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[54] SULFATED ALKYL ETHOXYLATE-CONTAINING DETERGENT COMPOSITION

[75] Inventor: **Rodney M. Wise**, Cincinnati, Ohio

[73] Assignee: **The Procter & Gamble Company**, Cincinnati, Ohio

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 268,359, July 3, 1972, abandoned.

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[51] **Int. Cl.**^{2} **C11D 1/16**

[58] **Field of Search** 252/533, 539, 540, 551, 252/532, 557, 558

[56] **References Cited**

UNITED STATES PATENTS

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3,717,591	2/1973	Yang	252/545
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OTHER PUBLICATIONS

Schönfeldt, "Surface Active Ethylene Oxide Adducts," 1st Ed., 1969, Pergamon Press, N.Y., pp. 647–648.

Primary Examiner—Benjamin R. Padgett
Assistant Examiner—E. Suzanne Parr
Attorney, Agent, or Firm—J. J. Yetter; Charles R. Wilson; Forrest L. Collins

[57] ABSTRACT

Process for producing a spray-dried sulfated alkyl ethoxylate-containing detergent composition. A water-soluble salt of an organic compound having from 1 to 6 carbon atoms substituted with a sulfate or sulfonate group and at least one carboxyl group is added to an aqueous slurry containing the detergent and an alkaline detergency builder to lower the viscosity, making it easier to spray-dry.

11 Claims, No Drawings

SULFATED ALKYL ETHOXYLATE-CONTAINING DETERGENT COMPOSITION

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of U.S. Application Serial No. 268,359, filed July 3, 1972, R. M. Wise, titled SULFATED ALKYL ETHOXYLATE-CONTAINING DETERGENT COMPOSITION now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to spray-dried detergent compositions. More particularly, it relates to spray-dried built detergent compositions containing a sulfated alkyl ethoxylate as the detergent component.

Detergent compositions intended for the cleaning of soiled laundry are generally referred to as heavy-duty or built detergent compositions. Typically, such compositions contain a soap or organic synthetic detergent, a builder for sequestering or otherwise removing hardness ions found in water and, optionally, other components, e.g. alkali metal silicates, sodium sulfate, bleaches, etc. Most built detergent compositions are produced in a solid granular form. A process well known to the detergency industry for producing such granular built detergent compositions comprises forming an aqueous slurry of most or all of the composition's components and thereafter spray-drying the slurry to form granules.

One of the problems encountered with spray-drying operation is the fact that an aqueous slurry of detergent and builder containing low levels of water is generally quite viscous, and hence difficult to process. The use of higher water levels makes the slurry less viscous, but also makes it more difficult to dry. With respect to spray-dried detergent compositions containing an alkyl benzene sulfonate as the detergent, benzene or toluene sulfonate is generally added to the aqueous slurry prior to spray drying so as to reduce the slurry's viscosity. Such an additive acts as a hydrotrope in that it results in the alkyl benzene sulfonate being more soluble in water over a wide range of temperature conditions. As such, less water is needed for rendering the slurry pumpable and atomizable with the ultimate result being that less water need be driven off from atomized droplets of the slurry. An additional effect of the hydrotrope is that water in the atomized droplets is removed more easily than if no hydrotrope is present, i.e. less severe drying conditions are needed for removing water from the hydrotrope-containing droplet.

It has been found, though, that materials that act as a hydrotrope for one organic detergent do not necessarily have a hydrotropic effect on other organic detergents. For example, the sulfated alkyl ethoxylates are known organic detergents useful in built detergent compositions. However, benzene or toluene sulfonates have no noticeable hydrotropic effect when added to an aqueous slurry containing the sulfated alkyl ethoxylates. Due to the lack of a material suitable as a hydrotrope for a sulfated alkyl ethoxylate-containing slurry (with its attendant processing difficulties) spray-dried detergent compositions containing same are not as popular as they might be.

Various additives have been suggested for use with built detergent compositions for various reasons, e.g. the use of sulfosuccinates as an anti-caking agent with alkyl benzene sulfonate-containing detergents (U.S. Pat. No. 3,328,314) and secondary alkyl sulfate- and sulfonate-containing detergents (U.S. Pat. No. 3,424,690); see also Canadian Pat. No. 907,997. Such additives, however, do not necessarily also possess hydroping characteristics.

An object of this invention is the production of a detergent composition that can be effectively spray-dried.

Another object of this invention is to produce a sulfated alkyl ethoxylate-containing detergent composition by an efficient and economical process.

A still further object of this invention is to produce a crisp and free-flowing built sulfated alkyl ethoxylate-containing detergent composition by a spray-drying process.

These and other objects will become evident from the description and examples to follow.

As used herein, all percentages are by weight unless otherwise stated.

SUMMARY OF THE INVENTION

A process for producing a crisp, free-flowing built detergent composition and the product so produced comprising:

a. forming an aqueous slurry consisting essentially of (1) from 7% to 55% of an alkaline detergency builder, (2) from 4% to 35% of a water-soluble salt of a sulfated alkyl ethoxylate having from 10 to 22 carbon atoms in the alkyl chain and from 1 to 20 ethylene oxide groups, (3) a processing aid characterized in acting as a hydrotrope in reducing the viscosity of the slurry, said processing aid being a water-soluble salt of an organic compound having from 1 to 6 carbon atoms substituted with a sulfate or sulfonate group and at least one carboxyl group wherein the processing aid is present in a weight ratio of processing aid to sulfated alkyl ethoxylate of from 1:40 to 1:2, and (4) the balance water; and
b. spray-drying the slurry to form crisp, free-flowing granules.

DETAILED DESCRIPTION OF THE INVENTION

A built detergent composition having excellent crispness and flowability is produced by a very efficient spray-drying process.

Spray-drying of aqueous slurries to obtain built detergent composition granules is a well-known drying process. An aqueous slurry having a temperature of from 105°F to 250°F of all or a part of the detergent composition is formed and atomized into the top of a spray-drying tower. In one method of spray-drying, a source of hot air, i.e. air having a temperature ranging from 300°F. to 800°F., is introduced at the base of the tower. As the hot air rises, it contacts the falling atomized droplets, thereby driving off substantially all the water. The resultant granules are collected at the base of the tower while the water-laden air exits at the top. In another method of spray-drying, the source of hot air is introduced along with the atomized droplets at the same end of the tower. Such known spray-drying processes all enjoy the benefits of the present invention as herein described.

The amount of water contained in the aqueous slurry is, for the most part, based on the amount needed to produce a slurry having a viscosity that is low enough to facilitate pumping and atomizing. That is, as small an amount of water as possible is used because of the necessity of later removing it with the consequent drying expenses. Yet enough water must be used so as to obtain a slurry that can be pumped and atomized. In accord with this invention, the addition of a water-soluble salt of a substituted organic compound as a processing aid acts as a hydrotrope for the organic detergent so that the viscosity of an aqueous slurry containing said detergent is reduced. This allows for less power needs for pumping purposes and/or less water in the slurry.

Processing aids of this invention are water-soluble salts of organic compounds having from 1 to 6 carbon atoms (exclusive of substituent groups) substituted with a sulfate or sulfonate group and at least one carboxylic group. The substituted organic compound may be cyclic, acylic, or aromatic, i.e., benzene derivatives. Preferred alkyl processing aids are water-soluble salts of an alkyl compound having from 1 to 4 carbon atoms substituted with sulfate or sulfonate group and with from 1 to 2 carboxyl groups. A preferred aromatic processing aid herein is a water-soluble salt of m-sulfobenzoic acid. The alkali metals, e.g., sodium, are the preferred water-solubilizing cations with both the alkyl and aryl processing aids herein. The processing aid may be fully neutralized or partially neutralized depending on the end-use of the final detergent composition and its desired pH. Generally the processing aids of this invention are fully neutralized.

Examples of processing aids suitable for use are the water-soluble salts of sulfosuccinic acid, sulfoacetic acid, sulfophthalic acid and m-sulfobenzoic acid. An especially preferred alkyl processing aid is the trisodium salt of sulfosuccinic acid. An especially preferred aryl processing aid herein is the disodium salt of m-sulfobenzoic acid. This aromatic acid (in the form of disodium m-sulfobenzoate) exhibits additional processing advantages, over the alkyl materials, as disclosed hereinafter.

The inclusion of the processing aid in the aqueous slurry of this invention at a weight ratio of processing aid to sulfated alkyl ethoxylate of from 1:40 to 1:2, preferably 1:20 to 1:4, surprisingly reduces the viscosity of the slurry. When less than the above amount of the processing aid is used in the invention, a sufficient hydrotroping effect is lacking, while a greater amount of processing aid does not result in a noticeable increase in processability or a greater anti-caking effect as hereinafter discussed.

The sulfated alkyl ethoxylate organic detergent has the formula $R(CH_2CH_2O)_xSO_3M$ wherein R is an alkyl group having from 10 to 22 carbon atoms, preferably from 12 to 18 carbon atoms, x is from 1 to 20, preferably 1 to 9 and M is an alkali metal, e.g. sodium. This detergent material forms from 4% to 35%, preferably from 10% to 20% of the aqueous slurry.

Another component of the aqueous slurry of this invention is an alkaline detergency builder. Such materials may be any organic or inorganic detergency builder. The aqueous slurry contains from 7% to 55%, preferably from 15% to 35% of the alkaline detergency builder.

Examples of suitable water-soluble, inorganic alkaline detergency builder salts useful in this invention are alkali metal carbonates, borates, phosphates, polyphosphates, bicarbonates and silicates. Specific examples of such salts are sodium and potassium tetraborates, perborates, bicarbonates, carbonates, tripolyphosphates, pyrophosphates, orthophosphates and hexametaphosphates. An especially preferred detergency builder is sodium carbonate.

Examples of suitable organic alkaline detergency builder salts are: (1) Water-soluble aminopolycarboyxlates, e.g., sodium and potassium ethylenediaminetetraacetates, nitrilotriacetates and N-(2-hydroxyethyl)-nitrilodiacetates; (2) Water-soluble salts of phytic acid, e.g., sodium and potassium phytates — See U.S. Pat. No. 2,739,942; (3) Water-soluble polyphosphonates, including specifically, sodium, potassium and lithium salts of ethane-1-hydroxy-1,1-diphosphonic acid, sodium, potassium and lithium salts of methylene diphosphonic acid, sodium, potassium and lithium salts of ethylene diphosphonic acid, and sodium, potassium and lithium salts of ethane-1,1,2-triphosphonic acid. Other examples include the alkali metal salts of ethane-2-carboxy-1,1-diphosphonic acid, hydroxymethanediphosphonic acid, carbonyldiphosphonic acid, ethane-1-hydroxy-1,1,2-triphosphonic acid, ethane-2-hydroxy-1,1,2-triphosphonic acid, propane-1,1,3,3-tetraphosphonic acid, propane-1,1,2,3-tetraphosphonic acid, and propane-1,2,2,3-tetraphosphonic acid; (4) Water-soluble salts of polycarboxylate polymers and copolymers as described in U.S. Pat. No. 3,308,067. Specifically, a detergent builder material comprising a water-soluble salt of a polymeric aliphatic polycarboxylic acid having the following structural relationships as to the position of the carboxylate groups and possessing the following prescribed physical characteristics: (a) a minimum molecular weight of about 350 calculated as to the acid form; (b) an equivalent weight of about 50 to about 80 calculated as to acid form; (c) at least 45 mole percent of the monomeric species having at least two carboxyl radicals separted from each other by not more than two carbon atoms; (d) the site of attachment of the polymer chain of any carboxyl-containing radical being separated by not more than three carbon atoms along the polymer chain from the site of attachment of the next carboxyl-containing radical. Specific examples are polymers of itaconic acid, aconitic acid, maleic acid, mesaconic acid, fumaric acid, methylene malonic acid, and citraconic acid and copolymers with themselves and other compatible monomers such as ethylene; and (5) mixtures thereof.

In addition, other builders can be used satisfactorily such as water-soluble salts of mellitic acid, citric acid, pyromellitic acid, benzene pentacarboxylic acid, oxydiacetic acid, oxydisuccinic acid.

The balance of the slurry comprises water. Optionally, commonly used detergent components may be included in the slurry. For example, from 1% to 40% of sodium sulfate and from 2% to 17% of alkali metal silicate having an SiO_2:Na_2O ratio of from 3.2:1 to 1:1, may be added to the slurry. Organic detergents, e.g. soap, anionic, nonionic, zwitterionic, or ampholytic synthetic detergents may also be included in the slurry provided they do not interfere with the operation of the process. Alternatively, these compounds may be admixed dry with the spray-dried granules produced in accordance with the present invention.

The above-described aqueous slurry is next efficiently spray-dried by known procedures to produce detergent granules.

In the absence of the inclusion of the processing aid, the aqueous slurry is more viscous and harder to dry. More particularly, the aqueous slurry essentially is comprised of an organic phase, a lye phase, and a solids phase. The organic phase comprises mainly the organic detergent while the solids phase comprises mainly the undissolved inorganic compounds. The lye phase comprises dissolved inorganic compounds and water. When the composition of this invention in the form of a droplet is being spray dried, the lye phase tends to migrate to the outer portion of the droplet where the water content is evaporated into the surrounding atmosphere. As a result of migration and evaporation, the outer portion of spray-dried granule is comprised substantially of the inorganic components. Additionally, since the processing aid acts as a hydrotrope, less water is associated with the organic detergent-containing portion of the granule. Accordingly, less heat and time is needed to reduce the moisture content of the granule. This latter fact is all the more important considering the fact that the organic phase frequently forms a gel. As such, water is not easily given up by this phase. In accord with this invention, though, less of the gel is formed with the result being the water in the atomized droplet is easier to remove. Also, the reduction of this gel formation is responsible for lowering the slurry viscosity with its consequential benefit on process handling and atomization. This, together with the fact that less water is required in the aqueous slurry initially because of the viscosity reducing effect of the processing aid, makes the process of this invention economically attractive.

Additionally, it has been found that the resultant spray-dried granules of this invention are crisp and free-flowing. That is, the granules have less of a tendency to become tacky and cake. In areas of the country where high temperature and high humidity are encountered, a built detergent composition that will not cake is quite important. As a result of the process of this invention, the granules are more thoroughly dried due to the absence of the aforementioned organic gel phase. Consequently, even upon prolonged storage at temperatures and humidities condusive to caking, the granules remain crisp and free-flowing. This storage stability appears to be due largely to the granules having greater tolerance for moisture pick-up before tackiness occurs.

The spray-dried granules of this invention are substantially dry, i.e. contains less than 15% water, preferably less than 10% water. They consist essentially of:

a. from 5% to 50%, preferably 10% to 25%, of the sulfated alkyl ethoxylate;

b. from 10% to 80%, preferably 20% to 50%, of the alkaline detergency builder; and

c. as the processing aid, the water-soluble salt of the organic compound in a weight ratio of processing aid to sulfated alkyl ethoxylate of from 1:40 to 1:2, preferably 1:20 to 1:4.

The following examples are illustrative of this invention:

EXAMPLE I

Organic detergent pastes containing the following components in parts per weight were prepared:

	A	B	C	D
Sodium salt of linear alkyl benzene sulfonate having an average alkyl chain length of 13 carbon atoms (LAS)	20.0	20.0	—	—
Sodium salt of a sulfate ester of tallow alcohol ethoxylated with 3 moles of ethylene oxide (TAE_3S)	—	—	20.0	20.0
Trisodium salt of sulfosuccinic acid	—	1.0	—	1.0
Water	20.0	20.0	17.2	17.2
Miscellaneous (sodium sulfate, sodium sulfite, unsulfated or unsulfonated organic material)	1.1	1.1	2.8	2.9

Viscosity measurements for each of the above pastes were made using a Brookfield Viscometer (Model LVT) at a paste temperature of 150°F. — a temperature commonly used in the handling of such pastes. Compositions A and B were measured with a number 3 spindle at a spindle speed of 30 r.p.m. Compositions C and D were measured with a number 4 spindle at a spindle speed of 6 r.p.m. The viscosity measurements of the pastes were as follows:

Composition	Viscosity (centipoises)
A	1,320
B	2,280
C	54,000
D	36,000

The results obtained from Compositions A and B show that the addition of the sulfosuccinate to the LAS-containing paste did not reduce the viscosity, but in fact increased it. The viscosity measurements of Composition D, i.e. the composition representative of the invention, compared to Composition C indicate that the addition of the sulfosuccinate to the TAE_3S-containing paste substantially reduced the viscosity.

A result of the viscosity lowering effect of the sulfosuccinate on the sulfated alkyl ethoxylate is that an aqueous slurry containing same is more easily processable, i.e. easier to pump, atomize, and dry in a spray-drying operation.

EXAMPLE II

The following aqueous slurries were prepared:

	A	B	C
Sodium salt of the sulfate ester of tallow alcohol ethoxylated with 3 moles of ethylene oxide	13.2%	13.2%	13.2%
Sodium carbonate	35.2%	35.2%	35.2%
Trisodium salt of sulfosuccinic acid	—	0.4%	1.8%
Sodium silicate (SiO_2:Na_2O = 1.6)	8.8%	8.8%	8.8%
Sodium sulfate	8.8%	8.4%	7.0%
Water	33.5%	33.5%	33.5%
Misc. (fluorescers, colorants)	0.5%	0.5%	0.5%

Each of the above slurries was dried under essentially the same conditions. That is, each was pumped into the top of the spray-drying tower 50 feet in height and 10 feet in diameter and atomized through a spray nozzle having an orifice diameter of 0.082. inches. Air having a temperature as set out below was introduced at the bottom of the tower and exited at the top. Dried granules were collected at the bottom of the tower.

The data collected from the spray-drying of each of the above slurries was recorded as follows:

Composition	A	B	C
Dried granule rate (lbs/min)	12	14	14
Moisture content (%)	3.1	1.7	1.7
Inlet air temperature (°F)	555	560	495
Outlet air temperature (°F)	260	260	255
Pressure drop in line to tower (psi)	500	420	330

The above results show that the spray-drying of Compositions B and C (representative of the invention) was more efficiently accomplished than the spray-drying of Composition A.

The results obtained from Compositions A and B show that even though the rate of granule production for Composition B was greater than for Composition A, the amount of moisture removed from Composition B was greater under essentially the same drying conditions.

A comparison of the results from Compositions A (no sulfosuccinate) and C (1.8% sulfosuccinate) show that Composition C was dried more thoroughly even though the drying conditions were substantially less severe. Additionally, the substantial difference in the line pressure drop of the two slurries indicates that there was a significant difference in the viscosity of the two slurries, i.e. the viscosity of Composition C was substantially less than the viscosity of Composition A. As such, the slurry of Composition C was easier to pump and atomize.

EXAMPLE III

Compositions A and C of Example II were spray-dried under essentially the same conditions as in Example II except as noted otherwise below:

Composition	A	C
Dried granule rate (lbs/min)	12	14
Moisture content (%)	5.7	1.7
Inlet air temperature (°F)	508	495
Outlet air temperature (°F)	290	255
Pressure drop in line to tower (psi)	600	330
Nozzle orifice diameter (in.)	0.067	0.082

The above data shows that under essentially the same drying conditions, Composition C was dried much more thoroughly than Composition A even though a finer atomization nozzle was used for Composition A and the rate of granule production for Composition C was greater. The granules resulting from the spray-drying of Composition A were wet and sticky. The granules resulting from the spray-drying of Composition C were more crisp than those resulting from Composition A.

Formulations similar to that of foregoing Examples II and III were prepared wherein the trisodium salt of sulfosuccinic acid was replaced by an equal amount of the disodium salt of m-sulfobenzoic acid. Advantageous reductions in the viscosity were secured. Surprisingly, the reductions in viscosity were even more pronounced than when the sulfosuccinate salt was employed.

The sulfosuccinate-containing slurries and the sulfobenzoate slurries were centrifugally separated into their phase components. A visually discernible difference between the two types of systems was noted. The slurry containing the sulfobenzoate exhibited an even smaller detergent phase and proportionately larger aqueous phase than did the sulfosuccinate slurry. This evidences an even greater advantage of the sulfobenzoate in reducing hard-to-dry, detergent-bound water over the sulfosuccinate.

Another notable advantage of disodium m-sulfobenzoate over the sulfosuccinate is its stability in acid media. The acid stability allows the disodium m-sulfobenzoate to be added to the acid form of the sulfated alkyl ethoxylates herein to lower their viscosity. Hence, the disodium m-sulfobenzoate can be employed in the preparation of spray-dried sulfated alkyl ethoxylates at a much earlier step in the processing than the sulfosuccinate. This provides good viscosity control throughout the multiple processing steps.

The substitution of alkaline detergency builders for the sodium carbonate of the above examples as well as the substitution of sulfated alkyl ethoxylates having different alkyl chain lengths and number of ethylene oxide groups at the same levels give substantially the same results as above noted. Minor proportions of other soaps and surfactants can be added to the slurry at the option of the user without destroying the benefits obtained.

Spray-dried built compositions produced in accord with the process of this invention are illustrated below.

EXAMPLE IV

Sodium salt of sulfate ester of tallow alcohol ethoxylated with 15 moles of ethylene oxide	15%
Sodium citrate	70%
Disodium salt of sulfoacetic acid	1%
Sodium sulfate	6%
Sodium silicate (SiO_2:Na_2O = 1.6)	5%
Water	3%

EXAMPLE V

Sodium salt of sulfate ester of C_{12} alkyl ethoxylated with 9 moles of ethylene oxide	35%
Sodium stearate (soap)	5%
Sodium carbonate	30%
Trisodium salt of sulfosuccinic acid	15%
Sodium sulfate	7%
Sodium silicate	3%
Water	5%

EXAMPLE VI

Sodium salt of sulfate ester of C_{18} alkyl ethoxylated with 12 moles of ethylene oxide	5 %
Sodium carbonate	60 %
Trisodium salt of sulfophthalic acid	0.1%
Sodium sulfate	27.9%
Water	7 %

EXAMPLE VII

The following spray-dried formulation was prepared and tested and is illustrative of the use of m-sulfobenzoate in the compositions herein.

Linear C_{12} alkyl benzene sulfonate, sodium salt	9%
Sulfate ester of tallow alcohol ethoxylated with 3 moles of ethylene oxide, sodium salt	11%

-Continued

m-sulfobenzoic acid, disodium salt	2%
Sodium toluene sulfonate	1%
Sodium silicate (SiO_2:Na_2O = 2.4)	20%
Sodium carbonate	20%
Sodium sulfate	34%
Water	3%

What is claimed is:

1. A process for efficiently producing a crisp, free-flowing built detergent composition by spray drying an aqueous slurry having therein included a minor amount of a processing aid to reduce the viscosity of the slurry comprising:

a. forming an aqueous slurry consisting essentially of (1) from 7% to 55% of an alkaline detergency builder, (2) from 4% to 35% of a water-soluble salt of a sulfated primary alkyl ethoxylate having from 10 to 22 carbon atoms in the alkyl chain and from 1 to 20 ethylene oxide groups, (3) said minor amount of the processing aid characterized in acting as a hydrotrope in reducing the viscosity of the slurry, said processing aid being a water-soluble salt of an organic compound selected from the group consisting of sulfosuccinic acid, sulfoacetic acid, sulfophtalic acid, and m-sulfobenzoic acid wherein the processing aid is present in a weight ratio of processing aid to sulfated alkyl ethoxylate of from 1:40 to 1:2, and (4) the balance water; and

b. spray-drying the slurry to form crisp, free-flowing granules.

2. The process of claim **1** wherein the sulfated alkyl ethoxylate has from 12 to 18 carbon atoms in the alkyl chain and from 1 to 9 ethylene oxide groups.

3. The process of claim **2** wherein the aqueous slurry contains the processing aid in an amount of processing aid to sulfated alkyl ethoxylate of from 1:20 to 1:4.

4. The process of claim **3** wherein the alkaline detergency builder is sodium carbonate.

5. The process of claim **4** wherein the processing aid is the trisodium salt of sulfosuccinic acid.

6. The process of claim **4** wherein the processing aid is the disodium salt of m-sulfobenzoic acid.

7. A spray-dried built detergent composition comprised of granules which are crisp and free-flowing and possess excellent storage stability, containing a minor amount of a processing aid consisting essentially of:

a. from 5% to 50% of a water-soluble salt of a sulfated primary alkyl ethoxylate having from 10 to 22 carbon atoms in the alkyl chain and from 1 to 20 ethylene groups;

b. from 10% to 80% on an alkaline detergency builder; and

c. as said processing aid a water-soluble salt of an organic compound selected from the group consisting of the water-soluble salts of sulfosuccinic acid, sulfoacetic acid, sulfophthalic acid, and m-sulfobenzoic acid in a weight ratio of processing aid to sulfated alkyl ethoxylate of from 1:20 to 1:4,

wherein the granules are obtained by spray-drying an aqueous slurry of the components.

8. The detergent composition of claim **7** wherein the processing aid is a water-soluble salt of sulfosuccinic acid.

9. The detergent composition of claim **7** wherein the processing aid is a water-soluble salt of m-sulfobenzoic acid.

10. The detergent composition of claim **7** wherein the processing aid is selected from the group consisting of the trisodium salt of sulfosuccinic acid and the disodium salt of sulfobenzoic acid, and is present in a ratio of processing aid to sulfated primary alkyl ethoxylate of from 1:20 to 1:4, and wherein the detergency builder is an inorganic compound.

11. The detergent composition of claim **10** wherein the detergency builder is sodium carbonate.

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