can be added to an aqueous solution of the organic sulfonic acid or secondary acid sulfate before the neutralization step in the process of producing the detergent. Some additives may even be added at an earlier stage of manufacture of the detergent, as during or prior to the sulfonation or sulfation step where such is carried out under conditions at which the ether additive does not react. After incorporation of the additive the compositions can be made up into solutions, pastes, powders or bars in the usual way for detergent or other use.

It has been found that, as a rule, a minimum of at least 5% of glycerol monoether additive, based upon the active ingredient content of the organic sulfate and/or sulfonate detergent present, is desirable for good results in improving the foaming properties but that not more than about 30% should be used because greater amounts not only add to the expense of the product without producing advantageous results, but also in many cases have a detrimental effect on the foam and/or detergency. In gen-

eral, between about 10% and about 20% of additive, based on the amount of detergent present, is preferred.

The following examples illustrate some typical applications of the invention and show some of its advantages.

Example I

Foam stability tests were carried out with sodium dodecyl benzene sulfonate from a propylene tetramer benzene alkylate (film pressures at 25° C. and 55° C., 43.5 and 39.5 dynes/cm., respectively) containing 18% of active ingredient and 51% of sodium tripolyphosphate, the remainder being sodium sulfate and additive. The tests were made with 60 seconds' shaking in a mechanical shaking machine which insured reproducible results and in the presence of standard soil cloth. A 0.4% solution of the detergent in hard water (350 p.p.m. of calcium as calcium carbonate) at 55° C. was employed. The effect of different amounts of decyl glycerol ether (film pressures at 25° C. and 55° C., 48.8 and 45.2 dynes/cm., respectively) on the stability of the foam is shown by the following figures:

Additive	Amount of Additive (Percent by Weight of Active Ingredient)	Foam Volume, cc.		
		Initial	After 10 Min.	After 20 Min.
None	None	75	33	15
Decyl glycerol ether	11	92	55	28
Do	22	80	60	37

Example II

Comparative tests of different glycerol monoethers, when used in amounts of about 20% by weight of the active ingredient with sodium dodecyl benzene sulfonate in hard water at 55° C. in the presence of standard soil cloth, gave the following results in a procedure employing manual shaking:

Additive	Foam Volume (cc.) at a Detergent Soln. Concentration					
	of 0.2%			of 0.4%		
	Initial	After 10 Min.	After 20 Min.	Initial	After 10 Min.	After 20 Min.
None	47	20	17	45	24	15
Octyl glycerol ether	45	34	26	45	39	26
Decyl glycerol ether	47	30	23	50	39	27
Lauryl glycerol ether	48	33	23	45	36	26

Improved foam stability is likewise obtained when sodium propylene tetramer toluene sulfonate is the active ingredient of the detergent instead of sodium dodecyl benzene sulfonate.

Example III

The especially remarkable improvement effected by the additives of the invention in the foaming properties of alkyl aryl sulfonates having relatively short alkyl chains of about 7 to 10 carbon atoms is typified by the following results for sodium (2-n-octyl) benzene sulfonate with and without 22% by weight of decyl glycerol ether when tested as in Example I:

Additive	Foam Volume, cc.		
	Initial	After 10 Min.	After 20 Min.
None	11	2	0
Decyl glycerol ether	82	46	26

The improvement is not confined to the foaming properties but applies also to the detergency of these sulfonates and is such as to convert them from undesirable to highly effective components of detergents.

With 2-n-hexadecyl benzene sodium sulfonate as the detergent under similar conditions except that the shaking period was 10 seconds, the foam volumes of 21 cc. initially and 18 and 17 cc. after 10 and 20 minutes without additive were increased to 34, 32 and 27 cc., respectively, by addition of 22% of alpha-n-decyl glycerol monoether based on the weight of detergent. Equally good results are obtained when 1-n-pentadecyl glycerol monoether is used as the additive under the same conditions.

Example IV

Using a commercial built detergent containing 32% of the magnesium salt of alkyl benzene sulfonate as the active ingredient tests of foam stability were made as in Example I with and without 4% by weight of additive and the following results were obtained at a shaking time of 10 seconds with water of 350 p.p.m. $CaCO_3$ hardness:

Additive	Foam Volume, cc.		
	Initial	After 10 Min.	After 20 Min.
None	79	49	24
n-Decyl glycerol monoether	79	65	35

A similar improvement in foam stability is obtained when using sodium lauryl sulfobenzoate as the detergent.

Example V

Similar good results are obtained with secondary alkyl sulfonic acid salts as shown by the following figures obtained in tests carried out as in Example I when using sodium 2-tetradecane sulfonate as the detergent and decyl glycerol ether as the additive in an amount of 22% by weight of the active ingredient content of the detergent:

	Foam Volume, cc.		
	Initial	After 10 Min.	After 20 Min.
Without additive	75	47	26
With additive	92	92	68

Using a mixture of sodium 2-n-alkane sulfonates containing equal weights of C_{10} through C_{18} sulfonates a similar improvement in foam stability is obtained.

Example VI

A mixture of sodium secondary alkyl sulfates from cracked wax olefins having 10 to 18 carbon atoms per molecule sold under the trademark "Teepol" and having film pressures at 25° C. and 55° C. of 41.4 and 39 dynes/cm., respectively, was tested in admixture with sodium tripolyphosphate and sodium sulfate as in Example I using n-decyl glycerol monoether as the additive with the following results:

Additive	Amount of Additive Based on Active Ingredient in Detergent	Foam Volume, cc.		
		Initial	After 10 Min.	After 20 Min.
	Percent			
None	None	69	53	30
Decyl glycerol ether	11	83	82	50
Do	22	95	82	57

The effectivness of the decyl glycerol ether as foam stabilizer persists during repeated washings with the same detergent solution, being maintained through four successive soil loadings in the washing of fabrics, for example.

When glycerol-alpha-(2-dodecyl) ether is substituted for the n-decyl glycerol ether, a smaller but still substantial improvement in foam stability is obtained with sodium dodecane-2-sulfate as detergent.

Example VII

A detergent composition consisting of 18% pure sodium lauryl sulfate, 51% sodium tripolyphosphate, and 31% sodium sulfate was prepared and tested as in Example I at 0.4% total solids concentration in water of 350 p.p.m. hardness at 55° C. in the presence of soil cloth (eight equal size pieces totaling 2 square inches in 25 ml. of detergent solution). Another mixture of the same composition in which 4% of n-decyl glycerol monoether replaced an equal weight of sodium sulfate was tested in the same way with the following results:

Additive	Foam Volume, cc.		
	Initial	After 10 Min.	After 20 Min.
None	73	36	10
Decyl glycerol ether	100	100	70

With a detergent containing 30% magnesium coconut oil monoglyceride monosulfate as the active ingredient likewise gives improved foam stability with decyl glycerol ether as the additive. Improved foam stability is also attained when n-hexadecyl glycerol monoether is used as the additive instead of decyl glycerol ether with sodium lauryl sulfate.

Example VIII

Launder-Ometer tests have shown that the additives are not detrimental to the detergency of organic sulfate and sulfonate detergents but improve the detergency, particularly at lower concentrations in hard water, as shown by the following results for washing experiments carried out with decyl glycerol ether as the additive in built formulations of dodecyl benzene sulfonates from propylene tetramer:

Detergent composition	Relative detergency on cotton soil cloth in 10 minute washing tests at 60° C.			
	Soft water at detergent concentration		Hard water at detergent concentration	
	0.2%	0.4%	0.2%	0.4%
18% sodium dodecyl benzene sulfonate, 50% $Na_5P_3O_{10}$, 1% carboxymethyl cellulose, 31% sodium sulfate	80	89	66	85
Same—22% of glycerol α-n-decyl ether based on the active ingredient replacing an equal weight of sodium sulfate	84	88	84	85
35% magnesium dodecyl benzene sulfonate, 50% sodium polyphosphates remainder $MgSO_4$, NaCl and carboxymethyl cellulose	55	66	56	60
Same—16% of glycerol α-n-decyl ether based on the active ingredient, replacing an equal weight of magnesium sulfate	66	70	70	73

Equally good results are obtained when sodium dodecyl toluene sulfonate, or sodium alkyl benzene sulfonate having about 14 to 16 carbon atoms in the alkyl radical, are used in place of the propylene tetramer benzene sulfonate.

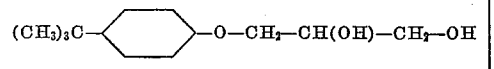
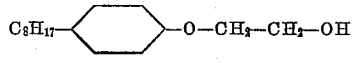
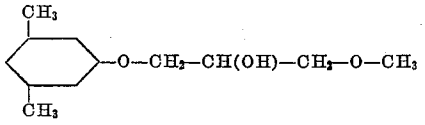
It will thus be seen that the invention offers many advantages and is capable of wide variation not only in respect to the organic sulfate and sulfonate detergents which can be employed and the alkyl glycerol monoethers which can be used as additives therewith but also in regard to the method of application of the new compositions. Thus, the new compositions of the invention are not only effective alone but can be used advantageously in combination or admixture with other wetting agents and detergents and/or water-soluble inorganic builders such as sodium tripolyphosphate, tetrasodium pyrophosphate, trisodium phosphate, sodium carbonate, sodium silicate, magnesium sulfate, etc. Any of the usual soap additives such as bleaching materials, perfumes, dyes, etc. may also be included. Some typical formulations in which the alkyl glycerol monethers having 1-alkyl or 2-alkyl groups of 8 to 16 carbon atoms have been found to be effective are, for example:

Secondary sulfonate salt detergent: Sodium dodecyl benzene sulfonate percent	18	6	25	30
C_{16}-C_{18} secondary alkyl sodium sulfates percent		12		
Sodium polyphosphates do	50	46.5	35	5.5
Sodium silicate do	7	5	10	
Sodium sulfate do	10	18.5	15	60
Carboxymethyl cellulose do	1	0.75	1	
Optical bleach or the like do	0.5		0.5	
Water do	9.5	7.5	9.5	2.5
Alkyl glycerol monoether do	4	3.75	4	2

Thus the new compositions of the invention can comprise various other components besides the detergent and glycerol monether additive and the expression "consisting essentially of" when used in defining these compositions is intended to exclude only the presence of other materials in such amounts as to interfere substantially with the properties and characteristics possessed by the compositions set forth but to permit the presence of other materials in amounts as not substantially to effect said properties and characteristics adversely. Accordingly the new compositions are not restricted to those given by way of illustration nor are they limited by any theory proposed in explanation of the improved results which are obtained.

The beneficial effect of the alkyl glycerol monoether additives of the invention on the foam stability of all types of organic sulfate and sulfonate salt detergents contrasts sharply with that of the various other types of ethers which it has been proposed, heretofore, to add to detergents for other purposes. These ethers having short and/or branched alkyl groups, and/or fewer hydroxyl groups in the molecule are either without substantial beneficial effect or reduce the foam stability, especially of the alkyl aryl sulfonate detergents. This is the case, for instance, with the monoaryl ethers of glycerol having short alkyl chains on the ring proposed as additives for improving the wetting-out and emulsifying properties of fatty acid and sulfonate soaps, and the glycol and polyglycol ethers of alkyl phenols which have been described as useful washing agents, etc. with or without other textile assistants as adjuvants. This is shown by tests with a propylene tetramer benzene sodium sulfonate detergent which contained 18% by weight of active detergent and 51% of sodium tripolyphosphate, the remainder being sodium sulfate with or without ether additive in the amount of 22% by weight of the active detergent content. The tests were carried out by manual shaking, under standard conditions, solutions of 0.2% solids content in

hard water at 55° C. in a stoppered graduate with the following results:

Ether	Foam Volume Relative to Detergent Solution Without Addition		
	Initial	After 10 Min.	After 20 Min.
	Percent	*Percent*	*Percent*
Glycerol mono-tertiary butylphenyl ether 	Same	89	83
Ethylene glycol mono-p-octylphenyl ether 	84	51	33
Glycerol alpha-methyl-gamma-xylenyl ether 	110	88	75

Similar tests using sodium lauryl sulfate as the detergent with short or branched chain ethers of glycerol as additives showed them to be foam depressants as can be seen from the following figures for the percentage of foam relative to that of the detergent solution in soft water:

Ether	Foam Volume Relative to Detergent Solution Without Additive		
	Initial	After 10 Min.	After 20 Min.
	Percent	*Percent*	*Percent*
Glycerol n-butyl monoether	45	66	Same
Glycerol diisobutyl carbinol monoether	61	66	50
Glycerol (3,5-dimethyl) phenyl monoether	39	34	50

This application is a continuation-in-part of application Serial No. 205,038, filed January 8, 1951, now abandoned.

We claim as our invention:

1. A detergent composition consisting essentially of a detergent of the group consisting of water-soluble organic secondary monosulfate and secondary monosulfonate detergents together with about 5% to about 30% by weight of said detergent of glycerol monoalkyl ether having in the alkyl group 8 to 16 carbon atoms in straight chain which is linked to the ether oxygen atom by a carbon atom not more than once removed from the end of the chain.

2. A detergent composition in accordance with claim 1 wherein glycerol normal-primary-alkyl ether is used.

3. A detergent composition consisting essentially of a detergent of the group consisting of water-soluble organic secondary monosulfate and secondary monosulfonate detergents together with about 10% to about 20% by weight of the detergent of glycerol mono-normal-alkyl monoether having 8 to 12 carbon atoms in the alkyl chain.

4. A detergent composition in accordance with claim 3 wherein the ether is normal-decyl glycerol monoether.

5. A detergent composition consisting essentially of a water-soluble higher alkyl aryl monosulfonate detergent together with about 5% to about 30% by weight of said detergent of glycerol monoalkyl ether having in the alkyl group 8 to 16 carbon atoms in straight chain which is linked to the ether oxygen atom by carbon atom not more than once removed from the end of the chain.

6. A detergent composition in accordance with claim 5 wherein the sulfonate detergent is water-soluble higher alkyl benzene monosulfonate detersive sodium salt.

7. A detergent composition in accordance with claim 6 wherein the sulfonate detergent is sodium propylene tetramer benzene monosulfonate.

8. A detergent composition consisting essentially of a water-soluble aliphatic secondary monosulfonate salt detergent together with about 5% to about 30% by weight of said detergent of glycerol monoalkyl ether having in the alkyl group 8 to 16 carbon atoms in straight chain which is linked to the ether oxygen atom by a carbon atom not more than once removed from the end of the chain.

9. A detergent composition consisting essentially of a water-soluble aliphatic secondary monosulfate salt detergent together with about 5% to about 30% by weight of said detergent of glycerol monoalkyl ether having in the alkyl group 8 to 16 carbon atoms in straight chain which is linked to the ether oxygen atom by a carbon atom not more than once removed from the end of the chain.

10. A detergent composition in accordance with claim 9 wherein the detergent is a higher secondary alkyl sodium monosulfate and the ether is glycerol mono-normal-alkyl ether.

11. A detergent composition in accordance with claim 10 wherein the detergent is a mixture of secondary alkyl sodium monosulfates having between 8 and 18 carbon atoms per molecule.

12. A detergent composition in accordance with claim 11 wherein the ether is normal-decyl glycerol monoether.

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