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DETERGENT COMPOSITIONS CONTAINING N-CHLORO-IMIDES

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ABSTRACT OF THE DISCLOSURE

Deteregnt compositions containing a water-soluble organic detergent; an N-halo-imide; and an amount effective to stabilize said N-halo-imide of anhydrous sodium acetate. The detergent compositions exhibit desirable cleaning, oxidizing and bleaching properties and are stabilized against loss of available halogen.

BACKGROUND OF THE INVENTION

This invention relates to detergent compositions containing a detergent component and a source of available halogen and which are adapted to provide in use both cleansing and oxidizing functions. More particularly, it relates to detergent compositions containing, as a bleaching agent, a source of halogen and a stabilizing compound effective to stabilize the bleaching agent against loss of its available halogen.

The use of bleaching agents in detergent compositions adapted to the provision of cleansing, oxidizing, bleaching and disinfecting properties has been well known in the art. For example, the utilization of chlorine-, bromine- and oxygen-containing bleaching compounds has been described in U.S. Pats. 3,048,546 to Lake et al. (August 7, 1962); 3,556,711 to Stalter (Jan. 19, 1971); 3,583,922 to McClain et al. (June 8, 1971); 3,575,865 to Burke et al. (Apr. 20, 1971) and 3,578,598 to Burke (May 11, 1971).

Hypohalite-releasing bleaching agents, i.e., those which liberate hypohalite, e.g. hypochlorite, upon contact with water comprise a relatively preferred class of bleaching agents employed in the detergent arts. These hypohalite-releasing agents include those of the N-halo-imide-type and are especially adapted to the provision of relatively high levels of oxidizing and bleaching performance. While the N-halo-imides are effective to provide desirable bleaching and oxidizing properties, such materials tend upon storage to lose their bleaching and oxidizing potential. The loss of available chlorine or bromine is particularly notable upon storage under adverse conditions of temperature and humidity. Inasmuch as the N-halo-imides are adapted to provide their available halogen upon contact with water, as for example, during a cleansing operation, they are particularly susceptible to loss of available halogen by reason of contact with levels of moisture which might be encountered during storage, particularly under adverse conditions of temperature and humidity. Thus it is found that the oxidizing and bleaching capacity of an N-halo-imide bleaching compound in a detergent composition can diminish rather markedly over relatively short periods of storage, for example, over periods of time as short as one or two days under particularly adverse conditions of temperature and humidity.

The present invention resides in detergent compositions having a water-soluble organic detergent component, an N-halo-imide bleaching agent as a source of available halogen and an effective amount of a stabilizing agent capable of minimizing the loss of available halogen upon storage. In accordance with the present invention, it has been discovered that there can be prepared detergent compositions exhibiting both desirable cleansing and oxidizing properties even after storage under relatively severe conditions of temperature and humidity.

SUMMARY OF THE INVENTION

The present invention is based in part upon the discovery that the incorporation of anhydrous sodium acetate in a detergent composition containing an N-halo-imide bleaching agent permits the preparation of detergent compositions exhibiting desirable cleansing and oxidizing effects and having an improved tendency to effectively reduce halogen loss for relatively extended periods of time. Accordingly, in its composition aspect, the present invention provides a detergent composition stabilized against loss of available halogen and consisting essentially of a water-soluble organic detergent; an N-halo-imide bleaching agent capable of liberating hypohalite upon contact with aqueous media; and anhydrous sodium acetate in an amount sufficient to stabilize the N-halo-imide against loss of halogen.

It has been discovered that detergent compositions containing an N-halo-imide bleaching agent can be effectively stabilized against loss of available halogen so as to maximize in use the desirable bleaching and oxidizing properties which normally characterize such agents.

DETAILED DESCRIPTION OF THE INVENTION

The water-soluble organic detergents which can be used in the detergent compositions of this invention are anionic, nonionic, zwitterionic and cationic organic detergents.

Examples of suitable deteregnts for use in the compositions of this invention include thoese detergents described in U.S. Pat. 3,318,817 at column 4, line 37, through column 6, line 30, and column 9, line 6 through line 57. This list is merely illustrative. The disclosure of this patent is incorporated herein by reference.

Suitable cationic detergents are those having the formula $R—N(R^2)_3{}^{(+)}X^{(-)}$ wherein R is an alkyl chain containing from about 8 to about 20 carbon atoms, each R^2 is selected from the group consisting of alkyl and alkanol groups containing from 1 to 4 carbon atoms and benzyl groups there being normally no more than one benzyl group and two R^2 groups can be joined by either a carbon-carbon ether, or imino linkage to form a ring structure, and X represents a halogen atom, sulfate group, nitrate group or other pseudohalogen group. Specific examples are coconut alkyl trimethyl amine chloride, dodecyl dimethyl benzyl bromide, and dodecyl methyl morpholino chloride.

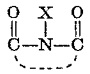
While suitable detergent compounds of the invention include soap, non-soap anionic, nonionic, zwitterionic, and cationic detergents as hereinbefore mentioned, preferred herein are the non-soap anionic detergents. Examples of these preferred anionic detergents are the water-soluble sulfated and sulfonated synthetic detergents. More particularly, it is preferred to employ an alkyl benzene sulfonate detergent wherein the alkyl group has from 8 to

18 carbon atoms. Suitable examples are sodium decyl benzene sulfonate, sodium dodecyl and pentadecyl sulfonates wherein the dodecyl and pentadecyl groups are derived from a propylene polymer, and sodium octadecyl benzene sulfonates. Other preferred anionic detergents are the surface-active sulfated or sulfonated aliphatic compounds, preferably having 8 to 22 carbon atoms. Examples thereof are the long-chain pure or mixed higher alkyl sulfates, e.g., lauryl sulfate and coconut fatty alcohol sulfate.

The anionic detergent components are commonly used in the form of their water-soluble salts. Preferred water-soluble cations are the alkali metal and ammonia cations, the sodium and potassium cations being particularly preferred.

The purpose of the organic detergent component is to provide its known and principal detergency or cleansing effects. The amount of detergent employed in the compositions of the invention will vary depending upon the particular soiling situation encountered, the nature of the detergent employed, the particular type of composition prepared, e.g., laundry pre-soak composition, heavy-duty laundry detergent composition, automatic dishwashing composition, abrasive scouring composition or the like. Generally, the compositions of the invention contain the detergent component in an amount of from 0.1% to 60%, the lower limit being based on the detergency requirement and the upper limit on such considerations as streaking, rinsing, sudsing and the like. In the case of preferred abrasive scouring compositions, described in greater detail hereinafter, the detergent component is employed in an amount of from 0.1% to 10% by weight of the cleanser composition. Preferably, the detergent component is present in such compositions in an amount of from 1% to 4% by weight.

The N-halo-imide bleaching and oxidizing agents employed herein are heterocyclic imides having from 4 to about 6 members in the ring, and are characterized by the following structure



where X is halogen (e.g. chlorine or bromine) and in which the electron-donating nitrogen atom is doubly activated to an acidic state by virtue of its proximity to two electropositive carbonyl groups. Suitable N-halo-imide compounds are the N-chloro-derivatives of cyanuric acid such as mono-, di- and trichlorocyanuric acid. Other examples include the N-chloro succinimides, N-chloro-malonimides, N-chloro phthalimides and N-chloro naphthalimides. Other examples are described in U.S. Pat. 3,406,116 to Vitale (Oct. 15, 1968) and in U.S. Pat. 3,257,324 to Wearn et al. (June 21, 1966). These N-chloroimides can be employed as a single bleaching source or in combination with an alkali metal, e.g. sodium bromide for provision of a hypobromite species.

Suitable N-bromo-imides include hypobromite-liberating compounds such as tribromocyanuric acid, dibromocyanuric acid, potassium dibromocyanurate, N-bromosuccinimide, N-bromomalonimide, and 1,3 - dibromo-5,5-dimethylhydantoin. N-halo-imides which yield both hypochlorite and hypobromite in solution such as N-dibromo-N-moonchloro-cyanuric acid and potassium N-monobromo-N-monochlorocyanurate can also be employed. Examples of these compounds are described in U.S. Pat. 3,575,865 to Burke et al.

Certain of the N-halo-imide compounds herein are capable of salt formation and the alkali and alkaline earth metal salts thereof are useful herein. As used herein, the term "N-halo-imide" is intended as embracing the N-halo-imides per se and the various salts thereof, notwithstanding that some of the N-halo-imides are not capable of salt formation. Especially preferred salts herein by reason of their desirable bleaching efficacy, inherent stability in relation to other N-halo-imide compounds and odor characteristics are the alkali metal, e.g., potassium and sodium, dichloroisocyanurates.

The N-halo-imide compound of the compositions of the invention can be employed in an amount which varies over a wide range. The particular amount employed will depend on the nature of the cleaning problem presented and the type of composition formulated. Generally, the employment of an amount in the range of from 0.1 to 95% of the detergent composition will be sufficient to provide a level of oxidizing or bleaching power so as to make possible efficient cleansing, oxidizing and bleaching performance under the types of cleaning situations normally encountered in house operations.

It will be appreciated that certain types of detergent formulations will contain more or less of the bleaching or oxidizing component than others. Compositions formulated for fabric treatment, e.g., pre-soaking compositions, laundry bleach-additive compositions and heavy-duty laundry detergents, will contain from 0.1% to 95% and preferably from 10% to 90% by weight of the composition. Abrasive scouring compositions will contain from about about 0.1% to 25% and preferably from 0.2 to 2% of the N-halo-imide compound.

The N-halo-imide bleaching agents of the invention are preferably provided in a particulate form and in a substantially dry state, i.e., free of uncombined water. Uncombined water is referred to herein as contemplating moisture content other than that which is combined with the bleaching agent as water of hydration or crystallization. Preferably the N-halo-imide compound is employed in a particulate form that permits ready solubilization in an aqueous solution or slurry and which makes possible ready mixing of the N-halo-imide with detergent granules, builder salts and like components conventionally employed in the detergent arts. The N-halo-imide component is preferably sized as to permit passage of a major portion, e.g., 60% to 90%, through a 65 mesh (Tyler) screen.

The sodium acetate stabilizing compound, which in combination with an organic detergent and an N-halo-imide bleaching agent, permits the provision of cleaning compositions having bleaching and oxidizing power, is an anhydrous form of sodium acetate. The stabilizing agent, which is commercially available and readily incorporated into detergent compositions having an N-halo-imide bleaching compound, provides an exceptionally high degree of stabilization against halogen loss. The compositions of the invention are additionally characterized by reduced filming and/or streaking properties when employed in the cleansing of hard surfaces. Thus, procelain or ceramic surfaces treated, for example, by sponge-application of a detergent composition of the invention in the form of a solution or slurry exhibit a reduced tendency to filming and streaking. The reduction is observed in the case of unrinsed surfaces where the solution or slurry is merely rubbed across the hard surface and in the case of rinsed surfaces where the composition is rubbed across the surface and rinsed by passing water over the cleansed surface area. The filming and streaking advantages of compositions of the invention containing sodium acetate are in contrast to the relatively greater levels of filming and streaking observed in the case of the employment of similar detergent compositions which do not contain the sodium acetate of the invention. The reduced filming and streaking advantages may be of particular significance in cleansing operations where there is inadequate rinsing, e.g., in the rinsing of sink faucets, fixtures or the like.

The anhydrous sodium acetate can be added to a detergent formulation in any of a number of convenient ways. For example, granular or powdered sodium acetate can be dry-mixed with the organic detergent and N-halo-imide compound so as to achieve a substantially uniform distribution throughout the mixture. Alternatively, an aqueous solution of the sodium acetate can be applied, as by spraying, to an organic detergent, builder salt or other component commonly employed in detergent compositions and subsequently dried and admixed with the N-halo-imide compound.

The amount of sodium acetate employed in the detergent compositions of the invention will vary depending upon storage conditions, the extent to which the sodium acetate loses its hydration capacity or desiccant properties upon storage, the amount of N-halo-imide bleaching agent present, the soiling problem encountered, the type of detergent formulation formulated, and the like. For example, compositions formulated for use in the washing and bleaching of fabrics, which will normally contain the lower amount of N-halo-imide compound as compared with compositions intended for other uses, will generally contain a correspondingly reduced amount of the sodium acetate stabilizing agent. Other compositions adapted to soil-removal problems which may be more severe, as might be encountered in the case of abrasive scouring cleanser compositions, will contain a relatively higher amount of sodium acetate stabilizing agent to correspond to the relatively greater amount of N-halo-imide compound.

The conditions to which the compositions of the invention are subjected in manufacture and storage will determine in part the amount of anhydrous sodium acetate employed. Thus, compositions subjected in manufacture or storage to conditions of high humidity will contain a greater level of sodium acetate than those manufactured and/or stored under conditions of low humidity. The employment of an amount of sodium acetate in relationship to the amount of free or loosely-bound moisture permits the preparation of compositions which maximize storage stability under the moisture conditions normally encountered in manufacture or storage. An amount of sodium acetate corresponding to a ratio by weight of sodium acetate to such mosture in the composition of the invention of 0.4:1 to 150:1 is suitably employed to provide against moisture effects. Preferably, a ratio from 2:1 to 10:1 is employed.

The compositions of the invention can be formulated for employment in meeting the problems presented by the soiling and staining of a variety of types of materials, including fabrics and hard surfaces, such as dishware, pots and pans, kitchen utensils, ceramic surfaces, such as enamel ware and the porcelain surfaces of laundry washtubs, kitchen sinks, and the like. Thus, the comopsitions of the invention comprise laundry presoaking compositions for the removal of soils and stains from fibrous materials, including fabrics, garments, household laundry, and the like. Heavy-duty laundry detergent compositions and dishwashing compositions are also contemplated as suitable formulations for the incorporation of N-halo-imide bleaching agent and sodium acetate stabilizer. In use, the stabilized compositions of the invention can be added to water to provide an aqueous medium in the form of a solution or slurry for use in the treatment of the particular soiling situation encountered. The amount of the detergent composition employed will, of course, depend on the nature of the cleaning problem presented and the amount of N-halo-imide bleaching agent employed in the composition. Thus, concentrated solutions will be employed in the treatment of ceramic surfaces where the possibility of damage to ceramic surfaces is low, while less concentrated solutions will be employed for the treatment of textiles where the possibility of fabric damage will be of greater significance.

The detergent compositions of the present invention can contain a variety of ingredients in addition to those mentioned hereinbefore. Thus, alkaline detergency builders can be employed for enhanced cleaning effects. These detergency builders enhance the detergency effect of the organic detergent component and aid in the regulation of the desired pH of the detergent composition. Suitable alkaline detergency builders include, for example, trisodium phosphate, tetrasodium pyrophosphate, sodium acid pyrophosphate, sodium tripolyphosphate, sodium monobasic phosphate, sodium dibasic phosphate, sodium hexametaposphate, sodium citrate, sodium silicates (SiO_2/Na_2O of 1:1 to 3.2:1), sodium carbonate, borax, trisodium nitriloacetate and the like. Mixtures of two or more inorganic or organic salts can be employed, as can mixtures of inorganic and organic salts. Other examples of suitable alkaline detergency builders include those described in U.S. Pat. 3,309,319 at column 4, line 44 through column 5, line 9. The disclosure of this patent is incorporated herein by reference.

Other ingredients which can also be present in the compositions of the invention include inert inorganic salts such as sodium chloride, sodium sulfate, potassium chloride and potassium sulfate, these being included in the compositions in amounts less than about 20% by weight of the composition. Other minor ingredients which can be included are anti-caking agents such as hydrated magnesium trisilicate, sodium carboxymethylcellulose, sulfamic acid, perfume, antiseptics, germicides, aluminum-mark-removing agents such as calcium oxide or hydroxide, coloring agents and the like.

The compositions of the invention are prepared so as to be substantially dry and free-flowing upon manufacture and during storage. Inasmuch as the bleaching agents employed are moisture-sensitive and tend to lose their oxidizing potential under adverse storage conditions, they should be formulated so as to be substantially devoid of free or loosely-bound water. Accordingly, the compositions of the invention will contain less than about 5% moisture, e.g. 0.1 to 5%, at the time of manufacture, preferably from 0.1 to 1%. Storage conditions may, however, cause the compositions to pick up additional moisture in which case the compositions of the invention can contain from about 0.1% to about 10% moisture.

A preferred embodiment of the compositions of the invention comprises abrasive scouring cleanser compositions. These compositions comprise a water-soluble organic or soap-like detergent material, a water-insoluble abrasive scouring material, an alkaline inorganic builder salt for certain cleaning effects, particularly grease removal, an N-chloroimide bleaching agent and sodium acetate stabilizing agent. Preferred abrasive scouring cleanser compositions of the invention include those which consist essentially, by weight, of: (1) from 0.1% to 10% of a water-soluble organic detergent; (2) from 60% to 95% of a water-insoluble siliceous abrasive; (3) an alkaline detergency builder salt; (4) an N-chloroimide bleaching agent; and (5) 2 to 15% sodium acetate.

The preferred scouring cleanser compositions of the invention can include any of the water-soluble organic detergent compounds described hereinbefore. The abrasive materials of the scouring cleanser compositions of the invention are well known in the art and include water-insoluble siliceous abrasive materials such as silica, feldspar, pumice, volcanic ash, diatomaceous earth, bentonite, talc and the like. Silica and feldspar are preferred abrasive materials from the standpoint of their ready availability, cost, hardness and whiteness properties. The particle size, hardness and shape characteristics will vary depending upon the contemplated use of the scouring composition. Generally, the particle size of the scouring abrasive employed herein ranges in size from about 0.3 mm. diameter to about 0.001 mm. diameter and finer. Normally, at least about 80% of the abrasive materials will pass through a sieve having mesh openings of 0.074 mm. At least about 5% by weight of the abrasive material will remain on a sieve having mesh openings of 0.037 mm. The abrasive component comprises from 60% to 95% of the scouring cleanser compositions of the invention. Preferably, the abrasive material comprises from about 70% to about 90% by weight of the cleanser.

Suitable detergency builder salts of the preferred scouring cleanser compositions of the invention include those specifically mentioned hereinbefore. Especially preferred, from the standpoint of making possible the formulation of detergent compositions free of phosphate components, are the alkali metal carbonates, e.g., sodium and potassium carbonate. Especially preferred is sodium carbonate from the standpoints of providing desirable cleaning and building effects, cost and availability. Any of the sources of carbonate known in the detergent arts can be employed. Suitable carbonate sources include those available in the art as soda ash, including the anhydrous calcined or hydrated forms although an anhydrous form is preferred from the standpoint of providing no moisture. Sodium or potassium sesquicarbonate can also be employed. The bicarbonate portion of mixtures commonly known in the art as sesquicarbonate, is believed to exist in the form of carbonate under the pH conditions of normal usage of the scouring compositions of the invention in slurry form.

It is preferable, in the formulation of the preferred scouring cleanser compositions of the invention, to employ the alkali metal carbonate in an anhydrous form so as to permit the preparation of a free-flowing and relatively non-agglomerating composition. The preferred anhydrous builder salts provide hydration capacity during formulation or storage of the compositions of the invention and permit the preparation of compositions which are dry to the touch and which are substantially devoid of uncombined moisture. The compositions of the invention normally contain from 0.1% to about 1% water upon manufacture, preferably less than 0.75% by weight. Thus, it is preferred that the water-soluble alkali metal carbonate detergency builder component of the compositions of the invention be present in a hydratable form.

The preferred carbonate, built abrasive scouring cleanser compositions of the invention, will contain for aluminum-mark-removing purposes, calcium oxide, calcium hydroxide or a mixture thereof, in a weight ratio of the calcium compound to the carbonate builder of from 0.01:1 to 0.4:1. Such compositions are effective in removing aluminum smears from porcelain surfaces such as those which are deposited on porcelain sink surfaces by contact with aluminum pots, pans and utensils incident to normal household cleansing and scouring operations.

An especially preferred abrasive scouring cleanser composition of the invention consists essentially of:

(1) from about 1% to about 4% of a compatible water-soluble organic detergent,
(2) from 8% to 14% of sodium carbonate;
(3) from 0 to 2% calcium oxide or hydroxide;
(4) from 70% to about 90% of a siliceous abrasive material;
(5) from 0.2% to 1% of an alkali metal dichlorocyanurate; and
(6) from 2% to 15% sodium acetate.
(7) from 0.1 to 5% moisture.

In order to maintain the substantially dry form of the compositions of the invention, it is desirable that these compositions be packaged in moisture-impermeable materials, e.g., plastic, glass, metal, fiber cans with interior wax coating or metal foil.

The following Examples are illustrative of the present invention and it will be understood that the invention is not limited thereto. All parts and percentages are by weight unless otherwise specified.

EXAMPLE I

In all of the Examples herein, the silca and sodium alkyl benzene sulfonate components had the following descriptions, except as noted:

The silica abrasive contained about 99.6 parts silica, approximately 0.2 parts moisture, 0.2 sodium sulfate and about 0.03 parts pigment. The particle size varied from about 5 microns to about 50 microns with the major portion of the particles being in the range from 10 microns to about 20 microns.

The sodium alkyl benzene sulfonate had a distribution of C_{10} to C_{14} alkyl chains and an average of $C_{11.8}$. In Examples I to III, the sodium alkyl benzene sulfonate was prepared into a premix with the sodium carbonate by spraying 3.7 parts of an anqeous slurry (60% sodium alkyl benzene sulfonate; 1.5% sodium sulfate; 0.5% sodium xylene benzene sulfonate; 38% water) onto 12.5 parts of anhydrous sodium carbonate and drying the resulting mixture to about 1% water, including water of hydration. The resulting agglomerate was ground to provide a distribution of particle sizes permitting admixture with the remaining components.

An abrasive scouring cleanser composition was prepared by dry mixing:

	Composition				
Component	A	B	C	D	E
Sodium carbonate/sodium alkyl benzene sulfonate premix (12.5 parts sodium carbonate, anhydrous basis; 2.2 parts sodium alkyl benzene sulfonate; 0.3 parts water, sodium xylene sulfonate and sodium sulfate)	15	15	15	15	15
Sodium carbonate, anhydrous				5	5
Potassium dichlorocyanurate	1.0	1.0	1.0	1.0	1.0
Sodium acetate, anhydrous	0	3	5	3	5
Lime (58% calcium hydroxide; 42% magnesium oxide)	1.1	1.1	1.1	1.1	1.1
Perfume	0.15	0.15	0.15	0.15	0.15
Silica/sodium sulfamate premix	Balance to 100				
pH (25% aqueous slurry)	12.05	11.9	11.9	11.85	11.9

In order to determine the stability of the above-identified compositions (A through E) against loss of chlorine upon standing, each of the compositions were subjected to ageing treatment employing a temperature of 80° F. and a relative humidity of 80. Samples were stored in corrugated cardboard cylinders having metallic tops with holes punched for removal of the sample from the container. Samples were stored with the holes covered (sealed) with tape and with the tape removed (opened). Measurements to determine chlorine content were taken at the intervals specified in the following table. Determinations of available chlorine content were made employing a standardized thiosulfate titration method. In accordance with this method, the sample is dissolved in water, and excess of potassium iodide is added and acetic acid is added to liberate iodine. The solution is titrated with sodium thiosulfate to a clear endpoint. The results are presented as follows:

TABLE I

Stability at 80° F./80% R.H.

	Composition				
	A	B	C	D	E
Time	Percent available chlorine (sealed/open)				
Initial	.59	.59	.59	.59	.59
1 week	.55/.30	.58/.58	.59/.58	.55/.54	.59/.57
2 weeks	.54/.15	.54/.14	.58/.57	.54/.39	.58/.52
3 weeks	.43/T	.54/.16	.55/.37	.54/.16	.58/.43
4 weeks	.44/T	.56/T	.56/.20	.53/T	.56/.20
5 weeks	.41	.55	.56	.51	.55

NOTE.—T=trace.

As is apparent from the above data, the presence of sodium acetate stabilizing agent in the compositions of the invention (B through E) imparts considerable chlorine stability compared to a composition having no sodium acetate (A). The improved stability is observed in the case of closed storage and particularly where the container is unprotected from moisture and humidity effects. The enhanced stability is particularly significant in view of the relatively extreme humidity condition (R.H. 80%), the compositions of the invention being capable of delivering available chlorine after five weeks open storage while the control sample underwent intolerable deterioration within three weeks. Comparison of compositions B and C and D and E shows the relative advantage of 5% sodium acetate over 3%.

EXAMPLE II

Abrasive scouring cleanser compositions were prepared by dry mixing:

	Composition	
	F	G
Component	Parts by weight	
Sodium carbonate/sodium alkyl benzene sulfonate premix (12.5 parts sodium carbonate, anhydrous basis; 2.2 parts sodium benzene sulfonate; 0.3 parts water, sodium xylene sulfonate and sodium sulfate)	15	15
Potassium dichlorocyanurate	1.0	1.0
Sodium acetate		10.0
Lime (58% calcium hydroxide; 42% magnesium oxide)	1.1	1.1
Perfume	0.15	0.15
Silica/sodium sulfamate premix	82.9	72.9
pH	12.0	11.85

Compositions F and G were evaluated for available chlorine using the method described hereinbefore. Storage was at 80° F. and 80% relative humidity both sealed and open. The results obtained are reported as follows:

TABLE II

Stability at 80° F./80% R.H.

	Composition	
	F	G
Time	Percent available chlorine (sealed/open)	
Initial		
1 week	.56/.26	.59/.57
2 weeks	.58/.20	.58/.56
4 weeks	.48/.11	.56/.53
8 weeks	.25/T	.53/T
12 weeks	.1/T	.55/T
6 months	T/T	.54

NOTE.—T=trace.

The results make clear the stabilizing effects of sodium acetate against loss of chlorine under severe conditions of storage. Composition G of the invention exhibits substantially all of its initial activity after 6 months closed storage compared to virtually complete deterioration in the case of a control composition (F) containing no sodium acetate. Composition G exhibited substantial activity after 4 weeks open storage (.53) compared to the control (.11).

EXAMPLE III

Abrasive scouring compositions were prepared by admixing:

	Composition			
	N	I	J	K
Component	Parts by weight			
Sodium carbonate/sodium alkyl benzene sulfonate premix (12.5 parts sodium carbonate, anhydrous basis; 2.2 parts sodium benzene sulfonate; 0.3 parts water, sodium xylene sulfonate and sodium sulfate)	15	15	15	15
Potassium dichlorocyanurate/sodium sulfate (40%/60%)	2.5	2.5	2.5	
Potassium dichlorocyanurate				1.0
Sodium acetate		3.0	3.0	3.0
Lime (58% calcium hydroxide; 42% magnesium oxide)	1.1	1.1	1.1	1.1
Perfume	0.15	0.15	0.15	0.15
Silica/sodium sulfamate premix	Balance to 100			

Compositions H through K were evaluated for available chlorine content in the manner described in Example I after storage at 80°/80% R.H. The results are tabulated as follows:

TABLE III

Stability at 80° F./80% R.N.

	Composition			
	N	I	J	K
Time	Percent available chlorine (sealed/open)			
Initial				
1 week	.55/.35	.56/.50	.60/.58	.57/.49
2 weeks	.50/T	.54/.34	.60/.34	.55/.36
4 weeks	.34/0	.55/0	.60/0	.55/0
8 weeks	.53/T	.55/T	.43/T	.49/T

NOTE.—T=trace.

EXAMPLE IV

Abrasive scouring compositions were prepared by dry mixing:

	Composition	
	L	M
Component	Parts by weight	
Sodium carbonate/sodium alkyl benzene sulfonate/sodium acetate premix (12.5 parts sodium carbonate, anhydrous basis; 2.2 parts sodium benzene sulfonate; 0.3 parts water, sodium xylene sulfonate and sodium sulfate; 3 parts sodium acetate		18
Sodium carbonate/sodium alkyl benzene sulfonate premix (12.5 parts sodium carbonate, anhydrous basis; 2.2 parts sodium benzene sulfonate; 0.3 parts water, sodium xylene sulfonate and sodium sulfate)	15	
Sodium acetate, anhydrous		2
Potassium dichlorocyanurate/sodium sulfate (40%/60%)	2.5	2.5
Lime (58% calcium hydroxide; 42% magnesium oxide)	1.1	1.1
Silica/sodium sulfamate premix	Balance to 100	

Compositions L and M were evaluated for available chlorine after storage at (1) 80° F. and 80 relative humidity and (2) 80° F. and ambient humidity. The results are tabulated as follows:

TABLE IV

Stability at 80° F./80% R.H.

	Composition	
	L	M
Time	Percent available chlorine (sealed/open)	
Initial	.56	.56
1 week	.55/.28	.53/.46
2 weeks	.54/T	.53/.36
4 weeks	.51/T	.43/T
8 weeks	.44/T	.53/T
12 weeks	.38/0	.51/0

NOTE.—T=trace.

TABLE V

Stability at 80 F./ambient R.H.

	Composition	
	L	M
Time	Percent available chlorine (sealed/open)	
Initial	.56	.56
1 week	56/.56	.56/.51
2 weeks	.55/.56	.53/.52
4 weeks	.53/.53	.52/.51
8 weeks	.53/.53	.50/.27
12 weeks	.51/.54	.50/.52

As is apparent from the above data, Composition M exhibits desirable stability. Composition L, while it withstood storage at 80° F./ambient humidity, deteriorated substantially relative to Composition M at the more severe storage conditions of 80° F. and 80% relative humidity.

EXAMPLE V

Four abrasive scouring compositions (Compositions N through Q) were evaluated for their filming characteristics in the following manner. Slurries (50% by weight in water) were applied to a black ceramic tile by passing the slurry across the tile with the aid of a terry cloth. Two samples were applied side by side on a single tile. Following application of the cleanser samples, the bottom half of each tile was rinsed so as to provide quadrant areas permitting evaluation of filming characteristics for each sample on both an unrinsed and rinsed basis. The samples were visually graded by a panel of judges on a round-robin paired-comparison basis with the grade of 1 indicating a very slight difference, 2 a slight difference, 3 a moderate difference and 4 a large difference. The four samples evaluated included a composition corresponding to Composition A of Example I and compositions having, respectively 1%, 2% and 4% of sodium acetate, the amount of silica/sodium sulfamate premix being reduced by the amount of sodium acetate present.

The following filming grades (unrinsed comparisons) were obtained.

Composition N (no sodium acetate)	—2
Composition O (1% sodium acetate)	—1
Composition P (2% sodium acetate)	+1.25
Composition Q (4% sodium acetate)	+1.75

As is apparent from the above data, there was a difference between the Control (N) and 4% sodium acetate-containing Composition (Q) of greater than 3 units.

A subsequent evaluation of compositions corresponding to Compositions N and Q showed a +1.75 advantage for Q over N on an unrinsed basis. Another evaluation showed a +2 advantage for Q over N on an unrinsed basis.

EXAMPLE VI

A detergent composition suited for automatic dishwashing comprises by weight the following:

	Percent
Sodium tripolyphosphate	50
Sodium silicate ($SiO_2:Na_2O=2.9:1$)	20
Nonionic synthetic detergent (Tallow alcohol ethoxylated with 11 ethylene oxide units)	5
Dichloroisocyanuric acid	4
Sodium acetate	4
Water (including water of hydration)	17

EXAMPLE VII

A detergent bleach composition adapated for the removal of stains on enamel sinks, tarnish stains on metal ware and for bleaching textiles comprises the following in parts by weight:

1,3-dichloro-5,5-dimethylhyrantoin	15
Wetting agents (sodium isopropyl naphthalene sulfonate)	6
Anhydrous tetrasodium pyrophosphate	24
Sodium dodecyl benzene sulfonate	3
Anhydrous borax	15
Sodium sulfate	33
Sodium acetate	4

EXAMPLE VIII

An abrasive scouring cleanser providing a hypobromite oxidizing species in solution is prepared by mixing intimately the following dry constituents:

	Parts by Weight
Silica (at least 80% by weight passing through a wire sieve in which the openings between the wires are 0.074 mm.)	75
Sodium carbonate, anhydrous	10
Sodium dodecyl benzene sulfonate	3
Trichlorocyanuric acid	2
Sodium bromide	2
Sodium acetate, anhydrous	8

What is claimed is:

1. A detergent composition stabilized against loss of available halogen consisting essentially of from about 0.1% to 60% by weight of a water-soluble organic detergent selected from the group consisting of soap, non-soap anionic, nonionic, zwitterionic and cationic detergents; from about 0.1% to 95% by weight of a heterocyclic N-halo-imide bleaching agent having from 4 to about 6 members in its ring structure with the halo moiety of said bleaching agent being selected from the group consisting of chloro and bromo; free moisture; and anhydrous sodium acetate in an amount sufficient to provide a weight ratio of acetate to free moisture of from about 0.4:1 to 150:1 and to thereby stabilize the N-halo-imide against loss of halogen.

2. The detergent composition of Claim **1** wherein the N-halo-imide is selected from the group consisting of dichloroisocyanuric acid, the alkali metal salts of dichloroisocyanuric acid and trichloroisocyanuric acid.

3. The detergent composition of Claim **2** wherein N-halo-imide is potassium dichloroisocyanurate.

4. The detergent composition of Claim **3** wherein the water-soluble organic detergent is selected from the group consisting of water-soluble sulfated and sulfonated anionic synthetic detergents.

5. A detergent composition stabilized against loss of chlorine consisting essentially of from about 0.1% to 10% by weight of a water-soluble organic detergent selected from the group consisting of soap, non-soap anionic, nonionic, switterionic and cationic detergents; from about 60% to 95% by weight of a water-insoluble abrasive scouring agent having particle sizes of from about 0.3 millimeter to about 0.001 millimeter; an alkaline inorganic builder salt; from about 0.1% to 25% by weight of a heterocyclic N-chloro-imide bleaching agent having from 4 to about 6 members in its ring structure; free moisture; and anhydrous sodium acetate in an amount sufficient to provide a weight ratio of acetate to free moisture of from about 0.4:1 to 150:1 and to thereby stabilize the N-chloro-imide against loss of chlorine.

6. The composition of Claim **5** wherein the water-insoluble abrasive scouring agent is a siliceous abrasive selected from the group consisting of silica, feldspar, pumice, volcanic ash, diatomaceous earth, bentonite and talc.

7. The detergent composition of Claim **6** wherein the water-soluble organic detergent is selected from the group consisting of water-soluble sulfated and sulfonated anionic synthetic detergents and is present in an amount of from 1% to 4% by weight of the composition.

8. The detergent composition of Claim **7** wherein the N-halo-imide is selected from the group consisting of dichloroisocyanuric acid, the alkali metal salts of dichloroisocyanuric acid and trichloroisocyanuric acid.

9. The detergent composition of Claim **8** wherein the N-chloro-imide is present in an amount of from 0.2 to 1% of the composition.

10. The detergent composition of Claim **9** wherein the N-chloro-imide is potassium dichloroisocyanurate.

11. The detergent composition of Claim **10** wherein the sodium acetate is present in an amount of from 2% to 15% of the composition.

12. A composition in accordance with Claim **11** wherein the alkaline inorganic builder salt is selected from the group consisting of sodium carbonate, potassium carbonate, sodium sesquicarbonate and potassium sesquicarbonate and wherein said composition is free of phosphate components.

13. A composition in accordance with Claim **12** wherein the alkaline builder salt is sodium carbonate and is present to the extent of from 8% to 14% by weight of the composition; wherein the siliceous abrasive material is present to the extent of from 70% to about 90% by weight of the composition; wherein the potassium dichloroisocyanurate is present to the extent of from 0.2% to 1% by weight of the composition; wherein free moisture is present to the extent of from 0.1% to 5% by weight of the composition and wherein the composition contains from 0% to 2% of an aluminum mark removing agent selected from the group consisting of calcium oxide and calcium hydroxide.

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Disclaimer

3,829,385.—*Charles Theodoric Abbott, Jr.*, and *George Cunningham Smith, Jr.*, Montgomery, Ohio. DETERGENT COMPOSITIONS CONTAINING N-CHLOROIMIDES. Patent dated Aug. 13, 1974. Disclaimer filed Sept. 12, 1974, by the assignee, *The Procter & Gamble Company.*

Hereby disclaims the term of this patent subsequent to June 18, 1991.

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