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LIQUID ABRASIVE CLEANSER
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 poration of Delaware
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 10 Claims. (Cl. 252-137)

The present invention relates to abrasive cleansers. More particularly, it relates to 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 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, and about 25 to 45% water, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises. Preferably the cleanser also contains at least about 0.002% of water dispersible copper phthalocyanine green pigment.

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. three 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 ninety days at room temperature and two 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 remains 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 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 8.0 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 Na₂O to SiO₂ 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, 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 de-

tergent 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, potassium soaps such as the potassium soap of mixed oleic and coconut oil fatty acids, and cationic detergents such as dialkyl dimethyl ammonium chloride 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 varies.

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 in the system. In addition to viscosity control, the instant alkylolamide appears to contribute to the present liquid cleanser highly beneficial properties not conferred by a wide variety of other viscosity-adjusting agents. Thus, the instant amides not only increase the viscosity of the system in a relatively stable manner, i.e. once adjusted, viscosity does not change appreciably or "drift" excessively on aging, but the amides also serve to raise substantially the solids-suspending power of the instant compositions. In addition to contributing a highly beneficial combination of viscosity adjustment within the desired range and a substantial increase in the suspending powder of the composition for undissolved particles of abrasive solids, the amide also appears to contribute improved grease soil removal and foaming and detergency to the finished product.

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 8.0 and 12.0, although suitable products may be prepared at a pH as low as 1.5.

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, a water dispersible green pigment which has been found to be highly effective in amounts as low as about 0.002% in increasing

the viscosity of the present liquid systems. 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 hypochlorite, and calcium hypochlorite, 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 melamines, 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 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 -----	56.72
Water -----	31.385
Trisodium phosphate, dodecahydrate, granular---	3.91
Tridecylbenzene, sulfonate, sodium salt (as aqueous slurry containing 54% solids, the solids consisting of 88% organic sulfonate and 12% sodium sulfate) -----	3.42
Diethanolamide of coconut oil fatty acids containing approximately 6% glycerin -----	4.35
Perfume -----	0.20
Coloring -----	0.015
	100.000

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

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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.

Example II

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

Composition of Example I	Parts
Trichloromonofluoromethane	94.2
Dichlorodifluoromethane	5.4
	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.

Example IV

A liquid abrasive cleanser in parts by weight containing oxalic acid as a bleaching agent has the following formulation:

Silica of Example I	56.720
Water	33.215
Oxalic acid	2.000
Diethanolamide of coconut oil fatty acids	4.350
Perfumes	0.200
Coloring	0.015
Di(alkyl) dimethylammonium chloride in which the alkyl substituents are derived from tallow fatty acids by reduction thereof	3.500

The pH of this product is 1.4

Example V

An abrasive cleanser in parts by weight containing sodium thioglycolate has the following composition:

Silica of Example I	56.720
Water	29.385
Trisodium phosphate dodecahydrate	3.910
Tridecyl benzene sulfonate of Example I	3.420

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Diethanolamide of coconut oil fatty acids	4.350
Perfume	0.200
Coloring	0.015
Sodium thioglycolate	2.000

This composition is effective in removing tarnish from copper and brass.

Example VI

A preferred liquid cleanser in parts by weight containing potassium pyrophosphate has the following formula:

Silica of Example I	56.720
Water	33.295
Tetrapotassium pyrophosphate	2.000
Tridecylbenzene-sulfonate of Example I	3.420
Diethanolamide of coconut oil fatty acids	4.350
Perfume	0.200
Coloring	0.015

The pH of this liquid cleanser is 10.2, and its apparent viscosity is 15,000 centipoises.

Example VII

A liquid abrasive cleanser containing mixed lauric-myristic fatty acid amide of diethanolamine has the following formula:

Silica of Example I	56.720
Water	31.385
Trisodium phosphate decahydrate	3.910
Tridecylbenzene sulfonate of Example I	3.420
Diethanolamide of mixed lauric and myristic acids	4.350
Perfume	0.200
Coloring	0.015

Examples VIII-XII

Liquid cleanser compositions containing various abrasives may be prepared having the following formulas:

	Examples (In parts by weight)			
	VIII	IX	X	XII
Water	43.000	31.335	43.355	31.485
Trisodiumphosphate decahydrate	3.910	3.910	3.280	3.910
Tridecylbenzene sulfonate of Example I	3.420	3.420	2.880	3.420
Diethanolamide of coconut oil fatty acids	5.250	4.500	2.640	4.350
Perfume	0.100	0.100	0.080	0.100
Coloring	0.015	0.015	0.015	0.015
Pumice (99% through 200 mesh screen)	44.305			
Feldspar (99% through 200 mesh screen)		56.720		
Alumina (92% through 325 mesh screen)			47.750	
Silica (99% through 160 mesh screen)				56.720

Examples XIII-XX

[In parts by weight]

	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX
Silica of Example I	56.720	56.720	56.720	56.720	56.720	56.720	56.001	55.371
Water	33.295	33.255	32.955	33.255	33.255	32.255	31.083	30.798
Tridecylbenzene sulfonate of Example I	3.420	3.460	3.460	3.460	3.460	3.460	4.939	4.891
Diethanolamide of coconut oil fatty acids	4.350	4.350	4.350	4.350	4.350	4.350		
Diethanolamide of tallow fatty acids							4.000	5.000
Perfume	0.200	0.200	0.200	0.200	0.200	0.200	0.100	0.100
Coloring	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Sodium carbonate	2.000							
Disodium hydrogen orthophosphate		2.000						
Sodium dihydrogen orthophosphate			2.300					
Trisodium acid pyrophosphate				2.000				
Sodium sulfate					2.000			
Citric acid						2.000		
Trisodium phosphate dodecahydrate							3.862	3.825
pH		9.9	5.9	5.6	10.5	3.0		
Viscosity, centipoises, one week after manufacture		15,000	14,500	11,000	16,000	14,500	14,000	22,500

Examples XXI-XXVIII

[In parts by weight]

	XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII
Silica of Example I.....	56.720	56.720	56.720	54.780	56.720	53.000	56.720	56.470
Water.....	32.255	31.255	27.115	33.155	34.715	33.585	33.255	33.110
Tridecylbenzene sulfonate of Example I.....	3.460	3.460				3.400		3.440
Diethanolamide of coconut oil fatty acids.....	4.350	4.350	4.350	4.350	4.350	2.900	4.350	4.790
Perfume.....	0.200	0.200	0.200	0.200	0.200	0.100	0.200	0.200
Coloring.....	0.015	0.015	0.015	0.015	0.015	0.015	0.015	
Sodium carbonate.....						2.000		
Tetrapotassium pyrophosphate.....	2.700	4.000	2.000	2.000	2.000		2.000	1.990
36% aqueous solution of potassium salts of coconut oil fatty acids and oleic acid in a ratio of 3:1.....			9.600					
Sodium salt of hydrogenated coconut oil monoglyceride sulfate 35%, sodium sulfate 65%.....				5.500				
Sodium lauryl sulfate.....					3.000			
Sodium lauryl orthophosphate.....						5.000		
60% aqueous inorganic salt free solution of triethanolamine salt of dodecyl benzene sulfonic acid.....							3.460	
pH.....	10.5	10.8	10.8	8.4	10.2		10.4	
Viscosity, centipoises, one week after manufacture.....	16,500	7,500	15,500	9,000	13,000		10,500	8,500

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, synthetic 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, and about 25 to 45% water, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises.

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 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, and about 25 to 45% water, 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.

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, and about 25 to 45% water, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises.

7. A liquid abrasive cleanser consisting essentially of a stable aqueous suspension of about 45 to 60% of a later insoluble 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, and about 25 to 45% water, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises.

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, and about 25 to 45% water, said liquid cleanser being pourable at room temperature and having an apparent viscosity between about 7,000 and 25,000 centipoises.

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

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

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CERTIFICATE OF CORRECTION

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Barney Joseph Zmoda

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 18, for "huch" read -- such --; line 49, after "Tridecylbenzene" strike out the comma; line 52, for "3,42" read -- 3.42 --; column 6, line 23, after "cleanser" insert -- in parts by weight --; column 8, line 52, for "later" read -- water --.

Signed and sealed this 16th day of November 1965.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

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Commissioner of Patents

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