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DETERGENT COMPOSITION

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The present invention relates to cleansing, washing, and laundering compositions of improved efficiency, and to the process of producing the same.

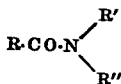
It is an object of our invention to improve the cleansing power of detergent compositions comprising as the essential detergent material water soluble organic sulfuric acid derivatives containing a sulfate or sulfonate group.

Another object is to prepare detergent compositions of superior cleansing and detergent properties.

Other objects will be apparent from the following description of our invention.

Wide use has been made of oils and related water insoluble compounds in aqueous detergent solutions for the finishing of textiles, but such materials have been little used for enhancing the detergent effect. Such materials are more likely to have the opposite effect in laundering operations and act like an additional load of oily soiling material. A notable exception, and the only important example of the practical use of an organic material to "build" or improve the cleansing efficiency of a detergent, as far as we know, is the use of higher alcohols with water soluble salts of sulfuric acid esters of higher alcohols.

We have found that certain compounds, closely related to each other, are outstandingly effective for increasing the cleansing action of sulfate and sulfonate detergents. These compounds are the amides having the formula



wherein R·CO is an acyl radical of a fatty acid having ten to fourteen carbon atoms and R' and R'' are selected from the group consisting of hydrogen and unsubstituted alkyl radicals having one to four carbon atoms, the sum of the carbon atoms in R' and R'' being less than five. By themselves, these amides are not laundering agents, but when added to a detergent of the class above named, they markedly enhance the cleansing effect thereof. For this purpose the amides described above are in a different class from those preparations such as stearamide and palmitamide which have heretofore been proposed for use with water soluble compounds in the softening of textiles.

Specific examples of amides which come within the scope of the above general formula and which may be employed in the practice of the present

invention are—lauramide, myristamide, capramide, diethyl lauramide, dimethyl myristamide, ethyl capramide, butyl lauramide, ethyl methyl capramide, methyl propyl capramide, propyl myristamide, and corresponding amide mixtures prepared from fatty acid mixtures consisting predominantly of lauric and/or myristic acids, such as those mixtures obtainable from oils of the coconut oil group, of which coconut oil and palm kernel oil are well known examples.

The invention is applicable to the improvement of all detergents coming within the class above mentioned, the advantage of the invention being the improvement in the cleansing power of those sulfates and sulfonates already characterized by substantial power to cleanse, rather than the conferring of cleansing power on those materials such as wetting and softening agents which are inactive as detergents.

Outstandingly interesting detergent compounds with which the above amides may be used with advantage are the water soluble salts of the higher molecular weight alkyl sulfuric acids which have distinct and pronounced detergent power, making the product suitable for use in cleansing and laundering operations. Thus the invention is particularly applicable to the improvement of the already known detergents in which the principal active constituent is a water-soluble salt of lauryl or oleyl sulfuric acid, for example triethanolammonium alkyl sulfate from the mixed higher alcohols obtainable by reducing coconut oil, or the sodium alkyl sulfate derived from the higher alcohols of sperm oil, but the invention does not afford a means of making a practical detergent out of a compound initially lacking detergent properties, such as sodium butyl sulfate, trisopropyl naphthalene sulfonate, Turkey red oil, or dioctyl ester of sodium sulfo succinate.

In addition to the alkyl sulfate detergents specifically mentioned above, water soluble salts of other alkyl sulfuric acids having decided detergent value and having eight to eighteen carbon atoms in the alkyl radical are improved by the addition of the amides herein covered and especially are these amides useful in improving the detergent power of the salts of those alkyl sulfuric acids derived from a mixture of higher alcohols obtained from oils of the coconut oil group such as coconut oil, palm kernel oil, etc.

Besides the alkyl sulfate detergents referred to above, other compounds having a sulfuric acid ester group and possessing value as washing and detergent agents in aqueous solution are improved by the addition of the amides of the present in-

vention. For example, highly beneficial results will be noted when the amides are employed with compounds such as the water-soluble salts of the sulfuric acid esters of higher fatty acid monoglycerides (sodium salt of the coconut oil fatty acid ester of 1,2 dihydroxy propane 3 sulfuric acid ester) and of the sulfated higher fatty acid alkylamides (the sodium salt of sulfated coconut oil fatty acid ethanolamide).

The improving agents of this invention may also be employed with compounds having a true sulfonate group, these compounds possessing a substantial power to wash and cleanse in aqueous solution in the absence of an enhancing agent. For example, beneficial results will be noted when the amides are employed with water soluble salts of higher fatty acid esters of 1,2 dihydroxy propane 3 sulfonic acid, the sodium salt of the coconut oil fatty acid ester being an excellent example of this type of detergent. Beneficial results will be noted also when the amides are employed with such detergents as the water soluble salts of the higher fatty acid mono-esters of lower molecular weight hydroxy alkyl sulfonic acids (oleic acid ester of the sodium salt of isethionic acid) and of the higher fatty acid amides of low molecular amino alkyl sulfonic acids (ammonium salt of oleic acid amide of N-methyl taurine). Likewise the amides may be employed with water soluble salts of the higher alcohol esters of sulfo-carboxylic acids (sodium salt of the lauryl alcohol ester of sulfoacetic acid), higher alkylated benzene sulfonic acids (potassium salt of the sulfonic acid derived from the condensation product of benzene and a chlorinated kerosene fraction containing predominantly twelve carbon atoms per molecule), and ethers of high molecular alcohols and lower hydroxy sulfonic acids (monolauryl ether of 1,2 dihydroxy propane 3 sodium sulfonate).

The above examples are merely specific illustrations of the numerous detergents which can be rendered more efficient in cleansing and laundering operations when used in conjunction with amides in accordance with our invention and we do not wish to be limited thereto.

In the practice of our invention the amide usage will vary depending on the specific combination of ingredients but in general the quantity of amide will be less than the quantity of active detergent ingredient. We prefer to employ from about eight per cent to about twenty per cent of amide based on the active detergent, but marked improvement can be obtained with smaller proportions and larger proportions, for example, proportions within the range of about five per cent to about forty per cent.

The invention will be more clearly understood from the following examples, but these examples are merely illustrative of the manner in which our invention may be practiced and are not to be construed as limitations. All parts are by weight.

Example 1.—To 97 parts of a commercial detergent containing as active ingredient 30.9 per cent of the sodium salt of the sulfuric acid ester of coconut oil fatty acid monoglyceride, i. e., the sodium salt of the mono coconut oil fatty acid ester of 1,2 dihydroxy propane 3 sulfuric acid are added 3 parts of a mixture of amides prepared from the fatty acid mixture derived from coconut oil. The mixture thus prepared contains the amide and active detergent ingredient in the ratio of 1:10 and can be employed as a detergent product in washing operations with highly satisfactory results far superior to those results obtained by

the use of the monoglyceride sulfate detergent without added amide.

Example 2.—An improved detergent is prepared by mixing 95 parts of a commercial sodium alkyl sulfate prepared from the higher alcohols obtained by the reduction of coconut oil and containing 39.3% active ingredient with 5 parts of lauramide. The detergent so prepared is much superior to the commercial detergent alone in cleansing operations.

Example 3.—A superior detergent coming within the scope of the present invention is prepared by mixing 95 parts of a commercial alkyl sulfate detergent of the type employed in Example 2 but containing 40% active ingredient with 5 parts of capramide.

Example 4.—This example illustrates the use of myristamide in the practice of our invention. A mixture of 95 parts of the commercial alkyl sulfate detergent used in Example 3, and 5 parts of myristamide is prepared. The detergent mixture thus made is superior in washing power to the commercial detergent without added amide.

Example 5.—A detergent of superior washing power is prepared by mixing 96 parts of a commercial detergent containing as active constituents 40% of the coconut oil fatty acid mono ester of 1,2 dihydroxy propane 3 sodium sulfonate with 4 parts of a mixture of amides prepared from the fatty acid mixture obtained from coconut oil and consisting predominantly of lauric and myristic acids.

Example 6.—A highly efficient washing agent is prepared by mixing 96 parts of a commercial detergent containing as active constituent 40% of the oleic acid amide of the sodium salt of N-methyl taurine with 4 parts of a mixture of amides prepared from the fatty acid mixture derived from coconut oil and consisting predominantly of lauric and myristic acids.

Example 7.—A detergent of outstanding washing power is prepared by mixing 96 parts of a commercial detergent containing as the active constituent 40% of the ester of sodium sulfoacetate and the higher alcohols derived from coconut oil with 4 parts of a mixture of amides prepared from the fatty acid mixture derived from coconut oil and consisting predominantly of lauric and myristic acids.

Example 8.—Detergents of superior washing power may also be prepared with N-alkyl substituted amides instead of the simple amides employed in the preparation of the detergent compositions of Examples 1 to 7. For example, highly efficient washing agents will result if instead of the capramide employed in Example 3 any one of the following N-alkyl substituted amides is used: diethyl myristamide, dimethyl myristamide, methyl myristamide, ethyl myristamide, butyl myristamide.

We have repeatedly referred to the superior washing power of detergents prepared in accordance with our invention and we wish to emphasize here that this superiority is real and represents a source of substantial saving in detergent usage. For example, detergents such as those of the above specific examples, that is, commercial detergent in admixture with amide, when employed in 0.2% concentration in hard water, a normal concentration used in laundering, will wash much whiter than any concentration of the commercial detergent without added amide. In general a solution containing any given concentration of a cleansing compound prepared in accordance with our invention will wash as white

as, or whiter than, a solution containing a much larger concentration of detergent without added amide.

Our invention is not limited to any particular method of mixing the amides with the sulfate or sulfonate detergents. They may be incorporated in the detergent in any of the forms in which the detergents are manufactured. The amide may be mechanically mixed in; it may be crutched into the detergent in the form of a slurry; and it may be dissolved in a solution of the detergent. While such ready-for-use mixtures may be manufactured and may be preferable for many purposes, it is likewise within the scope of our invention to add the amides to water prior to the adding of the detergent or vice versa, or to add both amide and detergent simultaneously but separately to the water.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. A cleansing and laundering composition comprising essentially a mixture of a detergent selected from the group consisting of water-soluble salts of organic sulfonic acids and water-soluble salts of aliphatic sulfuric acid esters, the said detergent having pronounced detergent power, and an amide of the formula



wherein $R\cdot CO$ is an acyl radical of a fatty acid having 10 to 14 carbon atoms and R' and R'' are selected from the group consisting of hydrogen and alkyl radicals having 1 to 4 carbon atoms, the sum of the carbon atoms in R' and R'' being less than 5, and the amount by weight of the amide being less than the amount by weight of the said detergent but sufficient to enhance the detergent power thereof.

2. A cleansing and laundering composition comprising essentially a mixture of a detergent having pronounced detergent power and selected from the group consisting of water-soluble salts of: higher alkyl sulfuric acids, higher fatty acid esters of lower molecular weight hydroxy alkyl sulfonic acids, higher fatty acid amides of low molecular aminoalkyl sulfonic acids, higher fatty acid monoglyceride sulfuric acids, higher alcohol esters of sulfocarboxylic acids, higher alkylated benzene sulfonic acids, higher alkyl ethers of low molecular hydroxy alkyl sulfonic acids, and higher fatty acid alkylolamide sulfuric acids, and an amide of the formula $R\cdot CO\cdot NR'R''$, wherein $R\cdot CO$ is an acyl radical of a fatty acid having ten to fourteen carbon atoms and R' and R'' are selected from the group consisting of hydrogen and alkyl radicals having one to four carbon atoms, the sum of the carbon atoms in R' and R'' being less than 5 and the amount by weight of the amide being less than the amount by weight of the detergent but sufficient to enhance the detergent power thereof.

3. A cleansing and laundering composition of claim 1, in which the acyl radical of the amide is derived from a mixture of fatty acids consisting predominantly of lauric and myristic acids.

4. A cleansing and laundering composition of claim 1, in which the acyl radical of the amide is derived from a mixture of fatty acids obtained from coconut oil.

5. A cleansing and laundering composition of claim 1, in which the acyl radical of the amide is derived from lauric acid.

6. A cleansing and laundering composition of

claim 1, in which the acyl radical of the amide is derived from myristic acid.

7. A cleansing and laundering composition of claim 1, in which the amide has the formula $R\cdot CO\cdot NH_2$, wherein $R\cdot CO$ is derived from a mixture of fatty acids obtained from coconut oil, consisting predominantly of lauric and myristic acids and in which the amount by weight of amide employed is from about five per cent to about forty per cent of the amount by weight of the detergent ingredient.

8. A cleansing and laundering composition of claim 1, in which the amide is lauramide.

9. A cleansing and laundering composition of claim 1, in which the amide is myristamide.

10. A cleansing and laundering composition of claim 1, in which the detergent is a water soluble salt of an aliphatic sulfuric acid ester containing eight to eighteen carbon atoms, and the amide has the formula $R\cdot CO\cdot NH_2$, wherein $R\cdot CO$ is derived from a mixture of fatty acids of an oil of the coconut oil group and consisting predominantly of lauric and myristic acids.

11. A cleansing and laundering composition of claim 1, in which the detergent is the water soluble salt of an alkyl sulfuric acid derived from higher alcohols obtained from coconut oil and the amide has the formula $R\cdot CO\cdot NH_2$ wherein $R\cdot CO$ represents the acyl radicals of a mixture of fatty acids derived from coconut oil and consisting predominantly of lauric and myristic acids.

12. A cleansing and detergent composition of claim 1, in which the amount of amide is from about 8 per cent to about 20 per cent of the detergent by weight.

13. A cleansing and detergent composition of claim 1, in which the amount of amide is from about 5 per cent to about 40 per cent of the detergent by weight.

14. A cleansing and laundering composition comprising essentially a mixture of a water soluble salt of an alkyl sulfuric acid having eight to eighteen carbon atoms in the alkyl radical, the said salt having pronounced detergent power, and an amide of the formula $R\cdot CO\cdot NR'R''$, wherein $R\cdot CO$ is an acyl radical of a fatty acid having ten to fourteen carbon atoms and R' and R'' are selected from the group consisting of hydrogen and alkyl radicals having one to four carbon atoms, the sum of the carbon atoms in R' and R'' being less than 5 and the amount by weight of the amide being less than the amount by weight of the said water soluble salt but sufficient to enhance the detergent power thereof.

15. A cleansing and laundering composition comprising essentially a mixture of a water-soluble salt of the coconut oil fatty acid mono ester of 1,2 dihydroxy propane 3 sulfonic acid, the said water-soluble salt having pronounced detergent power, and an amide of the formula



wherein $R\cdot CO$ is an acyl radical of a fatty acid having 10 to 14 carbon atoms and R' and R'' are selected from the group consisting of hydrogen and alkyl radicals having 1 to 4 carbon atoms, the sum of the carbon atoms in R' and R'' being less than 5, and the amount by weight of the amide being less than the amount by weight of the said water-soluble salt but sufficient to enhance the detergent power thereof.

16. A cleansing and laundering composition comprising essentially a mixture of a water-soluble salt of coconut oil monoglyceride sulfuric

acid ester, the said water-soluble salt having pronounced detergent power, and an amide of the formula $R \cdot CO \cdot NR'R''$ wherein $R \cdot CO$ is an acyl radical of a fatty acid having 10 to 14 carbon atoms and R' and R'' are selected from the group consisting of hydrogen and alkyl radicals having 1 to 4 carbon atoms, the sum of the carbon atoms

in R' and R'' being less than 5, and the amount by weight of the amide being less than the amount by weight of the said water-soluble salt but sufficient to enhance the detergent power thereof.

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