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ABRASIVE SCOURING POWDER

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6 Claims. (Cl. 252—116)

The present invention relates to an improvement in abrasive scouring powders, whereby the stability or keeping qualities, the detergent properties and efficiency thereof are substantially and unexpectedly increased. Abrasive scouring powders consist essentially of a finely ground abrasive material, primarily silica-containing, such as volcanic ash, silica flour, pumice, pumicite, tripoli, feldspar, and the like, or mixtures thereof. A material having detergent capacities usually comprises another ingredient of abrasive scouring powders. Such detergent material consists either of a soap-like material or a soluble alkali metal salt detergent. The soap-like material may consist of either animal or vegetable oil soaps, rosin soaps, blended soaps, soap powders, saponin, or the so-called wetting or sudsing agents, which are, generally speaking, salts of sulphonated or sulfated organic compounds of high molecular weight which have the property of depressing the surface tension of their aqueous solutions and causing foaming or sudsing. The soluble alkaline detergent material may consist of alkali metal carbonates, silicates, phosphates and borates, particularly the sodium salts thereof, such as sodium carbonate, sodium bicarbonate, sodium silicate, tri-sodium phosphate, modified soda and borax.

Considerable difficulty has been experienced in the past in the storage or keeping qualities of abrasive scouring powders due to their tendency to form a relatively hard mass or cake, on standing, particularly in localities having relatively humid or hot atmospheric conditions. It is not known positively whether a chemical reaction occurs between the abrasive and the detergent ingredients of the abrasive scouring powder, such as the formation of a silicate compound which, in turn, has a cementing or adhesive action, tending to set the particles of the powder in a mass or cake; or if moisture from the atmosphere, or contained as water of hydration or crystallization in the powdered ingredients of the product, effects a hydraulic cementing, which produces the caking or hardening of the abrasive scouring powder. Possibly it is a combination of these two indicated effects which causes the difficulty and lack of stability or keeping qualities of abrasive scouring powders heretofore known and used in the art.

I have discovered that the addition of tetrasodium pyrophosphate sometimes alternatively called tetrasodium pyrophosphate, when mixed in the technically dry, powdered form with the abrasive material, and with or without the soap, soap-like or alkaline detergent material present, and in the amount of $\frac{5}{10}$ to 50%, that the keeping qualities or stability as well as the detergent properties and efficiency of the resultant abrasive scouring powder product, are remarkably and unexpectedly improved. Furthermore, tetrasodium pyrophosphate is in itself a soluble alkaline detergent material, and so, if need be, it performs the additional function of a detergent, thus obviating the necessity and increased cost of manufacture and materials incident to the presence of some other alkaline detergent material.

My present invention includes the addition of bentonite to abrasive scouring powders in combination with the presently disclosed and claimed addition of tetrasodium pyrophosphate. The addition of bentonite to abrasive scouring powders is disclosed in detail and claimed in my co-pending application Serial No. 322,006, filed March 2, 1940. Incorporation by reference of the advantages, improved results and manner of addition of bentonite to abrasive scouring powders, as set forth in such co-pending application, is accordingly made herewith.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

Tetrasodium pyrophosphate has previously been known and used as a detergent, a water softener and a soap builder. However, the function and unusual properties of sodium tetra pyro phosphate in improving the stability and detergent efficiency of an abrasive scouring powder, has not heretofore been appreciated or known. I claim that I am the first in the art to discover the unusual ability of tetrasodium pyrophosphate to improve the stability and keeping qualities of abrasive scouring powders composed largely of finely divided silica.

Careful and exhaustive tests have been made of abrasive scouring powder mixtures comprising silica-containing abrasive and other detergent materials, such as the soluble alkaline detergent materials above listed, with and without soap or soap-like materials. Such tests upon these mixtures, when compared with corresponding tests made upon the mixture or product embodying my present invention, show that the addition of tetrasodium pyrophosphate results in a much greater stability or keeping quality. It has been determined that conditions of relatively high atmospheric temperatures and humidity, either alone or in combination, greatly accelerate the hardening or caking effect upon abrasive scouring powders. When these conditions vary over a substantial range, the hardening and caking effect becomes all the more pronounced. Therefore, in order to formulate a rigorous and dependable test of the stability, keeping, quali-

ties, or storage ability of abrasive scouring powders, accurate and controlled conditions artificially simulating the indicated atmospheric conditions were established. Thus, the various abrasive scouring powders to be tested were subjected, first, to 100% relative humidity at constant room temperature; secondly, to 90% relative humidity at 104° F. temperature; and finally, to 90% relative humidity at 104° F. alternating with oven heat at 122° F.

Samples of abrasive scouring powders containing abrasive material, soap-like material and alkaline detergent material, but without tetrasodium pyrophosphate, were subjected to these tests along with the product of the present invention. The ability of the various products to withstand the test conditions before undergoing a caking or hardening were noted and tabulated as follows:

Product	100% R. H. room temperature	90% R. H. 104° F.	90% R. H. and 104° F. alternating with oven at 122° F.
Product containing $Na_4P_2O_7$	Excellent [1]	Excellent [2]	Excellent.[3]
Product #1 without any $Na_4P_2O_7$	Good [1]	Poor [2]	Fair.[3]
Product #2 without any $Na_4P_2O_7$	Excellent [1]	Very good [2]	Fair.[3]
Product #3 without any $Na_4P_2O_7$	Good [1]	Fair [2]	Fair.[3]
Product #4 without any $Na_4P_2O_7$	Poor [1]	Bad [2]	Bad.[3]
Product #5 without any $Na_4P_2O_7$	Excellent [1]	Good [2]	Good.[3]

[1] End of 14 days. [2] End of 11 days. [3] End of 15 days.

It has also been found that the abrasive scouring powder of my invention has improved detergent and cleaning properties. Thus, iron stains, such as accumulate in wash basins, bath tubs and sinks, where water containing iron has been allowed to drip, which are, at best only difficultly removable with powder containing an abrasive with or without some other alkaline detergent material, are very readily removed by my abrasive scouring powder containing tetrasodium pyrophosphate. Insoluble calcium magnesium soaps, which are formed by the reaction of calcium and magnesium salts, present in water with soaps, fats and greases, are also very readily removed from washing receptacles by my abrasive scouring powder.

In my above-mentioned co-pending application Serial No. 322,006, I have disclosed that the addition of bentonite also improves the stability and detergent properties, as well as the rinsability of abrasive scouring powders. Therefore, in order to combine and enhance these properties and particularly in order to impart the quality of improved rinsability to the above-indicated advantages of the sodium tetra pyro phosphate addition, my present invention also contemplates the incorporation or admixture of bentonite in the range of $\frac{1}{10}$ to 5%, in the abrasive scouring powder.

Thus, as suitable formulations for the amount of the various ingredients to be incorporated into the abrasive scouring powder of the present invention, the following ranges are cited:

	Per cent
Abrasive material	91 to 93½
Soap and alkaline detergent material	3 to 4
Tetrasodium pyrophosphate	1 to 4

When bentonite is incorporated with the above formulations, it is preferably added in the amount of $\frac{5}{10}$ to 2%. Although as high as 50% tetrasodium pyrophosphate may be utilized, if need be, the above-mentioned range of 1 to 4% is satisfactory for most uses and purposes of abrasive scouring powder and sufficient to accomplish the desired results and objects hereinabove set forth and described.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such be employed.

I, therefore, particularly point out and distinctly claim as my invention:

1. A substantially non-caking abrasive scouring powder comprising an abrasive material selected from the group consisting of volcanic ash, silica flour, pumice, pumicite, tripoli and feldspar, a minor proportion of detergent material selected from the group consisting of water-soluble, finely divided alkali metal carbonates, silicates, phosphates and borates, said abrasive material and said alkali metal salt normally forming a caked mass when subjected to atmospheric conditions of relatively high humidity and temperature, bentonite in the proportion of 0.1 to 5%, and tetrasodium pyrophosphate in the proportion of 1 to 4%, said last two ingredients being present to prevent caking of the composition.

2. A substantially non-caking abrasive scouring powder comprising soap, an abrasive material selected from the group consisting of volcanic ash, silica flour, pumic, pumicite, tripoli and feldspar, a minor proportion of detergent material selected from the group consisting of water-soluble, finely divided alkali metal carbonates, silicates, phosphates and borates, said abrasive material and said alkali metal salt normally forming a caked mass when subjected to atmospheric conditions of relatively high humidity and temperature, bentonite in the proportion of 0.1 to 5%, and tetrasodium pyrophosphate in the proportion of 1 to 4%, said last two ingredients being present to prevent caking of the composition.

3. A substantially non-caking abrasive scouring powder comprising 91 to 93½% abrasive material selected from the group consisting of volcanic ash, silica flour, pumice, pumicite, tripoli and foldspar, 3 to 4% detergent material selected from the group consisting of water-soluble, finely divided alkali metal carbonats, silicates, phosphates and borates, said abrasive material and said detergent material normally forming a caked mass when subjected to atmospheric conditions of relatively high humidity and temperature, 1 to 4% terasodium pyrophosphate, and 0.5 to 2% bentonite, said last two ingredients being present to prevent caking of the composition.

4. A substantially non-caking abrasive scouring powder comprising 91 to 93½% abrasive material selected from the group consisting of volcanic ash, silica flour, pumice, pumicite, tripoli and feldspar, 3 to 4% soap and detergent material selected from the group consisting of water-soluble, finely divided alkali metal carbonates,

silicates, phosphates and borates, said detergent material being present in such amount as to form normally with said abrasive material a caked mass when subjected to atmospheric conditions of relatively high humidity and temperature, 1 to 4% tetrasodium pyrophosphate, and 0.5 to 2% bentonite, said last two ingredients being present to prevent caking of the composition.

5. A substantially non-caking scouring powder comprising 91 to 93½% silica flour, 3 to 4% sodium carbonate, said silica flour and said sodium carbonate normally forming a caked mass when subjected to atmospheric conditions of relatively high humidity and temperature, 1 to 4% tetrasodium pyrophosphate and 0.5 to 2% bentonite, said last two ingredients being present to prevent caking of the composition.

6. A substantially non-caking scouring powder comprising 91 to 93½% silica flour, 3 to 4% soap and sodium carbonate, said sodium carbonate being present in sufficient amount as to form normally with said silica flour a caked mass when subjected to atmospheric conditions of relatively high humidity and temperature, 1 to 4% tetrasodium pyrophosphate and 0.5 to 2% bentonite, said last two ingredients being present to prevent caking of the composition.

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