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(54) HARD SURFACE CLEANING COMPOSITION

REINIGUNGSZUSAMMENSETZUNG FÜR HARTE OBERFLÄCHEN

COMPOSITION NETTOYANTE POUR SURFACES DURES

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Description

[0001] The present invention relates to improved hard surface cleaning compositions. More particularly the present invention is directed to hard surface cleaning compositions featuring low streaking, effective against greasy soils, comprising amine oxide surfactant and phenyl containing glycol ether solvents.

[0002] Hard surface cleaning compositions are commercially important products and enjoy a wide field of use, and are known in assisting in the removal of dirt and grime from surfaces, especially those characterized as useful for cleaning "hard surfaces". Hard surfaces include those which are frequently encountered in lavatories, for example lavatory fixtures such as toilets, shower stalls, bathtubs, bidets, sinks, etc., as well as countertops, walls, floors, etc. In such lavatory environments two types of commonly encountered stains in lavatories include "hard water" stains, "soap scum" stains as well as "rust stains". Such hard surfaces, and such stains, may also be found in different environments as well, including kitchens, hospitals, etc. Hard water stains are mineral stains caused by the deposition of salts, such as calcium or magnesium salts which are frequently present in hard water which is commonly encountered. Soap scum stains are residues of fatty acid soaps, such as soaps which are based on alkaline salts of low fatty acids. These fatty acids are known to precipitate in hard water due to the presence of metal salts therein leaving an undesirable residue upon such surfaces. Still further stains, typically referred to as greasy stains, are surface residues which generally comprise hydrophobic materials often with further materials which leave unsightly residues on surfaces.

[0003] WO2008/155518 describes an aqueous alkaline hard surface cleaning composition.

[0004] Although the prior art provides a variety of compositions which provide effective cleaning of one or more, typically all of the foregoing classes of stains, there is still an urgent need in the art to provide improved hard surface cleaning compositions which are effective in the treatment of many types of stains typically encountered on hard surfaces, particularly in a home or commercial environment, especially in or around kitchens, bathrooms where cleanliness is of special importance. It is to such needs that the compositions of the present invention are particularly directed.

[0005] Broadly stated, the compositions of the present invention are directed to low streaking hard surface cleaning compositions which are particularly effective in the removal of stains from hard surfaces especially glassy or polished hard surfaces, e.g., reflective hard surfaces.

[0006] In a further aspect the present invention also provides methods for the production of such low streaking hard surface cleaning compositions, as well as methods for their use.

[0007] The hard surface cleaning compositions of the present invention necessarily comprises:

0.01 - 1.5%wt. of one or more amine oxide surfactants;
0.5 - 6%wt. of a C_1-C_3 monohydric alcohol,
0.05 - 0.85%wt. of a phenyl containing glycol ether solvent;
0 to 5%wt. of a non-phenyl containing glycol ether organic solvent;
0.1 - 5%wt. of an alkanolamine;
0 to 0.005%wt., preferably 0.0001 - 0.002%wt. of a silicone based antifoaming constituent;
0 to 0.5%wt. of a hydrotrope;
at least 90%wt. water;

and optionally, one or more further conventional additives in a cumulative amount of not in excess of 10%wt. of the total of the composition of which they form a part, wherein the compositions comprise as the sole organic solvents present isopropanol, propylene glycol phenyl ether and propylene glycol n-butyl ether characterized in that the composition excludes further cationic and anionic surfactants and comprises a readily pumpable and pourable liquid exhibiting a viscosity of 1 to 50 cP at such environmental conditions.

[0008] The compositions of the present invention exhibit good cleaning properties against dirt and stains commonly found in household, commercial and residential settings, particularly in kitchen settings wherein greasy soils and stains are frequently encountered, and concurrently exhibit reduced streaking and/or reduced residues of such cleaned surfaces.

[0009] By "essentially free" is to be understood that less than 0.05%wt. of an identified constituent is present in the inventive compositions, but preferably, such identified constituents are absent or excluded from the inventive compositions.

[0010] The compositions of the invention necessarily include at least one amine oxide surfactant such as:

alkyl di(C_1-C_7) amine oxides in which the alkyl group has 10-20, and preferably 12-16 carbon atoms, and can be straight or branched chain, saturated or unsaturated. Examples of such compounds include lauryl dimethyl amine oxide, myristyl dimethyl amine oxide, and those in which the alkyl group is a mixture of different amine oxide, dimethyl cocoamine oxide, dimethyl (hydrogenated tallow) amine oxide, and myristyl/palmityl dimethyl amine oxide;

alkyl di(hydroxy C_1-C_7) amine oxides in which the alkyl group has 10-20, and preferably 12-16 carbon atoms, and can be straight or branched chain, saturated or unsaturated. Examples of such compounds include bis(2-hydrox-

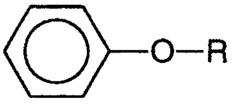
yethyl) cocoamine oxide, bis(2-hydroxyethyl) tallowamine oxide; and bis(2-hydroxyethyl) stearylamine oxide;
alkylamidopropyl di(C_1-C_7) amine oxides in which the alkyl group has 10-20, and preferably 12-16 carbon atoms, and can be straight or branched chain, saturated or unsaturated. Examples of such compounds include cocoamidopropyl dimethyl amine oxide and tallowamidopropyl dimethyl amine oxide; and
alkylmorpholine oxides in which the alkyl group has 10-20, and preferably 12-16 carbon atoms, and can be straight or branched chain, saturated or unsaturated.

[0011] Particularly preferred are alkyl di(C_1-C_2) amine oxides in which the alkyl group has 10-14, and preferably has 12 carbon atoms, which are preferably saturated. Especially preferred is lauryl dimethyl amine oxide which in preferred embodiments is present to the exclusion of other amine oxides. The amine oxide surfactant(s) present comprise 0.01 - 1.5%wt., preferably 0.1 - 0.7%wt and especially preferably 0.3 - 0.55%wt of the compositions of the present invention..

[0012] The inventive compositions are preferably essentially free of anionic and cationic surfactants, and in especially preferred embodiments the inventive compositions are essentially free of further anionic, cationic, nonionic, amphoteric and zwitterionic surfactants other than the amine oxide surfactants identified above. Thus in particularly preferred embodiments amine oxide surfactants are the sole species of surfactants present in the compositions.

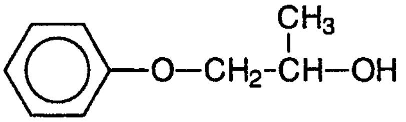
[0013] The compositions of the invention comprises at least one C_1-C_3 monohydric alcohol being exclusively isopropanol which has been found to be particularly effective. The C_1-C_3 monohydric alcohols comprise 0.5 - 6%wt., preferably 1.5 - 5%wt and especially preferably 2 - 4%wt of the inventive compositions. Isopropanol is the sole C_1-C_3 monohydric alcohol present.

[0014] The compositions of the invention additionally comprise one or more phenyl containing glycol ether solvents including those which may be represented by the following general structural representation (I):



(I)

wherein R is a C_1-C_6 alkyl group which contains at least one -OH moiety, and preferably R is selected from: CH_2OH, CH_2CH_2OH, $CH(OH)CH_3$, $CH(OH)CH_2OH$, $CH_2CH_2CH_2OH$, $CH_2CH(OH)CH_3$, $CH(OH)CH_2CH_3$, $CH(OH)CH_2CH_2OH$, $CH(OH)CH(OH)CH_3$, and $CH(OH)CH(OH)CH_2OH$, and the phenyl ring may optionally substituted with one or more further moieties such as C_1-C_3 alkyl groups but is preferably unsubstituted. A specific useful phenyl containing glycol ether solvent is commercially supplied as DOWANOL PPH, described to be a propylene glycol phenyl ether which is described by it supplier as being represented by the following structural representation (II):



(II)

and further, indicated is that the major isomer is as indicated, which suggests that other alkyl isomers are also present. The sole phenyl containing glycol ether solvent present in the compositions is propylene glycol phenyl ether which has been found to be unusually effective. The phenyl containing glycol ether solvents comprise 0.05 - 0.85%wt., preferably 0.1 - 0.4 %wt and especially preferably 0.18 - 0.38%wt of the inventive compositions.

[0015] The compositions of the invention further additionally comprise a non-phenyl moiety containing glycol ether organic solvents. The non-phenyl moiety containing glycol ether organic solvent comprises 0 - 5%wt., preferably 0.1 - 2 %wt., and preferably 0.95 -2.2%wt, and particularly preferably 1 - 1.75%wt. of the inventive compositions. Propylene glycol n-butyl ether is the sole non-phenyl moiety containing, viz., aliphatic, glycol ether organic solvent present.

[0016] In particularly preferred embodiments the compositions concurrently comprise each of: 2 - 4%wt. isopropanol, 0.19 - 0.4%wt., but preferably 0.19 - 0.3%wt. propylene glycol phenyl ether and I - 1.5%wt. propylene glycol n-butyl ether which are present, to the exclusion of any further organic solvents in the compositions.

[0017] The inventor has unexpectedly and surprisingly discovered that highly effective, largely aqueous cleaning compositions suited for the cleaning of grease laden hard surfaces, while at the same time being essentially low residue, low streaking or "streak free" may now be produced particularly in compositions which include amine oxide based surfactants to the exclusion of further cationic and anionic surfactants, concurrently with the preferred organic solvent systems described herein.

[0018] The compositions also necessarily include one or more alkanolamines, which may provide alkalinity to compositions, as well as simultaneously providing excellent removal of hydrophobic soils which may be encountered, e.g., greases and oils. For the purposes of this patent specification, alkanolamines are not considered to be organic solvents.

Exemplary useful alkanolamines include monoalkanolamines, dialkanolamines, trialkanolamines, and alkylalkanolamines such as alkyl-dialkanolamines, and dialkylmonoalkanolamines. The alkanol and alkyl groups are generally short to medium chain length, that is, from 1 to 7 carbons in length. For di- and trialkanolamines and dialkylmonoalkanolamines, these groups can be combined on the same amine to produce for example, methylethylhydroxypropylhydroxylamine. One of skill can readily ascertain other members of this group. The alkanolamine constituent may be a single alkanolamine, or may be a plurality of alkanolamines as well. Particularly preferred as the alkanolamine constituent is monoethanolamine which has found to be effective both as an alkalinity source and as a cleaning component. In certain particularly preferred embodiments the alkalinity constituent of the invention consists solely of a single alkanolamine, preferably selected from monoalkanolamines, dialkanolamines, trialkanolamines of 1 to 7 carbons in length, preferably is a single monoalkanolamine selected from linear monoethanolamine, monopropanolamine or monobutanolamine, and especially preferably is monoethanolamine, which is advantageously present to the exclusion of other alkanolamines. The one or more alkanolamines comprise 0.1 - 5%wt. , preferably 0.5 - 2.5%wt and especially preferably 0.5 - 0.8%wt of the inventive compositions.

[0019] In preferred embodiments the compositions include 0 to 0.0005%wt of an antifoaming agent, typically silicone antifoaming agents comprising silicone and siloxane polymers often provided as emulsions in water. A particularly suitable antifoam agent is a polydimethylsiloxane composition. It has been observed that the inclusion of a minor amount of antifoam agent is advantageously used the compositions described herein to reduce foaming tendencies of the compositions, such that a brief visible foam is present and seen when the compositions are wiped on a surface but quickly breaks and dissipates and thus does not leave undesired residues on the treated surface. While such an antifoaming constituent may be excluded from the compositions taught herein, advantageously they are present in amounts of from 0.0001 - 0.002%wt., based on the weight of the silicone and/or siloxane compounds of the compositions of which they form a part. Surprisingly even such small amounts of this constituent were found to be effective.

[0020] In preferred embodiments the compositions include a hydrotrope which primarily fulfills the function of improving the solubility of any fragrance constituent present in the largely aqueous compositions taught herein. Such a constituent may be omitted however if desired but is advantageously present. Exemplary hydtropes include, *inter alia,* benzene sulfonates, naphthalene sulfonates, C_1-C_{11} alkyl benzene sulfonates, naphthalene sulfonates, C_5-C_{11} alkyl sulfonates, C_6-C_{11} alkyl sulfates, alkyl diphenyloxide disulfonates, and phosphate ester hydrotropes. The hydrotropic compounds of the invention are often provided in a salt form with a suitable counterion, such as one or more alkali, or alkali earth metals, such as sodium or potassium, especially sodium. However, other water soluble cations such as ammonium, mono-, di- and tri- lower alkyl, i.e., C_{1-4} alkanol ammonium groups can be used in the place of the alkali metal cations. Exemplary alkyl benzene sulfonates include, for example, isopropylbenzene sulfonates, xylene sulfonates, toluene sulfonates, cumene sulfonates, as well as mixtures thereof. Exemplary C_5-C_{11} alkyl sulfonates include hexyl sulfonates, octyl sulfonates, and hexyl/octyl sulfonates, and mixtures thereof. Particularly useful hydrotrope compounds include benzene sulfonates, o-toluene sulfonates, m-toluene sulfonates, and p-toluene sulfonates; 2,3-xylene sulfonates, 2,4-xylene sulfonates, and 4,6-xylene sulfonates; cumene sulfonates, wherein such exemplary hydrotropes are generally in a salt form thereof, including sodium and potassium salt forms. While such a hydrotrope may be excluded from the compositions taught herein, advantageously they are present in amounts of from about 0.001 - 2%wt., preferably 0.01-0.5 %wt and especially preferably 0.1 - 0.3%wt of the present inventive compositions.

[0021] The inventive compositions may comprise, up to a cumulative total of 10%wt, but preferably a cumulative total of 5%wt. of one or more conventional additives selected coloring agents, fragrances and fragrance solubilizers, viscosity modifying agents including one or more thickeners, pH adjusting agents and pH buffers including organic and inorganic salts, optical brighteners, abrasives, and preservatives, as well as other optional constituents known to the art. Preferably however, any such conventional additive constituent which undesirably diminishes the preferred low streaking characteristics of the invention are expressly omitted from the compositions.

[0022] Preservatives may also be added in minor amounts in the compositions according to the invention, e.g., including those which are presently commercially available under the trademarks Kathon® CG/ICP (Rohm & Haas, Philadelphia Pa.), Suttocide® A (Sutton Labs, Chatham N.J.) as well as Midtect® TFP (Tri-K Co., Emerson, N.J.). Such may be included in minor amounts, e.g., 0.0001 to 0.5% by weight of the total concentrate composition, more generally an amount of 0.1% by weight and less, and preferably present in amounts of 0.05% by weight and less.

[0023] The concentrate compositions of the invention optionally but in certain cases desirably include a fragrance constituent. Fragrance compositions as received from a supplier may be provided as an aqueous or organically solvated composition, and may include as a hydrotrope or emulsifier a surface-active agent, typically a surfactant, in minor amount, generally not in excess of 1.5%wt. Such a fragrance constituent may be present in any effective amount, but are typically comprises not more than 2%wt, preferably not more than 1%wt. of the composition.

[0024] Thickeners such as clays, cross-linking acrylic polymers, e.g. CARBOPOL, gums, celluloses including modified celluloses, and the like are desirably excluded as such are expected to reduce the preferred low streaking characteristics of preferred embodiments of the invention.

[0025] Similarly, abrasive materials such as: oxides, e.g., calcined aluminum oxides and the like, carbonates, e.g., calcium carbonate and the like, quartzes, siliceous chalk, diatomaceous earth, colloidal silicon dioxide, alkali metasilicates, e.g., sodium metasilicate and the like, perlite, pumice, feldspar, calcium phosphate, organic abrasive materials based on comminuted or particulate polymers especially one or more of polyolefins, polyethylenes, polypropylenes, polyesters, polystyrenes, acetonitrile-butadiene-styrene resins, melamines, polycarbonates, phenolic resins, epoxies and polyurethanes, natural materials such as, for example, rice hulls, corn cobs, and the like, or talc and mixtures thereof, and the like are desirably excluded as such are expected to reduce the preferred low streaking characteristics of preferred embodiments of the invention.

[0026] In certain particularly preferred embodiments the compositions of the invention expressly exclude organic acids, e.g., citric, malic, succinic, lactic, glycolic, fumaric, tartaric, and formic, etc.

[0027] The compositions of the invention may include one or more pH adjusting agents, or compounds which may be use to adjust the pH of the compositions, or to buffer the pH of the compositions of which they form a part. However such is frequently unnecessary due to the inclusion of the alkanolamine constituent, which imparts alkalinity to the compositions.

[0028] In certain particularly preferred embodiments the compositions of the invention expressly exclude inorganic acids, e.g., sulfuric acid, phosphoric acid, potassium dihydrogenphosphate, sodium dihydrogenphosphate, sodium sulfite, potassium sulfite, sodium pyrosulfite (sodium metabisulfite), potassium pyrosulfite (potassium metabisulfite), acid sodium hexametaphosphate, acid potassium hexametaphosphate, acid sodium pyrophosphate, acid potassium pyrophosphate, , hydrochloric acid, and sulfamic acid. Other water dispersible or water soluble inorganic or mineral acids not specifically eludicated herein are also desirably excluded from certain preferred embodiments of the inventive compositions.

[0029] The inventive compositions are highly aqueous and comprise at least 90%wt. water, which is preferably distilled, demineralized but especially preferably is deionized water.

[0030] The inventive compositions are readily pourable and pumpable, and are liquids at room temperature, exhibiting a viscosity in the range of from 1 cP to 50 cP at such environmental conditions.

[0031] The compositions typically exhibit a pH in the range of 9.5 - 11.5, preferably in the range of 10.5 - 11.35.

[0032] The compositions are easily produced by any of a number of known art techniques. Conveniently, a part of the water is supplied to a suitable mixing vessel further provided with a stirrer or agitator, and while stirring, the remaining constituents are added to the mixing vessel, including any final amount of water needed to provide to 100%wt. of the inventive composition.

[0033] The composition provided according to the invention can be desirably provided as a consumer product in a manually openable and resealable storage container, which may be either rigid or may be a deformable "squeeze bottle" type dispenser. Preferably however the composition is advantageously provided in a bottle, flask or other reservoir and dispensed via a nozzle or a pump, e.g., a manually operable pump or a manually operable trigger spray to a hard surface requiring treatment. The inventive compositions may also be provided to a pressurizable container, e.g., an aerosol container with a suitable amount, typically up to 10%wt. based on the weight of the inventive composition, of an aerosol propellant, e.g., a hydrocarbon, of from 1 to 10 carbon atoms, such as n-propane, n-butane, isobutane, n-pentane, isopentane, and mixtures thereof or a non-hydrocarbon gas, e.g., CO_2, N_2, etc. or for that matter, even pressurized air. The inventive compositions are advantageously used in the cleaning treatment of hard surfaces, as the hard surface cleaning composition according to the invention is desirably provided as a ready to use product which may be directly applied to a hard surface. The composition may be applied directly from a product container as a liquid, or may be applied as a wipe article preimpregnated with a quantity of the said composition. Cleaning of a hard surface may be effectuated by applying a cleaning effective amount of a composition according to any preceding claim, and optionally thereafter wiping the treated hard surface to remove at least a part of the composition from the hard surface.

[0034] By way of non-limiting examples, hard surfaces include surfaces composed of refractory materials such as: glazed and unglazed tile, brick, porcelain, ceramics as well as stone including marble, granite, and other stones surfaces; glass; metals; plastics e.g. polyester, vinyl, fiberglass and other hard surfaces known to the industry. Hard surfaces which are to be particularly denoted are surfaces normally encountered in a lavatory, e.g., lavatory fixtures, shower stalls, bathtubs and bathing appliances (racks, curtains, shower doors, shower bars) toilets, bidets, wall and flooring surfaces as well as those associated with kitchen environments and other environments associated with food preparation, including cabinets and countertop surfaces as well as walls and floor surfaces especially those which include refractory materials, plastics, Formica®, Corian® and stone. The inventive compositions are particularly effective in the cleaning treatment of polished or reflective surfaces, e.g, glazed enameled surfaces, glazed ceramic surfaces, glass, mirror surfaces, metals and polished metal surfaces and the like.

[0035] Illustrative example compositions which were produced include those set forth below. The illustrative example compositions demonstrate particularly preferred embodiment of the invention as well as preferred weight percentages as well as preferred relative weight percentages/weight ratios with regard to the respective individual constituents present within the composition.

Examples

[0036] Examples the inventive hard surface treatment compositions are described in the following Table 1; the constituents indicated on Table 1 used to produce the formulations were used on an "as supplied" basis; the identity of these constituents are disclosed in more detail on Table 2. The hard surface treatment compositions were produced by mixing the constituents into water as outlined in Table 1 in a beaker at room temperature which was stirred with a conventional magnetic stirring rod or paddle mixer; stirring continued until the formulation was homogenous in appearance. It is to be noted that the constituents might be added in any order, but it is preferred that a first premixture is made of any fragrance constituent with one or more surfactants and/or hydrotrope in an aliquot of water used in the inventive hard surface treatment compositions. The order of addition is not critical, but good results are obtained where the surfactants (which may be also the premixture of the fragrance and surfactants) are produced prior to the addition of the remaining constituents to the water. The amounts of the named constituents are indicated in %w/w based on a total weight of the hard surface treatment composition of which they form a part. The total amount of water present in each composition was based on the amount of water provided via one or more of the named constituents.

[0037] Table 1 also illustrates a series of "comparative examples" which were made in a similar manner, which are identified by a "C" preceding a digit.

Table 1

	C1	1	2	3	4	5	6
anionic surfactant	1.67	--	--	--	--	--	--
Ammonyx LO (30%)	-	1.67	1.67	1.67	1.67	1.67	1.67
monoethanolamine (85%)	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Dowanol PPH (93%)	0.2	0.2	0.4	0.3	0.4	0.3	0.3
Dowanol PnB	1.5	1.5	1	1	1.5	1.5	1.5
isopropanol	4	4	4	2	2	2	2
sodium cumene sulfonate (40%)	0.25	0.25	0.25	0.25	0.25	-	0.25
DSP Antifoam (0.5%)	1	1	1	1	1	1	1
fragrance	0.04	0.04	0.04	0.04	0.04	0.04	0.04
di water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.

[0038] All of the constituents in the compositions on the foregoing Table I are indicated in weight percent, and each composition comprised 100%wt. The individual constituents were used, "as-supplied" from their respective source and unless otherwise indicated, each of the constituents are to be understood as being "100%wt. actives". Deionized water was added in quantum sufficient, "q.s." to provide the balance to 100%wt. of each of the example and comparative example compositions. Further identity of, and the sources of the constituents used in the formulations of Tables I are described on the following Table 2.

Table 2

anionic surfactant	sodium alkane sulfonate surfactant, e.g., HOSTAPUR SAS (30%wt. actives) (ex. Clariant)
Ammonyx LO (30%)	lauryl dimethyl amine oxides (30%wt. actives) ex. Stepan Co.
monoethanolamine (85%)	monoethanalamine (85%wt. actives) ex. Huntsman Corp.
Dowanol PPH (93%)	propylene glycol phenyl ether (93 %wt. actives) ex. Dow Chem. Co.
Dowanol PnB	propylene glycol n-butyl ether (100%wt. actives) ex. Dow Chem. Co.
Isopropanol	isopropanol (99% wt. actives)
propylene glycol	propylene glycol (100%wt. actives)

(continued)

Table 2	
sodium cumene sulfonate (40%)	sodium cumene sulfonate, supplied as NAXONATE 40SC (40%wt. actives) ex. Nease Corp.
DSP Antifoam (0.5%)	DSP Antifoam (10%wt. active silicone emulsion, further diluted with deionized water to form a 0.5%wt. active silicone premix) ex. Dow Corninq Co.
Fragrance	fragrance composition, proprietary composition of its supplier
di water	deionized water

[0039] Several of the foregoing compositions were tested and evaluated according to one or more of the following test protocols.

Evaluation of Baked Greasy Soil Cleaning

[0040] The efficacy of compositions according to present invention (example "E2") as well as comparative examples based on commercial products was evaluated in accordance with the following test protocol which was used to evaluate cleaning efficacy of baked on, tough greasy soils on a hard surfaces.

[0041] A "baked greasy test soil" was prepared from "Part I" and "Part II" soils which were prepared as follows.

[0042] The "Part I" soil was prepared by mixing together the ingredients indicated on the following table

Part I soil	%w/w
Peanut oil	26.2
Corn oil	14.5
Cherry pie filling	14.5
Ground beef	14.5
Ground pork	14.5
Accent® (monosodium glutamate flavor aid)	0.60
Table salt	0.60
Deionized water	14.6

and thereafter baking the mixture in a glass baking dish at 400°F (205°C) for 2 hours. The Part I soil was allowed to cool to 100°C or less. After being prepared, the Part I may be divided into aliquots for later use and refrigerated in glass jars. If a refrigerated aliquot is later used, it is first heated in a hot water bath to 100°C and stirred or shaken prior to mixture with an amount of the Part II soil.

[0043] The Part II soil was "Kitchen Bouquet®", a commercially available bottled food product used to flavor and color gravy; it is believed to be primarily burnt sugar caramel, which is used "as supplied" from the manufacturer.

[0044] The baked greasy test soil used in the evaluation is mixed immediately prior to soiling test tiles by combining 83.3%wt. of the Part I soil at a temperature of 100°C with 16.7%wt. of the Part II by blending in a laboratory beaker for a minimum of 5 minutes using a hand held homogenizer.

[0045] As test substrates, white porcelain enameled steel tiles (4 inches by 4 inches) in size were used. The enameled tiles are all first cleaned with mild hand dishwashing detergent, wiped with ethanol and placed in vertical racks and allowed to dry and cool to room temperature, approx. 68°F (20°C).

[0046] The baked greasy test soil was heated to 100°C in a water bath, and kept homogenized during application to test tiles to avoid settling of the test soil. Prior to application of the test soil, each tile was weighed. The test soil was thereafter applied to the dry test tiles by depositing 0.75 grams (+/- 0.10 grams) on the porcelain surface of each test tile using a small kitchen basting brush which was used to uniformly distribute said soil. After application, the test tile was reweighed to assure that at least 0.75 grams were deposited on the tile. If needed, a few additional drops of the baked greasy soil was applied to the tile, and applied by brushing and the tile reweighed to ensure that at least 0.75 grams of the baked greasy soil were deposited on the tile. This procedure was repeated until at least 0.75 grams of the baked greasy soil were deposited on the tile. Thereafter, the tile was placed on metal baking tray and covered prior to subsequent tile baking. When sufficient test tiles were coated with the requisite amount of the baked greasy soil, the covered tiles were baked in convention oven at 300°F for 90 minutes to further solidify the baked greasy test soil. After the 90 minute time period, the baking trays were removed from the oven, the covers removed and the tiles were allowed to cool at least 12 hours, (typically overnight,) prior to being used in the cleaning evaluation of a sample composition.

[0047] Standard sized cellulose test sponges, approximately 10 cm by 7.6 cm sponges were subjected to three rinse and spin dry cycles in a domestic laundry washing machine in order to ensure that all soils, detergents or other contaminants were flushed from the sponges. After the third spin cycle, the sponge were removed from said machine and placed in a tightly sealed plastic container to maintain cleanliness as well as their relative dampness prior to their use in a cleaning evaluation.

[0048] To evaluate cleaning, a soiled test tile prepared as indicated above was placed in a SHEEN wet abrasion scrub tester (Reference: 903PG) and secured. Prior to use, the dampened sponges were overwrapped with a nonporous polymer film in order to enclose the sponges and provide a liquid barrier between the sponge and a composition to be tested. For each tested composition (example E2, as well as for each comparative example), a 50 ml amount of a composition was loaded onto a uniformly sized sheet of dry wipe, e.g., a dry paper towel, which was then wrapped to enrobe a polymer film wrapped sponge, and then inserted into the holder of the SHEEN tester. A 200 gram weight was added to each of the sponge holders in order to ensure compression of the sponge and good surface scrubbing of the soiled test tile with the wetted paper towel The SHEEN tested was then actuated and controlled to provide 3 cleaning cycles (6 linear strokes over the surface) over the test soil on a test substrate, and thereafter the test substrate was removed, rinsed with approximately equal amounts of tap water, and dried with compressed air from an airbrush compressor. This test was repeated several times for each composition in order to provide at least 3 replicates for each tested composition.

[0049] The cleaning efficacy of the tested compositions was evaluated utilizing a high resolution digital imaging system which evaluated the light reflectance characteristics of the each treated test substrate. This system utilized a photographic copy stand mounted within a light box housing which provided diffuse, reflected light supplied by two 15 watt, 18 inch type T8 fluorescent bulbs rated to have a color output of 4100K which approximated "natural sunlight" as noted by the manufacturer. The two fluorescent bulbs were positioned parallel to one another and placed parallel and beyond two opposite sides of the test substrate (test tile) and in a common horizontal plane parallel to the upper surface of the test substrate being evaluated, and between the upper surface of the tile and the front element of the lens of a CCD camera. The CCD camera was a "QImaging Retiga series" CCD camera, with a Schneider-Kreuznach Cinegon Compact Series lens, f1.9/10mm, 1 inch format (Schneider-Kreuznach model #21-1001978) which CCD camera was mounted on the copy stand with the lens directed downwardly towards the board of the copy stand on which a treated test substrate was placed directly beneath the lens. The light box housing enclosed the photographic copy stand, the two 18 inch fluorescent bulbs and a closeable door permitted for the insertion, placement and withdrawal of a treated test substrate which door was closed during exposure of the CCD camera to a treated test substrate. In such a manner, extraneous light and variability of the light source during the evaluation of a series of tested substrates was minimized, also minimizing exposure and reading errors by the CCD camera.

[0050] The CCD camera was attached to a desktop computer via a Firewire IEEE 1394 interface and exposure data from the CCD camera was read by a computer program, "Media Cybernetics Image Pro Plus v. 6.0", which was used to evaluate the exposures obtained by the CCD camera, which were subsequently analyzed in accordance with the following. The percentage of the test soil removal from each treated test substrate was determined utilizing the following equation:

$$\% \text{ Removal} = \frac{RC - RS}{RO - RS} \text{ X } 100$$

where

RC = Reflectance of tile after cleaning with test product
RO = Reflectance of original soiled tile
RS = Reflectance of soiled tile

[0051] The results of this evaluation was averaged for each of the tested compositions, and the results of the evaluation are reported on the following Table 3.

Drying Rate and Streaking

[0052] Testing of the streaking and drying characteristics of certain of the compositions described on Table 1 were performed according to the following protocol.

[0053] Prior to application of tested composition, a 12 inch by 12 inch glass mirror tile was cleaned and thoroughly rinsed with water to ensure the removal of any surface deposits, and subsequently the surface of the mirror was wiped with alcohol applied with a disposable lint free laboratory wipe (Kimwipe®, ex. Kimberly- Clark, Inc.)

[0054] Thereafter, for each product tested, a quantity of the product was provided to a non-pressurized bottle equipped with a trigger sprayer. Next, the cleaned and prepared mirror was placed on a horizontal laboratory benchtop and the trigger was manually pumped once to dispense a quantity of the test composition. Immediately thereafter the applied composition was wiped using a standard paper towel sheet folded once to forma a 3.5 by 5 inch rectangle, in circular motion 6 times to evenly distribute over the mirror surface, and thereafter the wipe was immediately turned over and used to wipe the mirror in a zig-zag path from the top of the mirror to bottom, whereby the wipe was moved downwardly in a continuous motion in the zig-zag pattern with 4 passes. The mirror was immediately observed by a skilled observer to evaluate drying time/rate and degree of streaking. These results are reported on Table 3.

[0055] With regard to drying rate, the performance of a tested composition was evaluated according to the following scale: "10" indicated total product drying within about 3 seconds; "9" indicated total product drying within about 6 seconds; "8" indicated total product drying within about 9 seconds; "7" indicated total product drying within about 12 seconds; "6" indicated total product drying within about 15 seconds; "5" indicated total product drying within about 18 seconds; "4" indicated total product drying within about 21 seconds; "3" indicated total product drying within about 24 seconds; "2" indicated total product drying within about 3 seconds and a rate of "1" indicated total product drying within about 30 seconds or more.

[0056] With respect to streaking rate, such was evaluated following drying of the tested composition on a mirror tile. The ranking of streaking was based on a linear scale having the following two endpoints, a "best performance" score being "10", indicating no visible streaking/deposits, and having a surface appearance equivalent to the washed and alcohol wiped mirrors prepared for testing, and the "worst performance" score being "2", equivalent to the performance of FLASH, (ex. Procter & Gamble Co., United Kingdom) a commercially available trigger sprayable hard surface cleaner and degreaser product which left contiguous visible product residue on the mirrored surface. All intermediate values were ranked relative to these two endpoints, by an expert panelist. These results are also reported on Table 3.

Table 3

Composition:	Streaking	Drying Rate	Cleaning (% removal)
C1	5	7	not tested
1	9.5	9	74.1
2	6.5	8	70.5
3	9.5	9	75.7
4	7	7	86.1
5	9	9	57.47
6	9	9	73.51
FLASH	0.5	2	59.43
VIGOR	9.5	9	not tested

[0057] As reported on the foregoing table, the compositions of the invention , particularly E1, E3, E5 and E6 concurrently provided both excellent cleaning of greasy surfaces and at the same time exhibited essentially streak free and low residue cleaning benefit on the tested substrates. Surprisingly the compositions of the invention provided superior cleaning performance than the commercially available FLASH product, which exhibited a high degree of streaking but satisfactory cleaning of greasy surfaces, and low streaking and fast drying characteristics comparable to a commercially available glass cleaning product, VIGOR (ex. Eau Ecarlate S.A.S., France).

Claims

1. A low streaking hard surface cleaning composition comprising:

0.01 - 1.5%wt. of one or more amine oxide surfactants;
0.5 - 6%wt. of a C_1-C_3 monohydric alcohol solvent,
0.05 - 0.85%wt. of a phenyl containing glycol ether solvent;
0 to 5%wt. of a non-phenyl containing glycol ether organic solvent;
0.1 - 5%wt. of an alkanolamine;

0 to 0.005%wt., preferably 0.0001 - 0.002%wt. of a silicone based antifoaming constituent;
0 to 0.5%wt. of a hydrotrope;
at least 90%wt. water;

and optionally, one or more further conventional additives in a cumulative amount of not in excess of 10%wt. of the total of the composition of which they form a part, wherein the compositions comprise as the sole organic solvents present: isopropanol, propylene glycol phenyl ether and propylene glycol n-butyl ether **characterized in that** the composition excludes further cationic and anionic surfactants and comprises a readily pumpable and pourable liquid exhibiting a viscosity of 1 to 50 cP at such environmental conditions.

2. A composition according to claim 1 comprising 0.1 - 0.7%wt. of one or more amine oxide surfactants.

3. A composition according to claim 1, comprising each of: 2 - 4% isopropanol, 0.19 - 0.4%wt., but preferably 0.19 - 0.3 %wt. propylene glycol phenyl ether and about 1 - 1.5%wg. propylene glycol n-butyl ether.

4. A composition according to claim 1, comprising each of: 0.185 - 0.3%wt., but preferably not in excess of 0.3%wt. propylene glycol phenyl ether; a combined total mass of between 1 - 2%wt., preferably between 1.2 - 1.8%wt. of propylene glycol n-butyl ether and dipropylene glycol monobutyl ether wherein the weight ratio of the former to the latter is between 0.1 - 0.3: 1, preferably is between 0.15 - 0.2:1 of the former to the latter on a weight basis; and, 2 - 4%wt. but preferably 3 - 4%wt. isopropanol.

5. A composition according to any preceding claim, wherein the pH of the composition is in the range of 9.5 - 11.5.

6. A process for the cleaning of a hard surface comprising the step of:

applying a cleaning effective amount of a composition according to any preceding claim, and optionally thereafter wiping the treated hard surface to remove at least a part of the composition from the hard surface.

Patentansprüche

1. Reinigungszusammensetzung mit geringer Streifenbildung für harte Oberflächen, umfassend:

0,01-1,5 Gew.-% an einem oder mehreren grenzflächenaktiven Aminoxid-Mitteln;
0,5-6 Gew.-% an einem monohydrischen C_1-C_3-Alkohol-Lösungsmittel;
0,05-0,85 Gew.-% an einem phenylenthaltenden Glycolether-Lösungsmittel;
0 bis 5 Gew.-% an einem nicht-phenylenthaltenden organischen Glycolether-Lösungsmittel;
0,1-5 Gew.-% an einem Alkanolamin;
0 bis 0,005 Gew.-%, vorzugsweise 0,0001-0,002 Gew.-%, an einem Antischaum-Bestandteil auf Silicongrundlage;
0 bis 0,5 Gew.-% an einem Hydrotrop;
wenigstens 90 Gew.-% an Wasser;

und gegebenenfalls einen oder mehrere weitere herkömmliche Zusatzstoffe in einer kumulativen Menge von nicht mehr als 10 Gew.-% der Gesamtzusammensetzung, von der sie ein Teil sind, wobei die Zusammensetzungen als die einzigen vorhandenen organischen Lösungsmittel umfassen:
Isopropanol, Propylenglycolphenylether und Propylenglycol-n-butylether,
dadurch gekennzeichnet, dass die Zusammensetzung keine weiteren kationischen und anionischen grenzflächenaktiven Mittel enthält und eine leicht pumpbare und gießbare Flüssigkeit bildet, die eine Viskosität von 1 bis 50 cP bei derartigen Umgebungsbedingungen aufweist.

2. Zusammensetzung gemäß Anspruch 1, umfassend 0,1-0,7 Gew.-% an einem oder mehreren grenzflächenaktiven Aminoxid-Mitteln.

3. Zusammensetzung gemäß Anspruch 1, umfassend jedes von: 2-4 % Isopropanol, 0,19-0,4 Gew.-%, aber vorzugsweise 0,19-0,3 Gew.-%, Propylenglycolphenylether und etwa 1-1,5 Gew.-% Propylenglycol-n-butylether.

4. Zusammensetzung gemäß Anspruch 1, umfassend jedes von: 0,185-0,3 Gew.-%, aber vorzugsweise nicht mehr als 0,3 Gew.-%, Propylenglycolphenylether; eine kombinierte Gesamtmasse von zwischen 1 und 2 Gew.-%, vorzugsweise zwischen 1,2 und 1,8 Gew.-%, an Propylenglycol-n-butylether und Dipropylenglycolmonobutylether, wobei das Gewichtsverhältnis des ersteren zu dem letzteren zwischen 0,1 und 0,3:1, vorzugsweise zwischen 0,15 und 0,2:1 von dem ersteren zu dem letzteren, auf Gewichtsbasis beträgt; und 2-4 Gew.-%, aber vorzugsweise 3-4 Gew.-%, an Isopropanol.

5. Zusammensetzung gemäß einem der vorstehenden Ansprüche, wobei der pH-Wert der Zusammensetzung im Bereich von 9,5-11,5 liegt.

6. Verfahren zum Reinigen einer harten Oberfläche, umfassend den Schritt:

Auftragen einer reinigungswirksamen Menge einer Zusammensetzung gemäß einem der vorstehenden Ansprüche und gegebenenfalls anschließend Wischen der behandelten harten Oberfläche, um wenigstens einen Teil der Zusammensetzung von der harten Oberfläche zu entfernen.

Revendications

1. Composition de nettoyage d'une surface dure laissant peu de traces, comprenant :

0,01-1,5% en poids d'un ou plusieurs agents tensioactifs à base d'oxyde d'amine ;
0,5-6% en poids d'un solvant à base d'alcool monohydrique en C_1-C_3 ;
0,05-0,85% en poids d'un solvant à base de glycol éther phénylé ;
0 à 5% en poids d'un solvant organique à base de glycol éther non phénylé ;
0,1-5% en poids d'une alcanolamine ;
0 à 0,005% en poids, préférablement 0,0001-0,002% en poids d'un constituant antimousse à base de silicone ;
0 à 0,5% en poids d'un hydrotrope ;
au moins 90% en poids d'eau ;

et éventuellement, un ou plusieurs autres additifs classiques selon une quantité cumulée n'excédant pas 10% en poids du total de la composition dont ils font partie, où les compositions comprennent comme seuls solvants organiques présents :

de l'isopropanol, du propylène glycol phényléther et du propylène glycol n-butyléther,
caractérisée en ce que la composition exclut d'autres agents tensioactifs cationiques et anioniques et comprend un liquide aisément pompable et versable présentant une viscosité allant de 1 à 50 cP dans de telles conditions environnementales.

2. Composition selon la revendication 1, comprenant 0,1-0,7% en poids d'un ou plusieurs agents tensioactifs à base d'oxyde d'amine.

3. Composition selon la revendication 1, comprenant chacun parmi : 2-4% d'isopropanol, 0,19-0,4% en poids, mais préférablement 0,19-0,3% en poids, de propylène glycol phényléther et environ 1-1,5% en poids de propylène glycol n-butyléther.

4. Composition selon la revendication 1, comprenant chacun parmi : 0,185-0,3% en poids, mais préférablement pas plus de 0,3% en poids, de propylène glycol phényléther ; une masse totale combinée de 1-2% en poids, préférablement de 1,2-1,8% en poids, de propylène glycol n-butyléther et de dipropylène glycol monobutyléther, où le rapport pondéral du premier au dernier est de 0,1-0,3:1, préférablement est de 0,15-0,2:1 du premier au dernier sur une base pondérale ; et 2-4% en poids, mais préférablement 3-4% en poids, d'isopropanol.

5. Composition selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le pH de la composition se trouve dans la plage de 9,5-11,5.

6. Procédé de nettoyage d'une surface dure, comprenant l'étape consistant à :

appliquer une quantité efficace nettoyante d'une composition selon l'une quelconque des revendications précédentes, puis éventuellement ensuite essuyer la surface dure traitée pour éliminer au moins une partie de la composition à partir de la surface dure.

REFERENCES CITED IN THE DESCRIPTION

Patent documents cited in the description

- WO 2008155518 A **[0003]**