



PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Abrasive Scouring Cleansers

We, COLGATE-PALMOLIVE COMPANY, a Corporation organised and existing under the Laws of the State of Delaware, United States of America, of 300 Park Avenue, New York, New York 10022, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to abrasive scouring cleanser compositions.

In accordance with the present invention an abrasive scouring cleanser composition is in the form of a dry powder and comprises at least 60% water-insoluble inorganic siliceous abrasive material having a particle size of less than 0.5 mm, 0.5 to 20% chlorinated trisodium phosphate (as herein-after defined), 0.5 to 15% of a water-soluble organic detergent stable in the presence of chlorinated trisodium phosphate, 0.3 to 10% of a water-soluble inorganic bromide, and a water-soluble inorganic buffer salt which adjusts the pH of the composition (as a 50% aqueous slurry) to within the range 8.5 to 10.5 inclusive.

All percentages and parts are by weight.

The term "particle size of less than 0.5 mm" means that the largest linear dimension of all the abrasive particles is less than 0.5 mm.

The compositions (hereinafter also referred to as cleansers) exhibit an accelerated rate of oxidation and bleaching on use with aqueous media by virtue of the combined action of the inorganic bromide and the adjusted pH. Thus, these compositions exhibit improved effectiveness, especially with respect to speed and extent of stain and soil removal. These compositions are stable during storage and also are characterized by highly satisfactory odour characteristics in

use. They are also highly effective in polishing tarnished metal surfaces and in removal of smears or deposits of soft materials such as aluminium on porcelain surfaces.

Examples of abrasive for use in the scouring cleansers of the present invention are silica, feldspar, pumice, volcanic ash, diatomaceous earth, bentonite, talc and mixtures thereof. For general use, it is preferred to use either silica or feldspar of various degrees of fineness for they are relatively hard and result in a whiter product. The abrasives may vary in hardness, particle size, and shape, and the choice for a particular composition is generally dependent upon the contemplated field of application. The particle size of the abrasive is less than 0.5 mm and preferably the maximum particle size of substantially all of the abrasive is 0.15 mm. Normally the abrasive employed will have a particle size such that at least 85% and preferably 99% thereof passes through a sieve having 0.074 mm openings. On the other hand, in the interest of effective cleansing action it is appropriate for at least 8% by weight of the abrasive particles to have a diameter of about 0.037 mm or larger. The abrasive preferably is present in a proportion of at least 85% of the cleanser.

Chlorinated trisodium phosphate is a known material and may be produced by combining trisodium phosphate in its normal $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ form and an alkali metal hypochlorite (such as sodium hypochlorite) in accordance with known procedures. A typical commercial material may contain about 3.5% available chlorine. It has been proposed that chlorinated trisodium phosphate be characterized as $4(\text{Na}_3\text{PO}_4 \cdot 11\text{H}_2\text{O})\text{NaOCl}$.

The water-soluble organic detergents

[Price 5s. 0d.]

which are stable in the presence of chlorinated trisodium phosphate may be anionic, cationic, amphoteric or non-ionic in character, provided that they are compatible with the compositions as a whole in the proportions employed. Where they are liquids under normal conditions, such as the non-ionic agents generally, they may be prepared in particulate solid form after adsorption upon diatomaceous earth or other similar agents by known procedures.

Examples of suitable anionic detergents are soaps and sulphated and sulphonated synthetic detergents, especially those anionic detergents having 8 to 26 and preferably 12 to 22 carbon atoms in the molecule. The soaps are generally water-soluble salts of saturated higher fatty acids or mixtures thereof.

The sulphated and sulphonated detergents may be prepared from suitable organic materials which are amenable to "sulphonation" (true sulphonation and/or sulphation). Of the vast variety of sulphates and sulphonates suitable, it is preferred to use aliphatic sulphates and sulphonates of 8 to 22 carbon atoms and alkyl aromatic sulphonates.

The alkyl aromatic sulphonate detergents referred to may be mononuclear or polynuclear in structure. More particularly, the aromatic nucleus may be derived from benzene, toluene, xylene, phenol, cresols, phenol ethers, naphthalene or derivatives containing a phenanthrene nucleus. The alkyl group may also vary. Thus, the alkyl group may be straight or branch chained and may be, for example, dodecyl, pentadecyl, octyl, nonyl, decyl, keryl, or mixed alkyls derived from fatty materials, cracked paraffin wax olefins and polymers of lower mono olefins. While the number of sulphonate acid groups present on the nucleus may vary, it is usually to have only one such group present in order to preserve as much as possible a balance between hydrophilic and hydrophobic portions of the molecule.

More specific examples of suitable alkyl aromatic sulphonate detergents are propyl naphthalene sulphonates, mixed butyl naphthalene sulphonates, tetrahydronaphthalene sulphonates, butyl diphenyl sulphonates and butyl phenyl-phenol sulphonates. It is preferred, however, to use higher alkyl aromatic sulphonates rather than lower alkyl substituted detergents. Typical examples of this preferred class are sulphonated and alkylated benzenoid compounds wherein the alkyl group has at least 8 and preferably 10 to 16 carbon atoms. The benzene ring may possess other substituents, for instance alkyl or hydroxy groups.

Other suitable anionic detergents are the surface-active sulphated or sulphonated aliphatic compounds, preferably having 8 to 22 carbon atoms. Examples are sulphuric acid

esters of polyhydric alcohols incompletely esterified with higher fatty acids, e.g. coconut oil monoglyceride monosulphate and tallow diglyceride monosulphate; long chain pure or mixed alkyl sulphates, e.g. lauryl sulphate and cetyl sulphate; hydroxy sulphonated higher fatty acid esters, e.g. higher fatty acid ester of low molecular weight alkylol sulphonate acids such as fatty acid esters of isethionic acid; fatty acid ethanamide sulphates; and fatty acid amides of amino alkyl sulphonate acids, e.g. lauric amide of taurine, and the like. It is preferred to use sulphonated aliphatic compounds containing at least 8 carbon atoms, especially those having 12 to 22 carbon atoms in the molecule.

Although anionic detergents are preferred, cationic, nonionic and amphoteric detergents may be employed as all are part of the detergent component, provided they are compatible with the other components of the composition under the conditions of storage and use thereof.

Examples of cationic detergents are long chain alkyl quaternary ammonium salts, such as cetyl trimethyl ammonium chloride and cetyl pyridinium chloride.

Non-ionic detergents include polyoxyethylene ethers of alkyl aromatic hydroxy compounds (e.g. alkylated polyoxyethylene phenols), polyoxyethylene ethers of long chain aliphatic alcohols, polyoxyethylene ethers of hydrophobic propylene oxide polymers, and higher alkyl amine oxides such as lauryl dimethyl amine oxide.

Examples of amphoteric detergents are salts of higher alkyl beta amino propionic acids, e.g. sodium N-lauryl beta alanine; higher alkyl substituted betaines such as lauryl dimethylammonium acetate; and imidazoline type detergents exemplified by the disodium salt of 1-(2 hydroxyethyl)-1-(carboxymethyl)-2-(undecyl)-4,5 dihydroimidazolium hydroxide.

The anionic and cationic detergents are commonly used in the form of their water-soluble salts. For the synthetic anionic detergents, the alkali metal (e.g. sodium or potassium) salts are preferred, though other salts such as ammonium, amine, alkylolamine, and alkaline earth metal (e.g. calcium or magnesium) salts may be used if desired. For the cationic detergents the chloride, sulphate and acetate are examples of salts which may be employed satisfactorily.

The amount of organic detergent to be used in the compositions is from 0.5% up to 15% and preferably from 1% to 5%. Commercial detergent compositions which contain these organic detergents as the active ingredients with other materials such as sodium sulphate and various phosphates may be employed with satisfactory results.

The inorganic bromide is a solid, water-soluble bromide which preferably is of substantially neutral or slightly alkaline nature, providing a ready source of bromide ions on dissolution in water. It is preferred to employ alkali metal bromides such as sodium bromide, sodium bromide dihydrate, lithium bromide and potassium bromide, although alkaline earth metal bromides such as strontium bromide and magnesium bromide may be employed in those instances in which these water hardness-producing cations are not objectionable. The preferred bromides are anhydrous, although any suitable combination in which the chlorinated trisodium phosphate and bromide salt do not yield water of hydration to each other may be employed, thereby ensuring that the chlorinated trisodium phosphate maintains its original degree of hydration and stability in the composition. Preferably the bromide is employed in an amount which is equal to or somewhat greater than the molar equivalent of latent hypochlorite ions which is present in the product, e.g. the mole ratio of water-soluble bromide ions to latent hypochlorite ions is preferably in the range 1:1 to 1.5:1, and suitably in a proportion of 0.1% to 10% of the product.

Chlorinated trisodium phosphate is strongly alkaline in nature and, in the absence of modifying agents, an abrasive scouring cleanser formulated therewith characteristically exhibits of pH above 11.5. As set forth hereinabove, however, it has been found that the compositions exhibit maximum activity at an appreciably lower pH, and therefore the compositions of the invention are adjusted to exhibit a pH in aqueous media (i.e. in a 50% aqueous slurry) within the range 8.5 to 10.5 inclusive. This is achieved by including in the composition a water-soluble inorganic buffer salt of such a nature and in such quantity as to adjust the pH of the composition to the desired range. Examples of such salts are water-soluble inorganic alkali metal bicarbonates, such as sodium bicarbonate, acid phosphates such as monosodium dihydrogen orthophosphate, disodium monohydrogen orthophosphate, and borates such as borax. Typically these buffering agents are employed in a small but effective amount sufficient to adjust the pH of a 50% slurry of the final composition to the desired range, as exemplified by from 1 to 15% thereof based on the final composition, and preferably 2 to 7% thereof.

Various additives may also be present in the abrasive deterrent compositions of the invention. These additives may be inorganic or organic. Inorganic water-soluble builder salts may be added in any suitable amounts, usually up to 25% and preferably not more

than 15%. There may also be present minor amounts of sequestering agents such as nitrilotriacetic acid, ethylene diamine tetraacetic acid, diethylene triamine pentaacetic acid and their salts (e.g. sodium salts), fillers such as wood pulp, sawdust, magnesite or whiting, sodium carboxymethylcellulose, anti-caking agents and optical brighteners. These constituents, as well as all the other constituents of the cleansers, desirably are of the same fine particle size as the abrasive constituent. They may be ground in an attrition mill if necessary in order to ensure the preparation of a uniform product of smooth appearance.

The following Examples illustrate the present invention. The ingredients were dry mixed and all the solid constituents employed in the compositions of these examples had a particle size of less than 0.5 mm, and at least 8% by weight of the abrasive particles had a diameter in the range 0.37 to 0.15 mm. The chlorinated trisodium phosphate (TSP) used was of commercial grade and contained 3.5% available chlorine. The pH was determined in a 50% aqueous slurry.

EXAMPLE I

An abrasive scouring cleanser composition was prepared by dry mixing:

	Parts
Silica (at least 99% passed through a wire sieve in which the openings between the wires were 0.074 mm.)	85.2
Chlorinated trisodium phosphate	7.5
Sodium bromide	0.5
Sodium bicarbonate	2.0
Sodium dodecyl benzene sulphonate	3.0
Sodium sulphate	1.3
Sodium silicate	0.5
This composition exhibited a pH of 10.0.	105

EXAMPLE II

	Parts
Silica as in Example I	79.2
Chlorinated trisodium phosphate	7.5
Sodium bromide	0.5
Sodium bicarbonate	8.0
Sodium dodecyl benzene sulphonate	3.0
Sodium sulphate	1.3
Sodium silicate	0.5
This composition exhibited a pH of 8.8.	115

EXAMPLE III

	Parts
Silica as in Example I	86.05
Sodium dodecyl benzene sulphonate	3.0
Sodium sulphate	0.45
Sodium silicate	0.45
Chlorinated trisodium phosphate	7.5
Sodium bromide dihydrate	1.0
Monosodium dihydrogen orthophosphate	2.0
This composition exhibited a pH of 10.4.	125

EXAMPLE IV

	<i>Parts</i>
Silica as in Example I	81.3
Sodium dodecyl benzene sulphonate	3.0
5 Sodium sulphate	0.45
Chlorinated trisodium phosphate	7.5
Borax	6.8
Sodium bromide	0.5
This composition exhibited a pH of	10.0.

presence of chlorinated trisodium phosphate, 40
0.3 to 10% of a water-soluble inorganic
bromide, and a water-soluble inorganic buf-
fer salt which adjusts the pH of the com-
position (as a 50% aqueous slurry) to with-
in the range 8.5 to 10.5 inclusive. 45

2. An abrasive scouring cleanser com-
position as claimed in Claim 1 in which the
siliceous abrasive material is silica in an
amount of at least 85%.

3. An abrasive scouring cleanser com- 50
position as claimed in Claim 1 or Claim 2
in which the water-soluble inorganic
bromide is an alkali metal bromide.

4. An abrasive scouring cleanser com-
position as claimed in Claim 3 in which 55
the alkali metal bromide is sodium bromide.

5. An abrasive scouring cleanser com-
position as claimed in any of the preceding
claims in which the water-soluble inorganic
buffer salt is sodium bicarbonate. 60

6. An abrasive scouring cleanser com-
position as claimed in Claim 1 in which
the abrasive is silica having a particle size
of less than 0.15 mm and such that at least
85% thereof passes through a sieve having 65
0.074 mm openings, the detergent is a
sodium dodecyl benzene sulphonate, the
bromide is sodium bromide, and the water-
soluble inorganic buffer salt is sodium bi-
carbonate and is present in the range 1 to 70
15%.

7. An abrasive scouring cleanser com-
position as claimed in Claim 1 and sub-
stantially as described.

8. An abrasive scouring cleanser com- 75
position substantially as described in any
of the Examples.

KILBURN & STRODE,
Chartered Patent Agents,
Agents for the Applicants.

EXAMPLE V

	<i>Parts</i>
Silica as in Example I	66.6
Sodium dodecyl benzene sulphonate	3.0
Sodium sulphate	0.45
15 Sodium silicate	0.45
Chlorinated trisodium phosphate	
Disodium monohydrogen orthophos- phate dodecahydrate	21.5
Sodium bromide	0.5
20 This product exhibited a pH of	10.5.

EXAMPLE VI

	<i>Parts</i>
Feldspar	84.1
Sodium dodecyl benzene sulphonate	3.0
25 Sodium sulphate	0.45
Sodium silicate	0.45
Chlorinated trisodium phosphate	7.5
Sodium bicarbonate	4.0
Sodium bromide	0.5
30 This composition exhibited a pH of	9.0.

WHAT WE CLAIM IS:—

1. An abrasive scouring cleanser com-
position in the form of a dry powder, com-
prising at least 60% of a water-insoluble in-
organic siliceous abrasive material having 35
a particle size of less than 0.5mm, 0.5 to
20% of chlorinated trisodium phosphate as
hereinbefore defined, 0.5 to 15% of a water-
soluble organic detergent stable in the

EXAMPLE IV

	<i>Parts</i>
Silica as in Example I	81.3
Sodium dodecyl benzene sulphonate	3.0
5 Sodium sulphate	0.45
Chlorinated trisodium phosphate	7.5
Borax	6.8
Sodium bromide	0.5
This composition exhibited a pH of 10.0.	

presence of chlorinated trisodium phosphate, 40
0.3 to 10% of a water-soluble inorganic
bromide, and a water-soluble inorganic buf-
fer salt which adjusts the pH of the com-
position (as a 50% aqueous slurry) to with-
in the range 8.5 to 10.5 inclusive. 45

2. An abrasive scouring cleanser com-
position as claimed in Claim 1 in which the
soliceous abrasive material is silica in an
amount of at least 85%.

3. An abrasive scouring cleanser com- 50
position as claimed in Claim 1 or Claim 2
in which the water-soluble inorganic
bromide is an alkali metal bromide.

4. An abrasive scouring cleanser com-
position as claimed in Claim 3 in which 55
the alkali metal bromide is sodium bromide.

5. An abrasive scouring cleanser com-
position as claimed in any of the preceding
claims in which the water-soluble inorganic
buffer salt is sodium bicarbonate. 60

6. An abrasive scouring cleanser com-
position as claimed in Claim 1 in which
the abrasive is silica having a particle size
of less than 0.15 mm and such that at least
85% thereof passes through a sieve having 65
0.074 mm openings, the detergent is a
sodium dodecyl benzene sulphonate, the
bromide is sodium bromide, and the water-
soluble inorganic buffer salt is sodium bi-
carbonate and is present in the range 1 to 70
15%.

7. An abrasive scouring cleanser com-
position as claimed in Claim 1 and sub-
stantially as described.

8. An abrasive scouring cleanser com- 75
position substantially as described in any
of the Examples.

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EXAMPLE V

	<i>Parts</i>
Silica as in Example I	66.6
Sodium dodecyl benzene sulphonate	3.0
Sodium sulphate	0.45
15 Sodium silicate	0.45
Chlorinated trisodium phosphate	
Disodium monohydrogen orthophos- phate dodecahydrate	21.5
Sodium bromide	0.5
20 This product exhibited a pH of 10.5.	

EXAMPLE VI

	<i>Parts</i>
Feldspar	84.1
Sodium dodecyl benzene sulphonate	3.0
25 Sodium sulphate	0.45
Sodium silicate	0.45
Chlorinated trisodium phosphate	7.5
Sodium bicarbonate	4.0
Sodium bromide	0.5
30 This composition exhibited a pH of 9.0.	

WHAT WE CLAIM IS:—

1. An abrasive scouring cleanser com-
position in the form of a dry powder, com-
prising at least 60% of a water-insoluble in-
organic siliceous abrasive material having 35
a particle size of less than 0.5mm, 0.5 to
20% of chlorinated trisodium phosphate as
hereinbefore defined, 0.5 to 15% of a water-
soluble organic detergent stable in the

