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(54) **Phosphate-free detergents.**

(57) Phosphate-free detergents, particularly for laboratory cleaning, based on rodium salts of methylene-phosphonic acids as sequestrants, preferred active ingredients being pentasodium salt of ethylenediaminetetra (methylenephosphonic) acid and/or heptasodium salt of diethylenetriaminepenta(methylenephosphonic) acid.

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Phosphate-free Detergents

This invention relates to detergents which are free of phosphates.

Conventional detergents rely on the use of phosphates, but these phosphates in waste outfalls degrade hydrolitically to orthophosphates which cause overgrowth of algae in sewers and water courses, and contribute to eutrophication of lakes.

There is therefore a need for substances which are effective as detergents while being free of phosphates, and an object of the present invention is to provide such substances especially, but not exclusively, for use in the cleaning of laboratories and laboratory glassware.

The invention accordingly provides a detergent composition free of phosphates and comprising a phosphonic sequestrant.

Preferred active ingredients are pentasodium salt of ethylenediaminetetra(methylenephosphonic) acid and/or heptasodium salt of diethylenetriaminepenta(methylenephosphonic) acid.

The composition may further comprise one or more of a foaming agent, a surfactant, a wetting agent, and a homogenisation-promoting agent.

The composition is preferably in the form of an aqueous solution.

Specific examples of the invention will now be described.

EXAMPLE 1

The following ingredients were added to a vat in the order stated and mixed with a paddle.

Aerosol OT 75	40.80 kg
Butyl diglycol ether	10.72 kg
Dequest 2046	75.90 kg
Dequest 2066	8.50 kg
Water	to 800 litres

After thorough mixing, the product was filtered through muslin as it was dispensed.

Aerosol OT 75 (By Cyanamid BV, Botlek, Rotterdam) comprises sodium sulphosuccinate in a mixture of ethanol and water, and is present as a foaming agent.

Butyl diglycol ether (butyl diglycol; diethylene glycol monobutyl ether) is commercially available (e.g. from Tennants (Lancashire) Ltd., Chetham, Manchester) and is present to promote homogenisation.

Dequest (trade mark) 2046 and 2066 are available from Monsanto plc, Chineham, Basingstoke. Both are sequestrants, Dequest 2046 being pentasodium salt of ethylenediaminetetra (methylenephosphonic) acid, and Dequest 2066 being heptasodium salt of diethylenetriaminepenta (methylenephosphonic) acid.

This mixture is useful as a general detergent for laboratory use.

EXAMPLE 2

The following mixture was prepared by the same procedure as in Example 1:

SXS-30	212.00 kg
Surfynol 104E	38.40 kg
Triton CF21	61.00 kg
Dequest 2046	47.00 kg
Dequest 2066	5.20 kg
Water	to 800 litres

SXS-30 is sodium xylene sulphonate from Lankro Chemicals Limited, Eccles, Manchester, and is

present as a solubilising agent.

Surfynol 104E (trade mark) by Air Products and Chemicals Inc., Wayne, Pennsylvania is a wetting agent and comprises 2, 4, 7, 9 - tetramethyl - 5 decyn - 4, 7 diol in ethylene glycol (50%).

Triton CF21 (trade mark) by Rohm and Haas, Philadelphia is a liquid anhydrous nonionic alkyl aryl polyether low-foaming surfactant.

The product of this example is useful as a detergent for automatic washers, especially for laboratory use.

The product of Examples 1 and 2 are liquids with specific gravities slightly in excess of 1.0. It would also be possible to produce the formulation of Example 2 as a powder.

The proportions of Dequest 2046 and Dequest 2066 in the above examples may be varied, and other sequestrants of the Dequest series may be substituted. If an acidic sequestrant is used, it may be necessary to include an alkali in the mixture to obtain the desired detergent pH. Alternative sequestrants are EDTA, NTA, and their derivatives. If a surfactant is present, the sequestrant must be limited to an amount compatible therewith without precipitation, the maximum likely to be 75% by weight of the constituents other than water.

Claims

1. A detergent composition free of phosphates and comprising a phosphonic sequestrant.

2. A composition according to Claim 1, comprising as active ingredient a sodium salt of a methylenephosphonic acid.

3. A composition according to Claim 2, in which the active ingredient is pentasodium salt of ethylenediaminetetra (methylenephosphonic) acid and/or heptasodium salt of diethylenetriaminepenta-(methylenephosphonic) acid.

4. A composition according to any preceding Claim, further comprising one or more of a foaming agent, a surfactant, a wetting agent, and a homogenisation-promoting agent.

5. A phosphate-free detergent composition for automatic washers, comprising sodium salt of methylene-phosphonic acid, a solubilising agent, a wetting agent, and a surfactant; said salt comprising 10%-15%, preferably about 14.4%, by weight of the foregoing; the foregoing constituents being dissolved in water.

6. A composition according to Claim 5, and having the following composition:

(a)	sodium xylene sulphonate	212.00 kg
(b)	2, 4, 7, 9 tetramethyl - 5 decyn - 4, 7 diol in ethylene glycol (50%)	38.40 kg
(c)	anhydrous nonionic alkyl aryl polyether surfactant	61.00 kg
(d)	pentasodium salt of ethylenediaminetetra (methylenephosphonic) acid	47.00 kg
(e)	heptasodium salt of diethylenetriaminepenta (methylenephosphonic) acid	5.20 kg
(f)	water	to 800 litre

or the same proportions in other quantities.

7. A phosphate-free detergent composition for laboratory cleaning purposes, comprising sodium salt of methylenephosphonic acid, a foaming agent and a homogenisation promoter; said salt comprising 50% - 75%, preferably about 59%, of the foregoing; the foregoing constituents being dissolved in water.

8. A composition according to Claim 7, and having the following composition:

(a)	sodium sulphosuccinate in a mixture of ethanol and water	40.80 kg
(b)	butyl diglycol ether	10.72 kg
(c)	pentasodium salt of ethylenediaminetetra (methylenephosphonic) acid	72.90 kg
(d)	heptasodium salt of diethylenetriaminepenta (methylenephosphonic) acid	8.50 kg
(e)	water	to 800 litre

or the same proportions in other quantities.