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SODIUM SILICATE DETERGENT
COMPOSITION

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A detergent material, consisting of alkali oxide and silica compounds (e. g., $\text{XNa}_2\text{O} \cdot \text{YSiO}_2$), has heretofore been well-known and extensively used for the cleaning of surfaces of metals and metallic parts in preparation for subsequent surface-treating processes, such as electroplating, painting and the like. Such detergent material has likewise enjoyed rather extensive use in the commercial laundry field.

Alkali oxide-silica compounds have a relatively strong alkaline reaction, and it is probably due to this property that they have found favor in such cleaning and detergent fields as those just mentioned, where strong alkalinity is required for a strenuous action and in order to remove soil and dirt in the nature of oil and grease. Such compounds are generally manufactured by the reaction of a caustic alkali, such as sodium hydroxide or potassium hydroxide and silica, present in varying proportions, respectively. Sodium orthosilicate and sodium metasilicate are specific examples of such compounds. The physical properties of these compounds is such that a relatively large amount of "fines" or dust-like particles are formed either during the manufacturing process thereof or subsequently, viz., during transportation, handling and use. Thus, even though a technically anhydrous, granular and dust-free sodium orthosilicate product is manufactured by the comparatively laborious and expensive process of grinding large particles and then classifying and screening the particles of the desired granular size, it has been found that the granular material, during packaging, handling and use, will generate a quantity of fine, dust-like particles, caused by the larger particles rubbing against each other.

The presence of these fine, dust-like particles in the alkali oxide-silica compound detergent material results in serious disadvantages and difficulties of use. This dust, due to its strongly alkaline properties, has a tendency to cause skin burns, is quite detrimental to clothing and if inhaled, attacks the mucous membranes of the human respiratory system.

Realizing that the formation and generation of fine, dust-like particles in an alkali-silica compound detergent material is inherent and unavoidable in either the manufacturing or handling and transportation processes, I have sought to overcome the difficulties and disadvantages incident thereto by, first, limiting the dust-forming and generating capacity of the material, and secondly, by so changing the physical properties of the dust-like particles already present in the ma-

terial that they will not be subject to being entrained or suspended in the air, but will remain with the body of the material during handling and use.

Heretofore, it has been sought to accomplish the prevention of dusting properties in sodium silicate detergents by treating them with saponifiable oils, fats or fatty acids which react with the alkaline silicate to form a soap. In such prior processes, difficulty is encountered in the admixture of the saponifiable oil and the like with the silicate material, inasmuch as it essentially amounts to a reaction process in which a portion of the material is formed into soap, tending to set the entire body of material in a solid mass. This requires extreme care and additional treating steps in the manufacture; for example, it has heretofore been found necessary to apply the saponifiable oil or the like, to the sodium silicate material by a relatively time-consuming and expensive spraying process with a close and careful control of the temperature conditions.

My present invention has solved the above-indicated problem and accomplished the desired results, all without materially detracting or diminishing the detergent efficiency or alkalinity of the material, while, at the same time, improving the physical properties of the material in dry form and producing a substantial saving in the cost of compounding an admixture of the ingredients.

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.

My invention particularly involves the addition of .10% to 20% of a non-saponifiable, technically ester-free and acid-free oil, such as a petroleum derivative or an essential oil. Of the petroleum derivatives I have found that kerosene or light mineral oil is quite suitable. Essential oils, such as pine oil, oil of citronella, oil of saffras, oil of clove, oil of thyme, or a mixture of two or more of any of the specifically mentioned oils, is likewise satisfactory. The addition of as little as .10% of these non-saponifiable oils to the sodium oxide-silica detergent material has the effect of eliminating any dust-forming or dust-generating capacity. Thus, the material embodying my invention, not only prevents a

sodium silicate material consisting of screened, granular-sized particles from forming dust-like particles during handling, transportation and use, but is also effective to prevent the particles of such material, which are initially of dust-like size, from being entrained in the air and in such fashion, carried into contact with the human mucous membranes, and sensitive parts of the human body. This latter advantageous result of my invention permits a substantial economy in the operation of the sodium silicate detergent material manufacturing process in that it permits utilization of the "fines" or dust-like particles discarded from the screening operation in which the larger, granular-sized particles are separated.

This result of eliminating the dust-emanating properties, or air entrainment of particles of dust-like size, by the addition of small amounts of non-saponifiable oils, is quite unexpected when it is considered that the added oil is essentially an inert material and does not react with the sodium silicate, so that ordinarily it would be expected that the liquid oil would separate out and become segregated with respect to the solid material.

I have found that up to 20% proportion of such oils may be added to such technically anhydrous sodium silicate materials without causing any separating out or segregation of the ingredients.

Furthermore, the presence of such petroleum or essential oils has the effect of preventing the particles of alkali oxide-silica compound, which in and of itself is of marked hygroscopic tendency, from absorbing moisture from the atmosphere and thus eliminating previously encountered difficulties of setting, caking and hardening of the detergent material. Inasmuch as the petroleum or essential oils added to my detergent material are not saponifiable, i. e., do not contain any appreciable amount of esters capable of being hydrolyzed by the alkalies, and are hence technically ester-free and acid-free, none of the alkaline strength of the originally present material is sacrificed by way of any reaction with the added oils. Hence, all of the originally present alkaline material is available for detergent action upon the material to be cleaned.

The sodium silicate detergent material embodying my invention may be very simply and economically compounded or admixed by a simple mixing operation in which the proper amount of oil is poured onto the dry sodium orthosilicate or sodium metasilicate material, in either granular or dust-like particle form, or a combination of both, and the mixture then subjected to a simple turn-over mixing operation, such as in a rotating pan mixer or ribbon mixer. The other alkaline materials, in addition to the sodium silicate material, may be added to the latter either prior to or along with the addition of the non-saponifiable oil.

The following are examples of specific proportions (by weight) of ingredients suitable for making up a detergent material embodying the principle of my above described invention:

Example I

	Per cent
Sodium orthosilicate (technically anhydrous)-----	90
Kerosene -----	10

This composition is quite suitable as a metal cleaner.

Example II

	Per cent
Sodium orthosilicate (technically anhydrous)-----	90
Pine oil -----	10

This composition is suitable for use as a metal cleaner or as a commercial laundry washing solution.

Example III

	Per cent
Sodium orthosilicate (technically anhydrous)-----	50
Sodium hydroxide (solid or crystal caustic) --	30
Tetrasodium pyrophosphate-----	10
Kerosene -----	5
Pine oil -----	5

This composition is suitable for use in the wash wheel of commercial laundry operation.

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 detergent composition for the introduction to commercial laundry wash wheels, such composition, in the dry state, being free from dust-emanating properties during handling and use, comprising by weight 50% technically anhydrous sodium orthosilicate, which normally during handling and use forms and generates fine dust-like particles capable of being entrained in the air, 30% solid sodium hydroxide, 10% tetrasodium pyrophosphate, 5% kerosene and 5% pine oil.

2. A detergent composition, such composition, in the dry state, being free from dust-emanating properties during handling and use, and comprising by weight, 50% to 90% technically anhydrous sodium orthosilicate which normally during handling and use forms and generates fine dust-like particles capable of being entrained in the air, approximately 30% sodium hydroxide, approximately 10% tetrasodium pyrophosphate and 5% to 10% of an oil selected from the group consisting of kerosene and pine oil.

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