

UNITED STATES PATENT OFFICE

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DETERGENT COMPOSITIONS

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This invention relates to detergent compositions suitable for washing textiles and for other purposes. It relates particularly to detergent compositions which may be used in automatic washing machines which are constructed in whole or in part of vitreous enameled steel or of aluminum.

In U. S. Patent 2,335,194 there is disclosed the combination of ethylene oxide condensation products of alkyl phenol, particularly the octyl and nonyl phenol with sodium carbonate, sodium silicate, tetrasodium pyrophosphate and carboxy methyl cellulose, the disclosed products being useful for detergent purposes.

I have found that the detergent power of such combinations is greatly influenced by the particular combination of ingredients present in the combination. I have also found in testing these and similar compositions that sodium silicates are desirably present in these compositions, particularly when they are to be employed in washing machines constructed of vitreous enameled steel or of aluminum. The effect of sodium silicate, when present in the ratio of from 10% to 25% by weight, based on the anhydrous composition as given below, is to minimize, and in many cases entirely prevent, the corrosive effect of aqueous solutions of these detergents upon such structural materials. The liquid form of sodium silicate known as "water glass" should not be employed because of its adverse effect on the product. The phosphates and carbonates in the compositions may be in the hydrated or anhydrous form; however, when water of hydration is present, allowance should be made for the amount present in order to maintain the ingredients when dissolved in water within the ranges of proportions disclosed and claimed.

Within the limits stated the corrosive effect of water solution thereof is maintained at a minimum and in many cases entirely eliminated without adversely decreasing the deterative efficiency of the composition. The high deterative efficiency of my composition is obtained by restricting the amount of sodium silicate present to the limits herein stated.

The $\text{Na}_2\text{O} : \text{SiO}_2$ ratio of the sodium silicates employed should be held within the limits indicated so that the solid silicates will dissolve in the detergent solution at a rate sufficiently rapid so

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that they will be effective for corrosion prevention from the instant of solution of the detergent. They should, moreover, be employed in the amount stated, since I have found that quantities below the lower limits herein provided are ineffective for the purpose, while quantities above the upper limit are undesirable, because of an adverse effect upon the deterative efficiency of the composition.

The composition of my improved detergent should be maintained within the limits stated below, all parts being by weight:

	Parts
Condensation product of tertiary octyl or nonyl phenol with from 5-20 moles of ethylene oxide per mole of said phenol	15-25
Tetrasodium pyrophosphate or sodium triphosphate	20-60
Sodium silicate, $\text{Na}_2\text{O} : \text{SiO}_2$ ratio=1:2 to 1:3.2	10-25
Starch	0-20
Alkaline material selected from the class consisting of sodium carbonate, sodium bicarbonate and mixtures thereof	10-25
Carboxy methyl cellulose	0.5-5
Total to give 100 parts of detergent composition.	

For washing soiled textiles, the above compositions are dissolved in hot water to give preferably a 0.1% to 0.2% solution, although other concentrations may also be employed.

The following more specific examples illustrate this invention:

Example 1

A composition consisting of an intimate mixture of the following ingredients is prepared, the proportions being based on the anhydrous salts:

	Parts
Condensation product of one mole of tertiary octyl phenol with 10 moles of ethylene oxide	20
Tetrasodium pyrophosphate	40
Sodium carbonate	24
Sodium silicate (anhydrous), $\text{Na}_2\text{O} : \text{SiO}_2 = 1:2$	15
Carboxy methyl cellulose	1
Total	100

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The above composition was prepared by adding the octyl phenol-ethylene oxide condensation product to the finely divided tetrasodium pyrophosphate in a mixing device and then adding the sodium carbonate, the sodium silicate, and the carboxy methyl cellulose. The order of addition is not critical. The ingredients, all of which are in finely divided form, may be added in any desired order.

Example 2

	Parts
Condensation product of one mole of tertiary nonyl phenol with 15 moles of ethylene oxide	20
Sodium tripolyphosphate	40
Sodium carbonate	15
Sodium silicate (anhydrous), $\text{Na}_2\text{O} : \text{SiO}_2 = 1:3.2$	10
Starch	14
Carboxy methyl cellulose	1
Total	100

Example 3

	Parts
Condensation product of one mole of tertiary nonyl phenol with 10 moles of ethylene oxide	20
Tetrasodium pyrophosphate	40
Sodium sesquicarbonate	18
Sodium silicate (anhydrous), $\text{Na}_2\text{O} : \text{SiO}_2 = 1:2$	20
Carboxy methyl cellulose	2
Total	100

The above compositions provide examples of detergents exhibiting maximum detergency without noticeable corrosive effect upon vitreous enamel or upon aluminum washer baskets.

What I claim is:

1. A detergent composition consisting of 100 parts thereof, of the following ingredients in parts by weight:

	Parts
Condensation product of a tertiary alkyl phenol having from 8-9 carbon atoms in the alkyl chain with from 5-20 moles of ethylene oxide per mole of said phenol	15-25
A sodium phosphate selected from the class consisting of tetrasodium pyrophosphate and sodium tripolyphosphate	20-30
Sodium silicate, $\text{Na}_2\text{O} : \text{SiO}_2$ ratio=1:2 to 1:3.2	10-25
Starch	0-20
Alkaline material selected from the class consisting of sodium carbonate, sodium bicarbonate and mixtures thereof	10-25
Carboxy methyl cellulose	0.5-5

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2. A detergent composition consisting of the following ingredients in parts by weight:

	Parts
Condensation product of one mole of tertiary octyl phenol with 10 moles of ethylene oxide	20
Tetrasodium pyrophosphate	40
Sodium carbonate	24
Sodium silicate (anhydrous), $\text{Na}_2\text{O} : \text{SiO}_2 = 1:2$	15
Carboxy methyl cellulose	1

3. A detergent composition consisting of the following ingredients in parts by weight:

	Parts
Condensation product of one mole of tertiary octyl phenol with 15 moles of ethylene oxide	20
Sodium tripolyphosphate	40
Sodium carbonate	15
Sodium silicate (anhydrous), $\text{Na}_2\text{O} : \text{SiO}_2 = 1:3.2$	10
Starch	14
Carboxy methyl cellulose	1

4. The process which comprises dissolving in water a detergent product having a composition as defined by claim 1 to form a detergent solution and then washing textiles therewith, said washing process being conducted in the presence of vitreous enameled or aluminum surfaces, whereby corrosion of said surfaces normally occurring in the absence of the sodium silicate contained in said product is substantially prevented.

5. The process which comprises dissolving in water a detergent product having a composition as defined by claim 2 to form a detergent solution and then washing textiles therewith, said washing process being conducted in the presence of vitreous enameled or aluminum surfaces, whereby corrosion of said surfaces normally occurring in the absence of the sodium silicate contained in said product is substantially prevented.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,335,194	Nusslein et al.	Nov. 23, 1943

FOREIGN PATENTS

Number	Country	Date
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498,743	Great Britain	Jan. 9, 1939

OTHER REFERENCES

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