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WATER-SOLUBLE SCOURING COMPOSITIONJohn Alexander Monick, 102 Jasper Ave.,
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4 Claims

ABSTRACT OF THE DISCLOSURE

A stable nongritty cleanser composition comprising a detergent, bleach, and a water soluble salt, said salt having less than 6 molecules of water of hydration.

This invention is directed to a stable non-gritty chlorine bleach containing cleanser composition.

It is well known in the art to use a bleach in compositions which are intended for use as cleansers. In general the compounds employed as bleaches are chlorine containing salts which, when contacted with water, release their chlorine which acts to remove stains. As an aid in the removal of stains, it is also customary to include an insoluble compound as an abrasive to loosen any surface dirt which the scouring composition may be used to remove. In the past the insoluble salts have included ground quartz, marble, limestone, dolomite, pumice stone or ground rock. Furthermore, it has been customary to include in compositions of this type anionic and nonionic detergents which impart surface active properties to the composition. The previously used anionic detergents have included sodium dodecylbenzenesulfonate, potassium dodecylbenzenesulfonate, sodium laurylbenzenesulfonate, sodium cetylbenzenesulfonate; the alkali metal salts of the higher alkylsulfonic acids and the alkali metal dialkyl sulfosuccinates, e.g., sodium dioctylsulfosuccinate, and sodium dihexylsulfosuccinate, sodium sulfoethylphthalate, sodium oleyl-p-anisidinesulfonate; sodium tetradecanesulfonate; sodium diisopropylphenathalenesulfonate; sodium octylphenoxyethoxyethylsulfate, etc. and the alkali metal alkyl sulfates, e.g. sodium lauryl sulfate. In addition, the specific nonionic surface active agents have included alkaryl polyglycol detergents such as alkyl-phenoethylene oxide condensates (2–200 moles ethylene oxide), e.g., p-isooctyl phenol-polyethylene oxide (10 ethylene oxide units), long chain alcohol-ethylene oxide condensation products (2–200 moles ethylene oxide), e.g., dodecyl alcohol-polyethylene oxides having 4 to 16 ethylene oxide units per molecule, polyglycerol monolaurate, glycol dioleate, sorbitan monolaurate, sorbitan sesquioleate, the condensation products of ethylene oxide with sorbitan esters of long chain fatty acids (Tweens), alkylolamides, amine oxides, phosphine oxides, sulfoxides, etc.

While compositions of this type have been effective, there have been certain problems associated with their use, that is to say, that the insoluble compounds used as abrasives result in an unpleasant gritty residue which is left on the surface on which the composition has been employed. This necessitates expending considerable additional effort to remove this undesirable gritty film.

In an effort to eliminate this problem, it has been conventional to substitute a soluble salt for all or part of the insoluble compound. By substituting a soluble salt for an insoluble one, one obtains a composition which rinses away and leaves no residue, as all the components of the composition are then soluble and are rinsed away in the normal cleaning process. The salts conventionally used in a composition of this type include hydrated salts such as carbonates, bicarbonates, phosphates, borates, and halogen salts of alkali and alkaline earth metals. While these salts eliminated the gritty residue which was formerly a

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problem, they resulted in a composition which was unstable if it contained a bleach.

Therefore, it is an object of this invention to provide a stable, non-gritty, bleach containing scouring composition.

Another object of the instant invention is to provide a stable chlorine bleach containing composition comprising a chlorine bleach, detergent, and a water soluble salt.

Another object of the instant invention is to provide a stable chlorine containing cleanser comprising a chlorine containing compound, a hydrated water soluble salt, and a detergent.

Yet another object of the instant invention is to provide a stable cleanser composition containing a water soluble salt having less than 6 molecules of water of hydration.

Still another object of the instant invention is to provide a stable chlorine bleach containing cleanser composition comprising a water soluble salt having less than 6 molecules of water of hydration, a detergent and a bleaching compound containing chlorine.

Yet a further object of this invention is to provide a scouring composition comprising more than fifty percent of a water soluble abrasive compound having less than 6 molecules of water of hydration, an anionic or non-ionic surface active agent, and a bleach.

The instant invention is directed to a composition comprising a detergent compound, a bleaching compound and a water soluble salt containing less than 6 molecules of water of hydration.

The useful detergents which may be used in conjunction with the instant scouring composition include anionic detergents such as alkylbenzene-sulfonic acid and its salts, and compounds of the formula alkyl-phenyl-SO₃-M, wherein alkyl may be straight or branched and M is hydrogen or an alkali metal, which compounds comprise a well-known class of anionic detergents and include sodium dodecylbenzene sulfonate, potassium dodecylbenzenesulfonate, sodium laurylbenzenesulfonate, sodium cetylbenzenesulfonate; the alkali metal salts of the higher alkylsulfonic acids and the alkali metal dialkyl sulfosuccinates, e.g., sodium dioctylsulfosuccinate, and sodium dihexylsulfosuccinate, sodium sulfoethylphthalate, sodium oleyl-p-anisidinesulfonate; sodium tetradecanesulfonate; sodium diisopropylphenathalenesulfonate; sodium octylphenoxyethoxyethylsulfonate, etc.; and the alkali metal alkyl sulfates, e.g., sodium lauryl sulfate.

Among the above-noted alkylbenzene-sulfonic acid and salts thereof, there are included those which are biodegradable and which are particularly characterized by a linear alkyl substituent of from C₁₀ to C₂₂ and preferably from C₁₂ to C₁₅. It is, of course, understood that the carbon chain length represents, in general, an average chain length since the method for producing such products usually employs alkylating reagents of mixed chain length. It is clear, however, that substantially pure olefins as well as alkylating compounds used in other techniques can and do give alkylated benzene sulfonates wherein the alkyl moiety is substantially (i.e. at least 99%) of one chain length, i.e., C₁₂, C₁₃, C₁₄, or C₁₅. The linear alkyl benzene sulfonates are further characterized by the position of the benzene ring in the linear alkyl chain, with any of the position isomers (i.e. alpha to omega) being operable and contemplated.

The linear alkyl benzene sulfonates are generally and conveniently prepared by sulfonating the corresponding alkyl benzene hydrocarbons which in turn may be prepared by alkylating benzene with a linear alkyl halide, a 1-alkene or a linear primary or secondary alcohol. Pure isomers (of the 1-phenyl isomer) are prepared by reduction of the acylated benzene (alkyl phenyl ketone) using

a modification of the Wolff-Keshner reaction. The 2-phenyl isomer is obtained from n-undecyl phenyl ketone and methyl magnesium bromide to form the tertiary alcohol which is dehydrated to the alkene and then hydrogenated. The 5-phenyl isomer is obtained similarly from n-heptyl phenyl ketone and n-butyl magnesium bromide. The other isomers are obtained in a similar manner from the appropriate n-alkyl phenyl ketone and n-alkyl magnesium bromide.

In addition to the benzene sulfonates one may also employ the lower alkyl (C_1 to C_4) analogs of benzene such as toluene, xylene, the trimethyl benzenes, ethylbenzene, isopropyl benzene and the like. The sulfonates are generally employed in the water soluble salt form which include as the cation, the alkali metals, ammonium, and lower amine and alkanolamine.

Examples of suitable linear alkyl benzene sulfonates:

sodium n-decyl benzene sulfonate
sodium n-dodecyl benzene sulfonate
sodium n-tetradecyl benzene sulfonate
sodium n-pentadecyl benzene sulfonate
sodium n-hexadecyl benzene sulfonate

and the corresponding lower alkyl substituted homologues of benzene as well as the salts of the cations previously referred to. Mixtures of these sulfonates may, of course, also be used which mixtures which may include compounds wherein the linear alkyl chain is smaller or larger than indicated herein provided that the average chain length in the mixture conforms to the specific requirements of C_{10} to C_{22} .

The linear paraffin sulfonates are also a well-known group of compounds and include water soluble salts (alkali metal, amine, alkanolamine, and ammonium) of:

1-decane sulfonic acid
1-dodecane sulfonic acid
1-tridecane sulfonic acid
1-tetradecane sulfonic acid
1-pentadecane sulfonic acid
1-hexadecane sulfonic acid

as well as the other position isomers of the sulfonic acid group.

In addition to the paraffin sulfonates illustrated above, others with the general range of C_{10} to C_{22} alkyls may be used, with the most preferable range being from C_{12} to C_{20} .

The linear alkyl sulfates which are contemplated in this invention comprise the range of C_{10} to C_{20} . Specific examples include sodium n-decyl sulfate; sodium n-dodecyl sulfate; sodium n-hexadecyl sulfate; sodium n-heptadecyl sulfate; sodium n-octadecyl sulfate; and the ethoxylated (1 to 100 moles ethylene oxide) derivatives; and, of course, the other water-soluble salt-forming cations mentioned above.

Also useful in conjunction with the instant invention are nonionic detergents such as alkaryl polyglycol detergents such as alkyl-phenol-ethylene oxide condensates (2-200 moles ethylene oxide), e.g., p-isooctyl phenol-polyethylene oxide (10 ethylene oxide units), long chain alcohol-ethylene oxide condensation products (2-200 moles ethylene oxide), e.g., dodecyl alcohol-polyethylene oxides having 4 to 16 ethylene oxide units per molecule, polyglycerol monolaurate, glycol dioleate, sorbitan mono-laurate, sorbitan monostearate, sorbitan monopalmitate, sorbitan monooleate, sorbitan sesquioleate, the condensation products of ethylene oxide with sorbitan esters of long chain fatty acids (Tweens), alkylolamides, amine oxides, phosphine oxides, sulfoxides, etc.

The bleaching compositions useful in the instant invention include solid chlorine yielding compounds such as trichlorocyanuric acid and its salts, dichlorocyanuric acid and its salts, chlorinated trisodium phosphate, calcium hypochlorite, and compounds of a similar type.

It has unexpectedly been found that when one combines the above ingredients with more than fifty percent of a water soluble salt containing less than 6 molecules of water of crystallization, one obtains a stable, nongritty scouring composition. While the use of compounds similar to those generally described is old, the salts previously employed have included a lesser amount of salts such as:

sodium borate decahydrate
sodium sulfate decahydrate
sodium carbonate decahydrate
sodium hypophosphate decahydrate
sodium phosphate dodecal hydrate
calcium chloride hexahydrate

all of which result in a composition which is unstable due to deterioration of the chlorine containing components. It has now been found, however, that this can be overcome by limiting the molecules of water of hydration that the water soluble salt employed in the composition contains and by using more than fifty percent thereof. Useful water soluble salts may be exemplified by, but are not limited to:

lithium phosphate hemihydrate
lithium potassium tartrate monohydrate
lithium tartrate monohydrate
lithium borate pentahydrate
lithium bromide monohydrate
anhydrous lithium carbonate
lithium chloride
lithium citrate tetrahydrate
lithium fluoride
lithium iodide trihydrate
anhydrous lithium nitrate
magnesium biphosphate trihydrate
dibasic magnesium citrate pentahydrate
dibasic magnesium phosphate trihydrate
tribasic magnesium phosphate pentahydrate
sodium ammonium phosphate tetrahydrate
sodium ammonium sulfate tetrahydrate
anhydrous sodium bicarbonate
sodium bisulfate monohydrate
anhydrous sodium bisulfite
sodium bitartrate monohydrate
anhydrous sodium bromate
anhydrous sodium bromide
sodium carbonate monohydrate
anhydrous sodium carbonate
sodium chloride
sodium citrate dihydrate
sodium hypophosphate monohydrate
anhydrous sodium nitrate
anhydrous sodium nitrite
sodium borate pentahydrate
sodium perborate tetrahydrate
monobasic sodium phosphate monohydrate
dibasic sodium phosphate pentahydrate
sodium sulfide
anhydrous calcium bromide
anhydrous calcium carbonate
calcium chloride dihydrate
calcium nitrate monohydrate
calcium nitrite monohydrate
dibasic calcium phosphate monohydrate
monobasic calcium phosphate dihydrate
calcium sulfate dihydrate
anhydrous calcium sulfate
calcium sulfite dihydrate
potassium bicarbonate
anhydrous potassium bisulfate
potassium borate pentahydrate
anhydrous potassium bromide
anhydrous potassium carbonate
potassium carbonate 1.1/2 water
potassium chloride
potassium citrate monohydrate

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potassium fluoride
monobasic potassium phosphite
anhydrous potassium iodate
potassium iodide
anhydrous potassium nitrate
anhydrous potassium nitrite
potassium percarbonate monohydrate
monobasic potassium phosphate
potassium pyrophosphate trihydrate
anhydrous potassium sulfate
potassium sulfite dihydrate
potassium tartrate hemihydrate

The composition of the instant invention, in addition to the water soluble salt with less than six molecules of water of hydration, bleach, and detergent, may contain builders, brighteners, germicides, soil suspending agents, anti-redeposition agents, anti-oxidants, coloring materials (dyes and pigments), perfumes, water-soluble alcohols, non-detergent alkali metal benzene sulfonates, etc.

The following examples are provided as being exemplary of the composition of the instant invention which is not to be deemed as being limited thereto. In addition, these examples teach the criticality of the degree of hydration of the water soluble salt employed in the instant composition and the concentration thereof in relation to the stability of the total composition.

EXAMPLE I

A composition comprising:

Borax (decahydrate)	90.4
Linear tridecyl sodium salt	9.0
Sodium salt of trichlorocyanuric acid	0.5
Perfume	0.1

was formulated in a ball mill and packaged to test the stability thereof over a controlled time period in comparison with the composition of Example II. The compositions were stored at 120° F., 90° F., and at room temperature for a period of three, six and twelve weeks. The composition of this example lost considerable weight at each of the indicated temperatures during each of the intervals.

EXAMPLE II

A composition comprising:

Borax pentahydrate	90.4
Linear tridecyl sodium salt	9.0
Sodium salt of trichloro-cyanuric acid	0.5
Perfume	0.1

was formulated in a ball mill and packaged to test the stability thereof over a controlled time period. In addition, this composition was tested to determine if a residue was left after the cleaning of a porcelain surface. This composition lost less weight and did not cake during the time intervals and at the temperatures of Example I, while the composition of Example I caked at each of the indicated temperatures.

EXAMPLE III

A composition comprising:

Fine silex	87.840
Perfume	0.250
Phthalocyanine Blue	0.125
Sodium bromide	0.700
Sprayed LAS ¹ detergent	6.635
Trisodium phosphate, anhydrous	3.950
Trichlorocyanuric acid, sodium salt	0.500

¹ Linear tridecylbenzene sulfonate.

was formulated in a ball mill. This composition was tested by the method of Example I. As a result of these tests, the bleaching compound contained in the formulation, i.e. sodium trichlorocyanuric acid, deteriorated and the composition was therefore deemed unstable.

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EXAMPLE IV

A composition comprising:

Sodium chloride	87.840
Perfume	.250
5 Phthalocyanine Blue	.125
Sodium bromide	.700
Sprayed LAS ¹ detergent	6.635
Trisodium phosphate, anhydrous	3.950
10 Trichlorocyanuric acid, sodium salt	.500

¹ Linear tridecylbenzene sulfonate.

was formulated in a ball mill. This composition was tested by the method of Example I. As a result of these tests the composition of this example was unexpectedly determined to be stable as the chlorine containing compound had not deteriorated and the weight loss of the composition was negligible.

EXAMPLE V

A composition comprising:

Sodium chloride	40.000
Fine silex	47.840
Perfume	0.250
Phthalocyanine Blue	0.125
25 Sodium bromide	0.700
Sprayed LAS ¹ detergent	6.635
Trisodium phosphate, anhydrous	3.950
Trichlorocyanuric acid, sodium salt	0.500

¹ Linear tridecylbenzene sulfonate.

was formulated in a ball mill. This composition was tested by the method of Example I. As a result of these tests, the bleaching compound contained in the formulation, i.e. sodium trichlorocyanuric acid, deteriorated and the composition was therefore deemed unstable.

EXAMPLE VI

A composition comprising:

Calcim sulfate	90.4
40 Sodium dodecyl benzene sulfonate	9.0
Trichlorocyanuric acid	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE VII

A composition comprising:

50 Potassium bisulfate	90.4
Sodium lauryl benzene sulfonate	9.0
Dichlorocyanuric acid	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE VIII

A composition comprising:

Potassium borate pentahydrate	90.4
Potassium dodecyl benzene sulfonate	9.1
Sodium salt of trichlorocyanuric acid	0.5
65 Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE IX

A composition comprising:

Potassium carbonate	90.4
Sodium dioctyl sulfosuccinate	9.1
Sodium salt of dichlorocyanuric acid	0.5
75 Perfume	0.1

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was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE X

A composition comprising:

Calcium nitrite monohydrate	90.4
Sodium hexadecyl benzene sulfonate	9.0
Calcium hypochlorite	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE XI

A composition comprising:

Calcium nitrate monohydrate	90.4
Sodium n-heptadecyl sulfate	9.0
Chlorinated trisodium phosphate	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE XII

A composition comprising:

Calcium chloride dihydrate	90.4
Sorbitan monolaurate	9.0
Trichlorocyanuric acid	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE XIII

A composition comprising:

Lithium carbonate	90.4
Sorbitan monostearate	9.0
Dichlorocyanuric acid	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE XIV

A composition comprising:

Lithium chloride	90.4
Sodium n-pentadecyl sulfonate	9.0
Sodium salt of trichlorocyanuric acid	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE XV

A composition comprising:

Sodium pyrophosphate	90.4
Sodium n-octadecyl sulfonate	9.0
Sodium salt of dichlorocyanuric acid	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

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EXAMPLE XVI

A composition comprising:

Sodium carbonate	90.4
Sodium lauryl sulfonate	9.0
Calcium hypochlorite	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE XVII

A composition comprising:

Sodium bicarbonate	90.4
Sodium cetyl benzene sulfonate	9.0
Chlorinated trisodium phosphate	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

EXAMPLE XVIII

A composition comprising:

Ammonium chloride	90.4
Sodium hexyl sulfosuccinate	9.0
Trichlorocyanuric acid	0.5
Perfume	0.1

was also formulated. The above composition was tested as in Example II and found to be stable and was also found to leave no gritty residue on a cleaned porcelain surface.

Each of the ingredients of the instant invention are employed in ranges in which they are conventionally used. The amount of detergent may range from 1-30% and one may use from 0.01-15% bleach. In all cases, however, the amount of water soluble salt having less than six molecules of water of hydration is more than fifty percent.

EXAMPLE XIX

Example III was repeated, employing in separate formulations the composition of Example III and two additional formulations, wherein the fine silex was replaced from the composition of Example III by an equal amount of borax pentahydrate in one formulation and an equal amount of borax decahydrate in another formulation. These three compositions were studied for their stability under ambient conditions. This study was run concurrently, and after five weeks storage in conventional containers these two compositions, along with the composition of Example III, were analyzed for percent chlorine loss. The results are as follows:

	Chlorine loss (percent)
Composition of Example III	28
Composition of Example III having silex replaced with borax pentahydrate	11
Composition of Example III having silex replaced with borax decahydrate	48

While various preferred embodiments of the present invention have been illustrated by way of specific example, it is to be understood that the present invention is in no way to be deemed as limited thereto, but should be construed as broadly as any or all equivalents thereof.

I claim:

1. In a method for cleaning surfaces by scouring followed by rinsing with water, the improvement which comprises employing as a scouring composition a stable, compatible, non-gritty composition consisting essentially of,

(a) 1 to 30% by weight of a detergent selected from the group consisting of anionic and nonionic detergents,

(b) from 0.01 to 15% by weight of a chlorine bleaching compound, and

(c) at least more than 50% by weight of a water soluble abrasive salt having less than six molecules of water of hydration, and selected from the group consisting of alkali and alkaline earth metal salts, said components a, b and c constituting substantially the entire composition.

2. The process of claim 1 wherein the bleaching compound is selected from the group consisting of trichlorocyanuric acid, the sodium salt of trichlorocyanuric acid, dichlorocyanuric acid, the sodium salt of dichlorocyanuric acid, calcium hypochlorite, and chlorinated trisodium phosphate.

3. The process of claim 1 wherein the detergent is selected from the class consisting of linear alkyl benzene sulfonates.

4. The process of claim 1 wherein the water soluble salt having less than six molecules of water of hydration is selected from the group consisting of sodium chloride, 20

sodium borate, sodium sulfate, sodium carbonate, and sodium prosphate.

References Cited

UNITED STATES PATENTS

5	2,534,781	12/1950	MacMahon	252—99
	2,590,794	3/1952	Robson	252—187
	2,634,238	4/1953	Soule	252—99
	2,980,622	4/1961	Symes	252—99
	3,108,079	10/1963	Wixon	252—99
10	3,120,378	2/1964	Lee et al.	252—95
	3,256,199	6/1966	Symes	252—99
	3,336,228	8/1967	Fuchs et al.	252—99
	3,361,675	1/1968	Fuchs et al.	252—99

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