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LIQUID ABRASIVE CLEANSER CONTAINING SODIUM CHLORIDE

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This application is a continuation-in-part of my U.S. patent application Serial No. 38,719, filed June 27, 1960.

The present invention relates to abrasive cleansers. More particularly, it relates to improved abrasive cleansers in the form of pourable liquids.

In accordance with the present invention, a liquid abrasive cleanser consists essentially of a stable aqueous suspension of about 45 to 60% of a water-insoluble inorganic abrasive having a particle size such that about 99% thereof passes through a 200 mesh sieve, about 0.5 to 4% of water-soluble detergent selected from the group consisting of anionic and cationic detergent salts, about 2 to 10% of a higher fatty acid amide of a lower alkylolamine, said higher fatty acid containing from about 10 to 18 carbon atoms and said alkylolamine containing from about 2 to 4 carbon atoms, about 25 to 45% water, and about 0.25 to 2.5% sodium chloride, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises. The cleanser may also contain at least about 0.002% of water dispersible copper phthalocyanine green pigment.

The presence of sodium chloride has been found to render the instant liquid abrasive cleanser substantially more stable toward chemical and physical deterioration on aging than the same formulas from which the sodium chloride has been omitted, and although similar benefits may also be obtained to some extent from the presence of other inorganic salts of strong acids and bases, such as alkali metal chlorides, sulfates and nitrates, e.g. potassium chloride and sodium sulfate, sodium chloride appears to be outstandingly effective as a stabilizer.

The physical character of the liquid abrasive cleanser of the present invention is that of a fluid liquid in which the undissolved solids are stably suspended, the viscosity of the liquid being sufficiently low that the cleanser is readily pourable at room temperature, i.e., about 70° F., both at the time the cleanser is made and after it has aged at room temperature for periods on the order of several, e.g. 3, months. As used herein, the term "stable suspension," refers to a dispersion of undissolved solid particles in a liquid medium, the dispersion being of such nature that the solid particles do not settle to the bottom of the container in which the cleanser is packaged and form a hard, non-redispersible cake, but rather remain suspended throughout the entire liquid medium during quiescent aging for an extended period of time, e.g. at least 90 days at room temperature and 2 days at 140° F. Thus the present cleanser is free from visible caking and does not require shaking in order to achieve uniformity in the course of normal storage and/or use.

The compositions of the present invention are characterized by an apparent viscosity between about 7,000 and 25,000 centipoises. It has been found that liquid cleansers within this range of viscosity are sufficiently fluid that the bulk or body of the cleanser drains readily from the walls of suitable household-type dispensers during use and handling thereof and yet are sufficiently viscous that on application to a static vertical surface such as may be found in kitchen sinks, bathroom walls, and the like, droplets or a heavy film of the cleanser remain on such a surface at the point of application without substantial run-off until such time as it is convenient to scour the surface. Likewise, the instant cleanser will adhere without drippage to the underside of horizontal surfaces and to ceilings. Thus it may be seen that as compared to a conventional powdered abrasive cleanser or a less viscous liquid cleanser which do not remain on a vertical or the underside of horizontal surfaces, the present liquid abrasive cleansers are highly advantageous in that they remain at any desired work location. On the other hand, as contrasted with a thickened paste or other non-pourable form, the instant pourable liquid cleansers are of sufficiently low viscosity to permit ready handling and dispensing in liquid form, to disperse quickly in water when contacted therewith, and to be easily completely flushed and washed with water away from any surface on which they have been deposited.

The liquid abrasive cleansers of the present invention have also been found to be characterized by extremely effective grease soil removal, highly effective lathering in both soft and hard water, and rapid removal of all kinds of soils from glass, vitreous, woodwork, painted, and enameled surfaces, and from metal surfaces such as aluminum ware, copper pot bottoms, and the like, with effective polishing action and virtually no scratching action. The cleanser is also effective for removing soil from the hands and from automobile tires, for removal of wax from waxed surfaces, and a variety of other applications.

The particle size or fineness of the water insoluble abrasive employed in the instant liquid cleansers influences the cleansing ability, scratchiness and the stability of the fluid suspension. For a proper balance of these characteristics, the abrasive is preferably of a particle size such that about 99% thereof passes through a 200 mesh sieve, although coarser material (i.e. 99% through 100 mesh) or finer material may be used. The abrasive may be selected from a large group of well known materials including inter alia synthetic alumina, corundum, volcanic ash, diatomaceous earth, bentonite, feldspar, pumice and mixtures thereof, however it is preferred to employ siliceous abrasives and more specifically silica as the abrasive in the present compositions.

The water insoluble abrasive is employed in the compositions of the present invention in an amount of approximately 45 to 60% by weight.

Liquid abrasive cleansers in accordance with the present invention also preferably contain a water soluble inorganic alkaline buffer salt in an amount from about 1 to 3%. These salts, which for the most part are salts of weak acids with alkali metal bases, are characterized by a pH in dilute aqueous solution (1%) of from about 5.0 to about 12.0. Examples of suitable such salts include trisodium phosphate, disodium phosphate, sodium carbonate, tetrasodium pyrophosphate, tetrapotassium pyrophosphate, pentasodium tripolyphosphate, borax, sodium silicate such as sodium silicate having an Na_2O to SiO_2 ratio of 1:2.35, and sodium sesquicarbonate. The presence of these inorganic salts facilitates the preparation of a liquid product of the desired stability and viscosity characteristics.

The liquid abrasive cleanser compositions of the present invention further contain from about 0.5 to 4.0% and preferably about 1.5 to 2% of a detergent selected from the group consisting of anionic and cationic detergent salts, a preferred detergent being a water soluble higher alkyl benzene sulfonate detergent salt wherein the alkyl group contains from about 10 to 16 carbon atoms. Examples of this preferred detergent salt are alkali metal and triethanolamine salts of alkyl aryl sulfonic acids, e. g. the commercial sodium salt of tetrapropylene benzene sulfonic acid, the triethanolamine salt of dodecyl benzene sulfonic acid, and the sodium salt of pentapropylene benzene sulfonic acid. Other suitable detergent salts comprise water soluble anionic sulfated and sulfonated detergent salts containing a hydrophobic alkyl moiety of from 10 to 18 carbon atoms such as higher alkyl sulfates, e.g. sodium lauryl sulfate, and higher fatty acid monoglyceride sulfates such as the sodium salt of the monosulfate of coconut oil fatty acid monoglyceride; soaps, such as the potassium soap of mixed oleic and coconut oil fatty acids; and cationic detergents such as dialkyl dimethyl ammonium chloride or bromide in which the alkyl groups are derived from tallow fatty acids by reduction thereof. If desired, other appropriate water soluble detergents such as ampholytic or polyethoxylated non-ionic types may also be employed in whole or in part as the detergent constituent.

In addition to its customary foaming and detergent action during use of the final composition, the detergent component of the instant liquid abrasive cleanser serves as a viscosity adjusting agent and influences the solids-suspending characteristics of the product. Thus, as the proportion of detergent is increased throughout the specified range, both the viscosity and abrasive suspending powers of the present liquid cleansers vary.

Another essential constituent of the instant compositions is a higher fatty acid amide of a lower alkylolamine, the higher fatty acid containing from about 10 to 18 carbon atoms and the alkylolamine being a primary or secondary N-(hydroxy alkyl)amine containing a total of about 2 to 4 carbon atoms. These amides, which are well known to the art as higher fatty acid alkylolamides, are exemplified by the diethanolamide of coconut oil fatty acids, the monoethanolamide of coconut oil fatty acids, the diethanolamide of mixed 70:30 lauric-myristic acids, and the diethanolamide of tallow fatty acids.

The alkylolamide, which is present in an amount from about 2 to 10% by weight of the composition, is a primary thickening and viscosity adjusting agent present in the system, and in addition serves to raise substantially the suspending power of the instant compositions for undissolved solids and to contribute improved grease soil removal and foaming and detergency to the finished product.

The sodium chloride constituent of the instant scouring cleanser is present in a small but effective amount sufficient to stabilize effectively the composition against chemical and physical deterioration on aging but less than that amount which diminishes the viscosity of the system below about 7,000 centipoises and to such an extent that undissolved solids rapidly precipitate, i. e. from about 0.25 to 2.5% and preferably about 1 to 2% by weight of the composition. The presence of sodium chloride in the present composition is of value not only with regard to extending the life expectancy of the cleanser as a uniform product, but also in that it affords protection against coagulation on freezing. In addition, the sodium chloride causes a reduction in the initial viscosity of the cleanser, a reduction which may be considered beneficial in that it facilitates handling of the liquid cleanser in package filling machinery. This viscosity diminution is only temporary, the viscosity of the system reverting substantially to that of a similar sodium chloride-free product over a period of a few days immediately subsequent to manufacture.

Both the degree of stabilization and the extent of the initial reduction in viscosity vary directly with the amount of sodium chloride employed. However, the proportion of sodium chloride which may be added is limited by the fact that above a certain level thereof, typically about 2.5%, the initial diminution in viscosity is so severe that undissolved solids precipitate from the cleanser (in a manner similar to the well known "salting-out" effect) and the system separates and becomes non-uniform.

Yet another essential constituent of the present liquid abrasive cleansers is water, which comprises from about 25 to 45% by weight of the final product. In the presence of the preferred water-soluble inorganic alkaline buffer salt mentioned hereinabove, the present aqueous product will have a characteristic pH between about 5.0 and 12.0 although suitable products may be prepared at a pH as low as 1.5 when the product contains an acidic material such as tridecyl benzene sulfonic acid.

Further in connection with the matter of pH, it has been found unexpectedly that the liquid suspensions of the present composition may be rendered more highly resistant to separation into a plurality of liquid layers by adjusting the pH of the system to a range of from about 5.0 to 10.5, and accordingly a superior liquid product of such pH is considered a highly preferred embodiment of the invention. A further advantage of such compositions is a reduced tendency towards distortion of the walls of polyethylene dispensers in which the product is packaged.

An additional preferred constituent of the present liquid cleanser is copper phthalocyanine which is a water dispersible green pigment and which has been found to be highly effective in amounts as low as about 0.002% by weight. In addition to desired coloring effects it may desirably modify other properties such as by increasing the viscosity of the present liquid systems depending upon their particular composition. Suitably this pigment is used in amounts on the order of up to about 0.01% and higher, preferred proportions being about 0.004 to 0.008%.

The scouring cleanser compositions of the present invention may also contain as a balance of its constituents a wide variety of optional water soluble and water insoluble adjuvants including oxidative or reductive bleaching and/or stain removing agents, e.g. sodium perborate, sodium thioglycolate, oxalic acid, potassium monopersulfate, sodium hydrosulfite and sodium sulfite, sodium hypochlorites and calcium hypochlorites, dyes and pigments, cysteine, organic sequestering agents such as ethylene diamine tetraacetic acid and its salts, polyvinylpyrrolidone, organic solvents such as deodorized kerosene, mineral spirits, and pine oil, perfumes and essential oils, germicides and bactericides such as hexachlorophene, lanolin, clays such as bentonite and attapulgite, fluorescent dyes, silicones, organic phosphate esters such as sodium lauryl orthophosphate, melamine, N-chlorinated melamine, betaine, opacifying and pearlescing agents, and the like. The resulting compositions may be packaged in a variety of containers or dispensers, such as glass bottles, metal cans, and the like, but it is particularly preferred to dispense these compositions from pressure propelled dispensers in which the propelling pressure is obtained by virtue of the presence of a propellant gas or by manual compression of flexible or resilient walls e.g. a polyethylene or polypropylene squeeze bottle.

The following examples are given additionally to illustrate the nature of the invention and it will be understood that the invention is not limited thereto. In these examples, as in the remainder of the specification and claims, proportions indicated are by weight unless otherwise specified, viscosities are apparent viscosities determined by using a Brookfield Viscometer Model No. LVF with a No. 4 spindle at 6 r.p.m., and the term "coloring" refers to a water dispersible commercial green pigment

consisting of 33% copper phthalocyanine and 67% extender (dextrin).

Example I

A liquid abrasive cleanser having an apparent viscosity of about 16,000 centipoises has the following composition:

	Parts
Silica	56.158
Water	33.371
Tetrasodium pyrophosphate	1.663
Tridecylbenzene sulfonate, sodium salt (as aqueous slurry containing 54% solids, the solids consisting of 88% organic sulfonate and 12% sodium sulfate)	3.386
Diethanolamide of coconut oil fatty acids containing approximately 6% glycerin	4.307
Sodium chloride	1.000
Perfume	0.100
Coloring	0.015
	100.000

The pH of this product is 10.5. The silica used in this formulation is of such particle size that 100% passes a 60 mesh sieve, a maximum of 0.5% is retained on a 100 mesh sieve, at least 99.3% passes through a 200 mesh sieve, and a maximum of 94% passes through a 325 mesh sieve.

8.5 fluid ounces of the composition of this example are packaged in a polyethylene "squeeze bottle" dispenser in the form of a vertical cylinder having a base or diameter of about 2 inches and a height of about 6½ inches. The top of the container is provided with a spout carrying a snap-on cap which opens to expose an opening at the end of the spout which has a cross sectional area of about 4 square millimeters. On squeezing of the side walls of the container (which walls are flexible being approximately 1/16 of an inch thick), the cleanser is dispensed in the form of a stream or jet of fluid which readily adheres to bathtub sidewall surfaces and tiled bathroom walls and ceilings. On the other hand, the composition is sufficiently fluid that on inversion, it readily drains toward the spout of the dispenser thereby facilitating complete emptying of the container during use.

After storage at 140° F. for 30 days, this product exhibits a viscosity of 23,500 centipoises. The product remains stable at 140° F. for 47 days.

Example II

The composition of Example I is packaged in conventional aerosol dispensers with liquefied gaseous propellants as follows:

	Parts
Composition of Example I	94.2
Trichloromonofluoromethane	5.4
Dichlorodifluoromethane	0.4

The dispenser is sealed, being equipped with a valve of the type known as whipped cream valve, which requires inversion of the can and sidewise pressure on the valve for dispensing of product. The product of this example dispenses from such a container as a foamy stream which readily adheres to vertical ceramic surfaces without rapid drainage or run-off and which, when contacted with water or a wet cloth for purposes of scouring, readily disperses throughout the water employed.

Example III

The composition of Example I is placed in a conventional aerosol dispenser equipped with a top mounted valve and a siphon tube, and is pressurized with nitrogen to a pressure of 100 pounds per square inch. On operation of the valve, the liquid abrasive cleanser is ejected in the form of a stream which readily adheres to virtually any surface to which it is applied.

Examples IV—VI

Several suitable liquid scouring cleansers in parts by weight constitute:

	Example IV	Example V	Example VI
Silica of Example I	56.158	55.882	55.586
Water	32.607	32.433	32,277
Potassium pyrophosphate	1.980	1.970	1.961
Sodium chloride	1.000	1.500	2.000
Sodium dodecyl benzene sulfonate (as aqueous slurry containing 42% sulfonate, 6% sodium sulfate and 52% water)	3.733	3.714	3.696
Diethanolamide of coconut oil fatty acids	4.307	4.286	4.265
Perfume	0.200	0.200	0.200
Coloring	0.015	0.015	0.015
pH:			
Initial	9.8	9.9	10.0
After 45 days at 140° F	9.15	9.1	9.05
Viscosity, centipoises:			
Initial	12,000	9,000	7,000
After 20 days at 140° F	17,500	20,500	23,500
After 30 days at 140° F	18,500	20,500	23,500
Phase separation after 45 days at 140° F	None	None	None

Example VII

A satisfactory liquid abrasive cleanser in parts by weight constitutes:

Silica of Example I	56.158
Water	31.172
Trisodium pyrophosphate, dodecahydrate	3.871
Sodium chloride	1.000
Tridecyl benzene sulfonate slurry of Example I	3.386
Diethanolamide of coconut oil fatty acids	4.307
Perfume	0.100
Coloring	0.015

Examples VIII—X

The following formulations are also stable liquid abrasive cleansers:

	Examples in Parts by Weight		
	VIII	IX	X
Silica [1]	55.0	55.0	55.0
Water	36.7	35.1	36.3
Potassium Oleate	3.9		
Cetyl Dimethyl Ethyl Ammonium Chloride		3.8	
Sodium lauryl sulfate			3.8
Cocodiethanolamide	4.1	2.4	3.8
Trisodium phosphate		1.3	
Sodium chloride	0.3	2.4	1.1
	100.0	100.0	100.0
Viscosity, centipoises	22,000	15,000	19,000

[1] Silica particle size is at least 99% thru 200 mesh sieve.

Examples XI–XII

The following formulations are liquid cleanser compositions containing various abrasives and having desired stability:

	Examples in Parts by Weight	
	XI	XII
Alumina (99% thru 200 mesh sieve)	55.0	
Feldspar (99% thru 200 mesh sieve)		55.0
Water	37.3	36.5
Potassium oleate	3.9	3.9
Cocodiethanolamide	3.2	4.2
Sodium chloride	0.6	0.4
	100.0	100.0
Viscosity, centipoises	10,000	21,000

Although the present invention has been described with reference to particular embodiments and examples, it will

be apparent to those skilled in the art that variations and modifications of this invention can be made and that equivalents can be substituted therefor without departing from the principles and true spirit of the invention.

What is claimed is:

1. A liquid abrasive cleanser consisting essentially of a stable aqueous suspension of about 45 to 60% of a water insoluble inorganic abrasive having a particle size such that about 99% thereof passes through a 200 mesh sieve, about 0.5 to 4% of a water-soluble detergent selected from the group consisting of organic anionic and cationic detergent salts, about 2 to 10% of a higher fatty acid amide of a lower alkylolamine, said higher fatty acid containing from about 10 to 18 carbon atoms and said alkylolamine containing from about 2 to 4 carbon atoms, about 25 to 45% water, and about 0.25 to 2.5% sodium chloride, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises, said percentages being by weight of the composition.

2. A liquid abrasive cleanser as set forth in claim 1 having an adjusted pH from 1.5 to 12.0.

3. A liquid abrasive cleanser as set forth in claim 1 having an adjusted pH from 5.0 to 10.5.

4. A liquid abrasive cleanser as set forth in claim 1 which contains at least about 0.002% of copper phthalocyanine.

5. A liquid abrasive cleanser consisting essentially of about 45 to 60% of a water insoluble inorganic abrasive having a particle size such that about 99% thereof passes through a 200 mesh sieve, about 0.5 to 4% of a water-soluble higher alkyl benzene sulfonate detergent salt wherein the alkyl group contains from about 10 to 16 carbon atoms, about 2 to 10% of a higher fatty acid amide of a lower alkylolamine, said higher fatty acid containing from about 10 to 18 carbon atoms and said alkylolamine containing from about 2 to 4 carbon atoms, about 25 to 45% water, and about 0.25 to 2.5% sodium chloride, said liquid cleanser being a stable suspension of undissolved solids in a fluid liquid, which suspension is pourable at room temperature and exhibits an apparent viscosity between about 7,000 and 25,000 centipoises, said percentages being by weight of the composition.

6. A liquid abrasive cleanser consisting essentially of a stable aqueous suspension of about 45 to 60% of a water insoluble inorganic abrasive having a particle size such that about 99% thereof passes through a 200 mesh sieve, about 0.5 to 4% of water-soluble higher alkyl benzene sulfonate detergent salt wherein the alkyl group contains from about 10 to 16 carbon atoms, about 2 to 10% of a higher fatty acid amide of diethanolamine, said higher fatty acid containing from about 10 to 18 carbon atoms, about 25 to 45% water, and about 1.0 to 2.0% sodium chloride, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises, said percentages being by weight of the composition.

7. A liquid abrasive cleanser consisting essentially of a stable aqueous suspension of about 45 to 60% of a water insoluble inorganic abrasive having a particle size such that about 99% thereof passes through a 200 mesh sieve, about 1 to 3% of a water-soluble inorganic alkaline buffer salt, about 0.5 to 4% of a water-soluble, organic, synthetic detergent selected from the group consisting of anionic and cationic detergent salts, about 2 to 10% of a higher fatty acid amide of a lower alkylolamine, said higher fatty acid containing from about 10 to 18 carbon atoms and said alkylolamine containing from about 2 to 4 carbon atoms, about 25 to 45% water, and about 0.25 to 2.5% sodium chloride, said liquid cleanser being pourable at room temperature and having an apparent viscosity between 7,000 and 25,000 centipoises, said percentages being by weight of the composition.

8. A liquid abrasive cleanser consisting essentially of a stable aqueous suspension of about 45 to 60% of silica having a particle size such that at least 99% thereof passes through a 200 mesh sieve, about 1 to 3% of a water-soluble inorganic alkaline buffer salt, about 0.5 to 4% of sodium tridecyl benzene sulfonate, about 2 to 10% of the diethanolamide of coconut oil fatty acids, about 0.002 to 0.01% of copper phthalocyanine, about 25 to 45% water, and about 0.5 to 2.5% sodium chloride, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises, said percentages being by weight of the composition.

9. A liquid abrasive cleanser as set forth in claim 8 in which the buffer salt is tetrapotassium pyrophosphate.

10. A liquid abrasive cleanser consisting essentially of a stable aqueous suspension of about 45 to 60% of a silica having a particle size such that at least 99% thereof passes through a 200 mesh sieve, about 1 to 3% of a water-soluble inorganic alkaline buffer salt, about 0.5 to 4% of sodium tridecyl benzene sulfonate, about 2 to 10% of the diethanolamide of coconut oil fatty acids, about 25 to 45% water, and about 0.5 to 2.5% sodium chloride, said liquid cleanser being pourable at room temperature and having an apparent viscosity between 7,000 and 25,000 centipoises, said percentages being by weight of the composition.

11. A liquid cleanser, adapted to be dispensed as a pressure-propelled stream of fluid, on to static vertical surfaces, which contains a liquid abrasive cleanser consisting essentially of a stable aqueous suspension of about 45 to 60% of a water insoluble inorganic abrasive having a particle size such that about 99% thereof passes through a 200 mesh sieve, about 1 to 3% of a water-soluble inorganic alkaline buffer salt, about 0.5 to 4% of a water-soluble, organic, synthetic detergent selected from the group consisting of anionic and cationic detergent salts, about 2 to 10% of a higher fatty acid ethanolamide, said higher fatty acid containing from about 10 to 18 carbon atoms, about 25 to 45% water, and about 0.25 to 2.5% sodium chloride, said liquid cleanser being pourable at room temperature and having an apparent viscosity between 7,000 and 25,000 centipoises, whereby on application to a static vertical surface, a heavy film of said cleanser remains thereon without substantial run-off, said percentages being by weight of the composition.

12. A liquid cleanser, adapted to be dispensed as a pressure-propelled stream of fluid, on to static vertical surfaces, which contains a liquid abrasive cleanser consisting essentially of a stable aqueous suspension of about 45 to 60% of a water insoluble inorganic abrasive having a particle size such that about 99% thereof passes through a 200 mesh sieve, about 0.5 to 4% of a water-soluble detergent selected from the group consisting of organic, synthetic anionic and cationic detergent salts, about 2 to 10% of a higher fatty acid ethanolamide, said higher fatty acid containing from about 10 to 18 carbon atoms, about 25 to 45% water, and about 0.25 to 2.5% sodium chloride, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises, whereby on application to a static vertical surface, a heavy film of cleanser remains thereon without substantial run-off, said percentages being by weight of the composition.

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