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UNITED STATES PATENT OFFICE

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DETERGENT AND METHOD OF PREPARING SAME

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An object of this invention is to produce a detergent compound from a mixture of alumina, silica and alkali metal carbonate, having a high degree of causticity, and wherein the caustic effect of alkali metal oxide may be controlled so that this cleaner compound will not destroy the substances or articles being cleansed; the said compound to have large water softening properties as well as detergent properties, and a high alkaline strength, and be anhydrous and therefore economical to handle and transport.

Another object is to provide a method of making the said anhydrous detergent compound.

The invention consists of an anhydrous detergent compound, composed of alumina, silica and alkali metal oxide, in chemical union and having the generic formula $Al_2O_3(SiO_2)_x(Na_2O)_{x-1}$, in which x may have any value greater than 7, and may be adjusted to give compounds of different physical characteristics with special reference to the rate of solution as indicated by the requirements of its use in special applications.

The invention also consists in the method of producing such a compound.

The present compound is distinguished from that forming the subject of Fay H. Guernsey's Patent, No. 1,419,625, dated June 13, 1922, in that the compond is an anhydrous detergent, whereas the compound of the patent referred to is a hydrated product.

In making the compound of this invention, I take in proper proportions, silica and alumina in the form of silica sand or silica and aluminum silicates of sufficient purity, and alkali metal carbonate, mix them intimately and heat to fusion in a properly designed furnace, so that the fused product flows from the furnace in a liquid or fused condition, which is then cooled and ground or comminuted to proper size for special uses.

This ground furnace product may or may not contain some alkali metal carbonate, as desired, in excess of the amount required to form the compound of the generic formula above given, in which case the compound of the generic formula will form, and the excess alkali metal carbonate will remain as such, congealed in solid solution.

The ground furnace product may then be mixed with other material to give products having certain desired properties required for special industrial uses.

The product produced is amply stable under ordinary atmospheric conditions as to temperature and humidity, this property being highly desirable in connection with the sale, transportation and storage of the material.

I have found that the addition to this compound of one or more of certain alkali metal salts of weak acids or bases, such as, for example, sodium or potassium carbonates, phosphates, borates, hydroxides, or the like, greatly enhances the water softening properties of the detergent compound and can be made to control the degree of causticity of the compound which is much desired for many purposes.

It is also often desirable to mix or incorporate certain materials whose presence augments the emulsifying, dispersing and wetting values of the solution, such as the fixed oils, fats, resins, etc., in a saponified or sulphonated condition. This compound added to soap in its process of manufacture, or mechanically mixed with soap in a disintegrated condition as in the case of powders and flakes, both cheapens and increases the detergent value of products so produced.

I have also found that the alumina and silica in the compound have certain colloidal properties which prevent the causticity of the compound from injuring the material or article on which the compound is used. This control of the causticity of the compound may be secured by proper proportioning of the constituents, so that when dissolved in water the silica and alumina by colloidal action control the alkali metal oxide and release it from combination only as fast at it is consumed in detergent action.

I have found that in the generic formula $Al_2O_3(SiO_2)_x(Na_2O)_{x-1}$, in which x may have any value greater than 7, potassium metal oxide (K_2O) can be substituted for sodium metal oxide in whole or in part

and is therefore the equivalent to sodium metal oxide and even preferable in some instances for special uses, as in wool scouring. Therefore in said formula K_2O may replace all or a part of the Na_2O without departing from this invention.

What I claim is:—

1. A detergent in an anhydrous condition, formed of a mixture of alumina, silica and alkali metal oxide, and having substantially the formula $Al_2O_3(SiO_2)_x(Na_2O)_{x-1}$, x representing any number greater than 7.

2. A detergent in an anhydrous condition, formed of a mixture of alumina, silica and alkali metal oxide, and having substantially the formula $Al_2O_3(SiO_2)_x(Na_2O)_{x-1}$, x representing any number greater than 7, in which there has been physically incorporated an alkali metal salt of a weak acid.

3. A detergent in an anhydrous condition, formed of a mixture of alumina, silica and alkali metal oxide, and having substantially the formula $Al_2O_3(SiO_2)_x(Na_2O)_{x-1}$, x representing any number greater than 7, in which there has been physically incorporated an alkali metal salt of a weak acid, together with an emulsifying agent.

4. A detergent in an anhydrous condition, formed of a mixture of alumina, silica and alkali metal oxide, and having substantially the formula $Al_2O_3(SiO_2)_x(Na_2O)_{x-1}$, x representing any number greater than 7, in which there has been physically incorporated an alkali metal salt of a weak acid, together with an emulsifying agent, and a further quantity of alkali metal oxide sufficient to augment the alkali metal oxide which is consumed in the saponification during the process of cleansing, said quantity being small enough to enable the detergent to maintain itself in a solid condition at summer temperatures.

5. A method of making a detergent in an anhydrous condition, consisting in heating to fusion and reaction alumina, silica and alkali metal carbonate proportioned to produce a composition of the generic formula

$$Al_2O_3(SiO_2)_x(Na_2O)_{x-1}.$$

x being greater than 7.

6. A method of making a detergent in an anhydrous condition, consisting in heating to fusion and reaction, alumina, silica and alkali metal carbonate proportioned to produce a composition of the generic formula

$$Al_2O_3(SiO_2)_x(Na_2O)_{x-1},$$

x being greater than 7, cooling the same and grinding the solid product.

In testimony whereof I have hereunto set my hand this 2nd day of March, A. D. 1926.

ALFRED H. COWLES.