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3,334,049

DETERGENT PROCESSES

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No Drawing. Filed Apr. 19, 1965, Ser. No. 449,333
7 Claims. (Cl. 252-135)

The present invention relates to processes for manufacturing heat-dried detergents. More particularly, this invention relates to "slurry" processes for manufacturing detergent compositions that contain sodium tripolyphosphate hexahydrate.

For several reasons, including the desire by manufacturers to make detergents having the various individual components contained therein uniformly distributed through the detergent products, practically all commercial processes for manufacturing detergents that contain sodium tripolyphosphate hexahydrate ($\text{STP} \cdot 6\text{H}_2\text{O}$) involve the preparation of an aqueous slurry at some relatively early stage of the processes. Invariably, the fluid continuous phase of such slurries consists essentially of water.

Since the major purposes of the greater majority of the water in such slurries is simply to serve as a fluidizing medium during the preparation stage of the slurry, as a source of water for the hydration of anhydrous sodium tripolyphosphate, and as a fluidizing medium for the transportation of the finally blended materials to a subsequent drying operation; since free water is generally not desirable in detergent compositions that are sold in the "dry" form; and because the removal of free water from such slurries (usually via a spray drying or drum drying step wherein heat is applied to the slurry to cause the free water to evaporate therefrom in order to convert them into acceptably "dry" compositions) is a relatively expensive processing operation; it is immediately apparent that any method of affecting a significant decrease in the amount of free water that must be evaporated from a slurry in order to manufacture the desired "dry" detergent composition would be extremely valuable to the detergent industry.

Consequently, it is an object of the present invention to provide processes for preparing detergent slurries, which processes make it possible to affect a significant decrease in the amount of water that must be evaporated from the slurries to obtain "dry" detergent products therefrom.

It is another object of the present invention to provide improved processes for manufacturing heat-dried detergents containing significant amounts of sodium tripolyphosphate hexahydrate.

It is still another object of this invention to provide improved "slurry" processes for manufacturing "dry" detergent compositions that contain significant amounts of sodium tripolyphosphate hexahydrate, which processes involve the preparation of aqueous slurries which are pumpable and handleable in conventional detergent slurry processing equipment, but which contain significantly more non-volatile "solids" than otherwise comparable detergent slurries prepared in a conventional manner.

These objects, as well as others which will become apparent from the following disclosure and claims, can be accomplished by properly utilizing the surprising discovery that (provided certain critical limitations with respect to

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the tripolyphosphate content of the slurry, the amount of tripolyphosphate hexahydrate in the slurry at a certain critical stage of the process, and the minimum concentration of "solids" in the slurry at this critical time are properly observed) the viscosity of a given detergent slurry can be significantly reduced by the seemingly simply technique of (a) withholding a portion of the water from the slurry until after at least about half of the sodium tripolyphosphate hexahydrate (based upon the total amount of $\text{STP} \cdot 6\text{H}_2\text{O}$ that will ultimately be present in the slurry just before it is subjected to the heat-drying step) is formed in the slurry and (b) then blending the water [withheld in step (a)] with the remainder of the slurry. In this manner, detergent slurries having significantly lower viscosities than would be expected based upon conventional processing experience can be prepared. For example, when prepared via conventional detergent slurry processing techniques (involving essentially the blending together of anhydrous sodium tripolyphosphate, water, and a detergent surfactant followed by a step in which the tripolyphosphate is allowed to hydrate) it was found that the maximum slurry "solids" (i.e., portion of the slurry not volatile at about 105°C . under 1 atmosphere of pressure) level that could practically be handled efficiently in a certain commercial detergent plant was only about 58 weight percent. By practicing the processes of the present invention, however, it was discovered that the maximum slurry "solids" level (for the same basic detergent formulation and to manufacture an apparently identical detergent product) that could be handled in this plant was increased to 65 weight percent. Thus, not only did the present invention make it possible to increase the plant's throughput of detergent product (in a given length of time) without the necessity to increase the size of the plant, but it also made it possible to save many thousands of dollars in heat costs that would otherwise have had to be expended to evaporate the "extra" water from the conventionally prepared slurry.

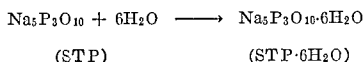
The reasons for the surprisingly valuable benefits that can be obtained by practicing the present invention are not known. Apparently, however, the hydration characteristics of the sodium tripolyphosphate (STP) and/or the physical properties of the resulting $\text{STP} \cdot 6\text{H}_2\text{O}$ are effected beneficially by the peculiar handling of the slurry water in accordance with the present processes. It is apparent, for example, that although some $\text{STP} \cdot 6\text{H}_2\text{O}$ that has been prepared prior to the preparation of the slurries of this invention can be used in the present processes (for example, as a "dry" crystalline raw material) at least about half of the $\text{STP} \cdot 6\text{H}_2\text{O}$ present in these slurries at the time they are (in the form of final "detergent slurries") should be derived by reaction with some of the water in the slurry (i.e., "in situ") during the present processes. Preferably, at least about 80 weight percent of the $\text{STP} \cdot 6\text{H}_2\text{O}$ in the final detergent slurries should be formed "in situ" in these slurries.

While the benefits that can be obtained by practicing the present invention are apparently dependent upon the actual amount of STP in the detergent slurries, generally for readily noticeable benefits, the final detergent slurries should contain at least about 12.5 weight percent and up to about 80 weight percent, of $\text{STP} \cdot 6\text{H}_2\text{O}$. For optimum

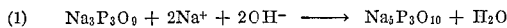
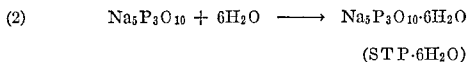
results, from about 20 weight percent to about 50 weight percent of STP·6H₂O should be present therein. These benefits are apparently dependent upon the actual concentration of non-volatile materials in the detergent slurries. Thus, when the total "solids" of a slurry (at the time the STP is hydrated) is below about 58 weight percent, no substantial benefits (with respect to decreasing the viscosity of slurries) can be observed. Above this level, increasing benefits (with respect to viscosity) result from increasing total slurry "solids" up to total "solids" levels of about 63 weight percent or more. Practicing the STP hydration step of the processes of this invention in slurries containing at least about 63 weight percent of "solids," therefore, is a preferred aspect of the present invention. Stated otherwise, in the successful practice of the present invention, the amount of free water in the slurries at that stage of the present processes just prior to the addition of the amount of water withheld initially from the slurry should generally be at most about 42 weight percent and at least about 20 weight percent, and for substantial benefits should be at most about 37 weight percent of free water (i.e., not counting the water combined with materials in the slurry as water of crystallization) and at least about 25 weight percent. The benefits that can result from practicing this invention can be obtained whether or not a surface active agent is present in the slurries at any stage of these processes.

While the actual amount of water that can be withheld initially from the slurries (while at least most of the STP·6H₂O is formed during the successful practice of the invention) can vary, depending somewhat upon the particular kinds of materials in the slurries and the total amount of STP to be hydrated therein, generally this amount should be within the range of from about 1 to about 20 weight percent, based upon the total weight of the "final" slurry (just prior to the heat-drying steps of the present processes). For optimum results, however, preferably from about 4 to about 12 weight percent, based on the total weight of the "final" slurry, should be withheld at this important stage of the present processes.

The present invention is useful when slurries are prepared by initially intermixing water with an inorganic sodium polyphosphate material that reacts with water to form STP·6H₂O. The water can contain other materials dissolved and/or dispersed therein when it is mixed with the inorganic sodium polyphosphate material. The term "inorganic sodium polyphosphate material that reacts with water to form STP·6H₂O" includes, but is not limited to, anhydrous STP (including Form I STP, Form II STP and mixtures thereof) and sodium trimetaphosphate. Sodium tripolyphosphate (both crystalline forms) simply hydrates in aqueous systems as follows:



Sodium trimetaphosphate must first be reacted with a strong sodium-containing base before it can react with the water:



Step 1 above is the rate controlling step, while step 2 is practically instantaneous in the presence of an excess (based on theoretical or stoichiometric amounts) of free 70 water.

Except for the necessity of withholding a certain portion of the water from the slurries until after most of the STP·6H₂O has been formed therein (as detailed hereinbefore), and the necessity of using fairly concentrated

aqueous slurries for the successful practice of this invention, the conditions (such as temperature and time) and manipulative procedures to which the present slurries are subjected (both in their preparation and in their subsequent handling) can be those to and by which detergent slurries (in which sodium tripolyphosphate and/or sodium trimetaphosphate are reacted with water) are subjected and handled conventionally. Thus, the essential elements of the present processes can be conducted in a conventional detergent crutcher. The fact that, in a preferred embodiment of the present processes, slurries having viscosities greater than those which can actually be pumped at practical rates through conventional high pressure pumps and transfer lines is generally not a realistic obstacle to the successful practice of such a preferred embodiment because conventional crutchers are generally designed to handle such very viscous compositions even though the pumps and transfer lines attached thereto are not. When this particular preferred practice is undertaken, one needs merely to be sure that the viscosity of the slurries is reduced sufficiently (by blending enough of the water that was originally withheld from the slurries back into the slurries after the necessary hydration has been accomplished) for them to be handled efficiently in the pumping and other transfer equipment.

Slurries that are useful in the successful practice of the present invention can contain, in addition to water and the inorganic sodium polyphosphate material that reacts with water to form $\text{STP} \cdot 6\text{H}_2\text{O}$, any other material that is useful on conventional detergent compositions and that is compatible with STP. This includes for example, other inorganic and organic sequestering agents and "builders" such as the alkali metal chain phosphate salts such as the sodium, potassium, lithium and ammonium pyrophosphates and acid pyrophosphates (for example, tetrasodium pyrophosphate, tetrapotassium pyrophosphate, tetralithium pyrophosphate, disodium dihydrogen pyrophosphate, dipotassium dihydrogen pyrophosphate, trisodium monohydrogen pyrophosphate, and the like); tripolyphosphates and acid tripolyphosphates such as potassium tripolyphosphate ($\text{K}_5\text{P}_3\text{O}_{10}$), tetrasodium monohydrogen tripolyphosphate, tripotassium dihydrogen tripolyphosphate, and the like; the alkali metal chain phosphates such as hexasodium and hexapotassium tetrapolyphosphates, alkali metal hexametaphosphates, and higher chain length chain polyphosphates such as those that are present in the sodium, potassium, lithium, and rubidium phosphate "glasses" (usually prepared by melting a mixture of phosphate salts having an $\text{M}_2\text{O}/\text{P}_2\text{O}_5$ ratio between about 1 and about 1.3 (where M is an alkali metal cation), and "quenching" the resulting product to yield a mixture of chain polyphosphate salts of varying molecular weights); and the like wherein particularly preferred alkali metal salts are the sodium and potassium salts. Other water-soluble sequestering agents such as alkali metal ethylene diamine, alkali metal citrate, alkali metal tartrate, alkali metal N-(2-hydroxyethyl)-ethylenediminetetraacetate, alkali metal nitrilotriacetate, alkali metal phytate, alkali metal ethane-1-hydroxy-1,1-diphosphates, and the like can also be present in the slurries of the present invention, as can various other "builder" and filler salts (such as sodium sulfate, sodium chloride, sodium carbonate, sodium bicarbonate, and the like), antiredeposition agents (such as sodium carboxymethylcellulose, polyvinyl alcohol, and the like), perfumes, optical bleaches, and the like without detracting substantially from the benefits that can result from practicing the present invention.

Any water soluble surfactant can also be present in the slurries of the present invention in practically any useful amount so long as it is compatible with STP. This includes soaps, anionic synthetic detergents, nonionic synthetic detergents and ampholytic synthetic detergents. These materials are well known to those skilled in the art. Many typical examples of such surfactants can be found in the books, "Surface Active Agents and Detergents,"

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by A. M. Schwartz et al., vols. I and II, published by Interscience Press (1963), and in U.S. Patent 3,159,581, the disclosures of which are incorporated herein by reference. Generally, it is preferred that the surfactant represent from about 0.2 to about 30 weight percent of the "viscous slurries" of the present invention.

In the following examples, which represent preferred embodiments of the present invention, all "parts" are by weight unless otherwise specified.

Example I

Into a conventional detergent crutcher which is a part of a commercial detergent plant are metered (with continuous stirring) 15,000 parts of water, 5,500 parts of aqueous sodium silicate solution (containing 53.1 weight percent of water), 3,100 parts of a product from the condensation reaction of ethylene oxide with n-tridecanol (wherein the molar ratio of EO to tridecanol is about 15), 7,020 parts of sodium sulfate, 107 parts of optical bleach, 1,295 parts of sodium benzene sulfonate, 6,230 parts of sodium n-tridecanol sulfate, and 23,300 parts of anhydrous sodium tripolyphosphate (having a "TR" of about 7 and containing a ratio of Form II to Form I of about 97:3.) Stirring is continued for about 30 minutes after the addition of these materials, during which time the viscosity of the slurry is observed gradually increasing until it is practically a "paste" (i.e., very difficult to handle in the pumping and other transfer facilities in the plant). The relative viscosity of this "paste" is about 38,000 units, as measured by a vibrating reed type viscometer. At this point, practically all of the STP has been converted to STP·6H₂O. Note that "viscosity" as described and used herein is only relative, being mainly given for purposes of comparison. "Relative viscosity" between two or more formulations may differ in terms of "units" measured but comparative figures should be of the same degree no matter how the "relative viscosities" of the various detergent slurries are measured.

Into this "pasty" slurry are then blended 5,710 parts of water (over a period of about 10 minutes). The resulting slurry then is found to have a relative viscosity of only 25,000 units (about the maximum slurry viscosity that can be pumped and sprayed efficiently in the slurry transfer and spray-drying equipment of this particular plant). It is then transferred, by means of the plant's high pressure equipment to the spray-drying tower and sprayed conventionally.

The amount of heat required to "dry" this amount (67,700 parts) of slurry is 10% less than that required to spray-dry a slurry prepared conventionally, having the same viscosity, but containing only 60 weight percent of non-volatile "solids."

The spray-dried product from Example I is apparently identical to that resulting from spray-drying the slurry prepared in the conventional manner.

Example II

It was pointed out above that sodium trimetaphosphate is one of the "inorganic water soluble sodium polyphosphate materials that react with water to form sodium tripolyphosphate hexahydrate" useful in the successful practice of the present invention. In this instance, the trimetaphosphate must first be reacted with a strong sodium-containing base (such as sodium hydroxide, sodium carbonate and sodium silicates having SiO₂/Na₂O ratios below about 2, and the like) before it reacts with the water. It is preferred that these reactions be carried out at slurry temperatures of from about 30 to about 105° C. (A detailed discussion of this reaction can be found in copending United States patent application, Ser. No. 135,718, filed Sept. 5, 1961.) In said copending United States patent application the disclosure of which is incorporated herein by reference, one of the several benefits attributable to the practice of the claimed invention is a net lowering of slurry viscosity, as compared with viscosities

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of slurries prepared using anhydrous STP. It is of significant import that the practice of the present invention makes it possible to lower slurry viscosities still further than that made possible by the invention disclosed in said copending patent application. This example relates specifically to the use of sodium trimetaphosphate as an initial source of STP·6H₂O in the slurries.

Into a conventional detergent crutcher are charged 15,000 parts of water, 11,090 parts of sodium dodecylbenzene sulfonate, 9,950 parts of sodium sulfate, 3,070 parts of sodium silicate (dry basis) having an SiO₂/Na₂O ratio of 2.40, and 470 parts of detergent grade sodium carboxymethylcellulose. The resulting mixture is stirred for about 5 minutes, during which time 12,000 parts of a 50% aqueous solution of NaOH are also blended into the mixture, after which the temperature of the blend is about 40° C. Then 23,000 parts of sodium trimetaphosphate are added to the blend. Stirring is continued for about 20 minutes, during which time the viscosity of the slurry is continuously monitored. The apparent viscosity of the slurry after 5 minutes "hold" time (measured with a Bendix Ultraviscoson vibrating reed type probe) is about 33,000 units, which viscosity can be described as very stiff. Almost all of the trimetaphosphate is converted into tripolyphosphate during this time. The viscosity of this slurry is greater than that which can be efficiently handled in the plant's pumping and fluid transfer equipment.

Into this very thick slurry are then blended 5,840 parts of water, which quickly results in the reduction of the viscosity of the slurry to only 22,000 units. This "final" slurry is readily handleable in the plant's pumping and transfer equipment. Then the slurry is quickly transferred to a conventional pressure pump, and from there to a conventional spray-drying tower where it is heat-dried.

Example III

Into a conventional detergent crutcher are charged 5,830 parts of a condensation product of nonylphenol with ethylene oxide (containing an average of 30 mols of ethylene oxide per mol of alcohol), 2,915 parts (dry basis) of sodium silicate (having an SiO₂/Na₂O ratio of 4.0), 450 parts of sodium carboxymethylcellulose, 15,000 parts of water (including that from the silicate), 17,000 parts of sodium sulfate, and 19,300 parts of sodium trimetaphosphate. The resulting slurry is stirred for 5 minutes. Its apparent viscosity is only about 2,000 units. It contains no "lumps."

Into this mixture (initially having a temperature of 33° C.) are mixed (over a 3 minute period of time) 10,300 parts of a 50 weight percent aqueous solution of NaOH. The temperature of the resulting mixture is observed to rise over the next 15 minutes to about 85° C., at which point practically all of the sodium trimetaphosphate has been converted to sodium tripolyphosphate. The relative viscosity of this slurry is then 45,000 units (too thick to pump and spray). The slurry contains about 70 percent of "solids."

However, upon the subsequent addition of 6,500 parts of water and stirring for 5 minutes in the crutcher, the viscosity is reduced to a pumpable 26,000 units. The total "solids" of this slurry is about 65%. Prepared conventionally, a practically identical slurry contains only 60% of total "solids" when its relative viscosity is about 26,000 units.

Examples IV-X

The following Table 1 illustrates the wide variety of materials that can be present in the slurries that can be prepared in the successful practice of this invention. Numbers appearing in Table 1 opposite the "ingredients" are in terms of parts by weight. Slurries prepared using STP are made using the procedure of Example I, above, while those in which sodium trimetaphosphate is used as a raw material are prepared in accordance with the manipulative procedures set out in Example II, above.

TABLE 1

Ingredients	Slurry Number						
	4	5	6	7	8	9	10
Sodium dodecylbenzene sulfonate.....	18	10	-----	-----	3	-----	-----
Sodium tridecanol sulfate.....	-----	-----	-----	12	-----	-----	15
Potassium dodecylphenol plus 6 EO sulfate.....	-----	5	-----	-----	-----	2	-----
Sodium dioctylsulfosuccinate.....	-----	-----	-----	-----	4	-----	-----
Sodium xylene sulfonate.....	3	-----	-----	2	-----	-----	3
Dodecylphenol plus 10 EO.....	-----	-----	10	-----	-----	-----	-----
Tridecanol plus 13 EO.....	-----	-----	3	-----	-----	10	-----
Nonylphenol plus 5 PO plus 15 EO.....	-----	-----	-----	-----	10	-----	-----
Sodium-3-dodecylaminopropionate.....	-----	-----	-----	3	-----	-----	3
Sodium sulfate.....	38.5	39.5	31.0	28	30.5	27	15
Sodium carbonate.....	-----	-----	-----	20	10	-----	-----
Sodium tripolyphosphate ¹	-----	45	-----	-----	-----	60	-----
Sodium tripolyphosphate ²	40	-----	-----	35	-----	-----	-----
Sodium trimetaphosphate.....	-----	-----	41.5	-----	33	-----	50
Sodium hydroxide.....	-----	-----	11.0	-----	8.8	-----	13
Sodium carboxymethylcellulose.....	0.5	.5	.5	-----	.7	1.0	1.0
Water ³	44	44	47	39	44	59	59

¹ Low "temperature rise" material (95% Form II, 5% Form I).

² High "temperature rise" material (75% Form II, 25% Form I).

³ Amount of water added initially to the slurry. See Table 2 for further treatment of these slurries.

TABLE 2.—SUBSEQUENT TREATMENT OF SLURRIES FROM TABLE 1

Slurry Number	Initial Viscosity	Initial "Solids", percent	Water Added ¹	Final Viscosity	Final "Solids", Invention	Final "Solids", (Conventional) ²
4.....	30,000	70	10	19,000	65	60
5.....	34,000	70	14.3	21,000	63	58
6.....	35,000	68	14	23,000	62	57
7.....	31,000	72	12	26,000	66	60
8.....	35,000	70	12.5	23,000	64	59
9.....	32,000	63	14	25,000	58	53
10.....	28,000	63	10	26,000	60	57

¹ Water withheld initially from the slurry and added after formation of the STP.6H₂O in accordance with the processes of this invention. In terms of weight percent of the resulting final slurry.

² Having essentially the same final viscosity as that prepared via the present processes.

What is claimed is:

1. In a process for manufacturing a heat-dried heavy duty detergent composition containing at least about 20 weight percent of sodium tripolyphosphate hexahydrate, which process comprises (1) preparing a concentrated aqueous slurry containing at most about 45 weight percent of free water by initially intermixing water with a member selected from the group consisting of (a) anhydrous sodium tripolyphosphate and (b) a mixture of sodium trimetaphosphate and a strong sodium-containing base, and (2) heat-drying said concentrated aqueous slurry; the improvement which comprises withholding a portion of said water from said concentrated aqueous slurry until at least about 50 weight percent of the phosphate material initially present in said slurry has been converted to sodium tripolyphosphate hexahydrate, and then blending said portion of said water into said concentrated aqueous slurry; said portion being from about 1 to about 20 weight percent, based on the amount of free water in said concentrated aqueous slurry just before it is heat-dried.

2. An improved process as in claim 1, wherein said slurry is initially prepared by mixing together anhydrous sodium tripolyphosphate and water.

3. An improved process as in claim 1, wherein said slurry is initially prepared by mixing together water, sodium trimetaphosphate and a strong sodium-containing base.

4. A process which comprises the steps of

(a) intermixing water and anhydrous sodium tripolyphosphate;

(b) agitating the resulting mixture until at least about 80 weight percent of said anhydrous sodium tripolyphosphate is converted to sodium tripolyphos-

phate hexahydrate to thereby form a viscous slurry; the amount of free water in said viscous slurry being from about 20 to about 42 weight percent of said viscous slurry;

(c) thereafter blending into said viscous slurry from about 4 to about 20 weight percent, based on the weight of said viscous slurry, of water to thereby form a final, pumpable slurry; the amount of said sodium tripolyphosphate hexahydrate in said final, pumpable slurry being from about 20 to about 50 weight percent.

5. A process which comprises the steps of

(a) forming an initial slurry by intermixing water, sodium trimetaphosphate and at least about two moles of a strong base selected from the group consisting of sodium hydroxide, sodium carbonate, and sodium silicate having Na₂O/SiO₂ ratios above about 2 per mole of said sodium trimetaphosphate in said initial slurry;

(b) maintaining the temperature of said initial slurry between about 30° C. and about 105° C. until at least about half of said sodium trimetaphosphate reacts with said strong base and water to thereby form a viscous slurry containing sodium tripolyphosphate hexahydrate; the amount of free water in said viscous slurry being from about 20 to about 42 weight percent of said viscous slurry; and

(c) thereafter blending into said viscous slurry from about 4 to about 20 weight percent, based on the weight of said viscous slurry, of water to thereby convert said viscous slurry to a final, pumpable slurry; the amount of said sodium tripolyphosphate hexahydrate in said final, pumpable slurry being from about 20 to about 50 weight percent.

6. A process which comprises the steps of (a) inter-
mixing water, an organic water-soluble detergent sur-
factant selected from the group consisting of soaps,
anionic synthetic detergents, nonionic synthetic deter-
gents, and ampholytic synthetic detergents, and anhydrous
sodium tripolyphosphate; (b) agitating the resulting mix-
ture for from about 3 minutes to about 90 minutes at
temperatures within the range of from about 40 to about
120° C. until at least about 80 weight percent of said
anhydrous sodium tripolyphosphate is converted to so-
dium tripolyphosphate hexahydrate to thereby form a
viscous slurry; the amount of free water in said viscous
slurry being from about 25 to about 37 weight percent
of said viscous slurry, the amount of said detergent sur-
factant in said viscous slurry being from about 0.2 to
about 30 weight percent of said viscous slurry and the
amount of said sodium tripolyphosphate hexahydrate in
said viscous slurry being from about 20 to about 80
weight percent of said viscous slurry; (c) thereafter
blending into said viscous slurry from about 4 to about
12 weight percent of water, based on the weight of said
viscous slurry, to thereby form a final detergent slurry.

7. A process which comprises the steps of (a) forming
an initial slurry by intermixing water, an organic water-
soluble detergent surfactant selected from the group con-
sisting of soaps, anionic synthetic detergents, nonionic

synthetic detergents, and ampholytic synthetic detergents,
sodium trimetaphosphate, and at least about two moles
of sodium hydroxide per mole of said sodium trimeta-
phosphate, (b) maintaining the temperature of said initial
slurry between about 30° C. and about 105° C. for at
least about 1 minute until said sodium trimetaphosphate
and said sodium hydroxide are reacted together to form
sodium tripolyphosphate hexahydrate and said initial
slurry is converted thereby to a viscous slurry; the amount
of free water in said viscous slurry being from about 25
to about 37 weight percent of said viscous slurry, the
amount of said detergent surfactant in said viscous slurry
being from about 0.2 to about 30 weight percent of said
viscous slurry, and the amount of said sodium tripoly-
phosphate hexahydrate in said viscous slurry being from
about 20 to about 80 weight percent of said viscous slurry,
(c) thereafter blending into said viscous slurry from
about 4 to about 12 weight percent of water, based on
the weight of said viscous slurry, to thereby form a final
detergent slurry.

No references cited.

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