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(54) **LIQUID HARD SURFACE CLEANING COMPOSITION**

FLÜSSIGE REINIGUNGSZUSAMMENSETZUNG FÜR HARTE OBERFLÄCHEN

COMPOSITION LIQUIDE DE NETTOYAGE DE SURFACES DURES

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Description

TECHNICAL FIELD

[0001] This invention relates to a liquid hard surface cleaning composition comprising activated citrus fibre and abrasive calcite particles.

BACKGROUND

[0002] Many people spend a considerable amount of time and effort on cleaning of hard surfaces in or around the home or office on a regular basis. Examples of hard surfaces are table-tops, leather, ceramic tiles, dish surfaces and car-bodies.

[0003] To clean hard surfaces cleaning compositions are typically used to improve cleaning efficiency (e.g. reduce the time and/or effort required).

[0004] Hard surface cleaning compositions typically comprise surfactants which may aid in stain and/or soil removal, such as fatty stains/soils. Surfactants typically lower the surface tension of a liquid, the interfacial tension between two liquids and/or that between a liquid and a solid. Surfactants may act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants.

[0005] As a common constituent of cleaning compositions, surfactants may end up in large amounts in land and/or water ecosystems. This can be problematic as surfactants may themselves exert toxic effects on animal and plant life and/or may increase the diffusion of other environmental contaminants and increase the exposure of animal and plant life with the latter.

[0006] Therefore it is desirable to reduce or even replace surfactants in hard surface cleaning compositions by alternative ingredients, which have less or no adverse environmental impact when deposited in ecosystems. However, it will be appreciated that said reduction/replacement should preferably have little or no impact on the cleaning efficiency. It follows that even more preferably said alternatives will be of natural origin and biodegradable.

[0007] WO 2012/040142 discloses liquid cleaning compositions to clean a variety of inanimate surfaces comprising bleached cleaning particles as abrasives having a degree of whiteness (L^*) of greater than 65, measured under D 65 illumination.

[0008] US 3,956,158 discloses pourable liquids comprising a three-dimensional network of insoluble entangled filaments having a diameter of 0.1 to 100 μm and a length to diameter ratio of at least 60, and particulate solid dispersed in the medium and prevented from separating from the medium by the filament network.

[0009] US 2007/019779 discloses the use of microfibrous cellulose as structuring system.

[0010] Citrus fibres and their uses for structuring of foodstuffs and personal care compositions are described in US2004/0086626, US2009/269376 and WO2012/019934.

[0011] It is an object of the present invention to provide a hard surface cleaning composition with improved cleaning efficiency.

[0012] It is a further object of the present invention to provide a hard surface cleaning composition wherein part or all the surfactants can be replaced by one or more alternative ingredients with little or no reduction in cleaning efficiency.

[0013] It is a further object of the present invention to provide a hard surface cleaning composition consisting entirely of natural and/or biodegradable ingredients with good cleaning efficiently, which is preferably on par with commonly used hard surface cleaning compositions.

SUMMARY OF THE INVENTION

[0014] We have surprisingly found that a combination of calcite particles and activated citrus fibre provides an improved cleaning efficiency of hard surfaces.

[0015] Without wishing to be bound by theory it is believed that in conventional liquid leaning compositions calcite particles are relatively free to move around. Therefore the calcite particles can move around (e.g. rotate) under applied force. The result of this is that the force applied on the particles, for example as a result of the rubbing effort of a human, is not efficiently transferred to the hard surface (containing the soils/stains). The added activated citrus fibre it is believed to form a network in the liquid cleaning composition that reduces the free movement of the calcite particles and thus improves the abrasive force exerted by the particles and the stains/soils.

[0016] Therefore, the invention relates to a liquid hard surface cleaning composition comprising:

- from 10 to 95 wt. % of liquid solvent, and
- from 0.025 to 5 wt. % of activated citrus fibre, and
- from 1 to 75 wt. % of abrasive calcite particles

wherein the pH of the liquid hard surface cleaning composition is at least 8.

[0017] In a further aspect the invention relates to the use of activated citrus fibre in a liquid hard surface cleaning composition comprising abrasive calcite particles and liquid solvent to improve the cleaning efficiency.

[0018] In addition it was found that the improved cleaning efficiently of calcite particles and activated citrus fibre may be used to reduce the amount of surfactant in a liquid hard surface cleaning compositions with little or no reduction in cleaning efficiency.

[0019] Therefore in a further aspect the invention relates to the use of activated citrus fibre in a liquid hard surface cleaning composition comprising abrasive calcite particles and liquid solvent to replace part or all of the surfactant, with little or no effect on cleaning efficiency.

[0020] In addition it was found that the a liquid hard surface cleaning composition comprising only natural ingredients, such as water, calcite particles and activated citrus fibre has good cleaning efficiency.

[0021] Therefore in a further aspect the invention relates to the use of activated citrus fibre in a liquid hard surface cleaning composition comprising abrasive calcite particles and liquid solvent to provide an efficient cleaning composition which essentially consists of natural ingredients.

[0022] It was observed that when certain process conditions are used to manufacture the liquid cleaning composition according to the invention, more stable liquid hard surface cleaning compositions according to the invention are obtained.

[0023] Therefore the invention further relates to a process to manufacture the liquid cleaning composition according to the invention, comprising the following steps:

a) providing liquid solvent;
b) providing a premix comprising activated citrus fibre;
c) providing abrasive calcite particles;
d) mixing said ingredients provided at steps 'a', 'b' and 'c' under at least partial vacuum.

[0024] To clean a hard surface, the composition according to the invention is applied to the hard surface to be cleaned. Next, preferably the composition on the hard surface is agitated by manual and/or suitable mechanical means.

[0025] It was observed that cleaning efficiency is further improved by agitation the composition on the surface by using a non-absorbent means, such as a brush or non-absorbent cloth.

[0026] Therefore the invention further relates to a method for cleaning of a hard surface comprising the following steps:

a) applying the liquid hard surface cleaning composition according to the invention to the hard surface;
b) agitating said composition on the hard surface with a non-absorbent means.

DETAILED DESCRIPTION OF THE INVENTION

[0027] In the context of the present invention, the terms "soil" and "stain" as used herein generally comprise all kinds of soils and stains generally encountered in the household, either of organic or inorganic origin, whether visible or invisible to the naked eye, including soiling solid debris and/or with bacteria or other pathogens. The term 'soil' includes stubborn soil, which means strongly adhering soils that are typically very difficult to remove, such as burnt-on and/or baked-on food residues. Weight percentage (wt. %) is based on the total weight of the composition unless otherwise stated. Throughout this specification, all stated viscosities are those measured at a shear rate of 20 s^{-1} and at a temperature of 25°C unless stated to be otherwise. This shear rate is the shear rate that is usually exerted on the liquid when poured from a bottle. The liquid detergent compositions according to the invention are shear-thinning liquids.

[0028] By hard surface is meant any kind of surface typically found in and around home or office houses like kitchens, bathrooms, e. g. , floors, walls, tiles, windows, cupboards, sinks, showers, shower plastified curtains, wash basins, WCs, fixtures and fittings and the like made of different materials like ceramic, vinyl, no-wax vinyl, linoleum, melamine, glass, Inox, Formica, vitroceramic, any plastics, plastified wood, metal or any painted or varnished or sealed surface and the like. Home or office hard surfaces also include household appliances including, but not limited to refrigerators, freezers, washing machines, automatic dryers, ovens, microwave ovens, dishwashers and so on. Such hard surfaces may be found both in private households as well as in commercial, institutional and industrial environments. Home or office hard surfaces include dish surfaces. With dish surfaces is meant herein dishes, glasses, pots, pans, baking dishes and flatware made from ceramic, china, metal, glass, plastic (polyethylene, polypropylene, polystyrene, etc.), wood, enamel, Inox, Teflon, or any other material commonly used in the making of articles used for eating and/or cooking.

[0029] An improved cleaning efficiency (i.e. 'an improved cleaning') indicates that the removal of soil and/or stains from a hard surface requires less time and/or effort (e.g. force exerted by the user). For example when less swiping actions are needed to remove a stain/soil from a hard surface using about the same force, the cleaning efficiency is improved. For example, in case the same number of swiping actions is required, but less force needs be applied, the cleaning efficiency is improved. Clearly, an improved cleaning may also be indicated by a similar effort to remove an

increased amount of soil/stain. It will be appreciated that some stains/soils type are harder to remove than others, and that to compare cleaning efficiency preferably a comparison is made using the cleaning of the same type of stain/soil.

Abrasive calcite particles

[0030] Preferably the amount of calcite particles in the liquid hard surface cleaning composition according to the invention is from 2 to 65 wt. %, more preferably from 3 to 60 wt. %, even more preferably from 4 to 55 wt. %, still even more preferably from 5 to 50 wt. % and still even more preferably from 6 to 45 wt. %.

[0031] It will be appreciated that the average particle size of the calcium particles is not excessively large or excessively small to provide good cleaning efficiency. For example on the one hand, a calcite particle population with an excessively large average particle size (e. g. above 2000 micron (μm)), add little to the cleaning as having a small surface to weight ratio and would require very high particle load in the composition to be effective. In addition, excessively large particles are easily detected visually or provide bad tactile experience while handling. For example, on the other hand, a calcite population with an excessively small average particle size (e.g. below 0.1 μm) are not desirable as these may be hard to remove from the hard surface leaving the surface with a visible residue.

[0032] It was observed that a certain average size of the calcite particles improves the cleaning efficiency of the liquid composition according to the invention. Preferably the average size of the calcite particles is from 0.1 to 500 μm, more preferably is from 0.5 to 200 μm, even more preferably is from 1 to 100 μm, still even more preferably is from 2 to 75 μm, still even more preferably is from 3 to 50 μm and still even more preferably is from 4 to 25 μm.

[0033] Abrasive calcite particles according to the invention of suitable average size can be made from calcium carbonate according to techniques known in the art. For example said particles can be made from calcium carbonate by mechanical grinding followed by suitable size sorting methods such as sieving. Furthermore abrasive calcite particles of a range of average particles sizes are commercially available. For example calcium particles with a mean particle size of 2.6, 5 or 35 μm are available for example under trade names Omyacarb 2 - AV, Omyacarb 5 - AV and Omyacarb 30 - AV respectively (Omya Greater South, Milano, Italy).

[0034] The average particle size may be measured using techniques and equipment known in the art (e.g. using sieve analysis). Preferably a Malvern Mastersizer X (Malvern Instruments, Worcestershire, UK) is used to measure particle size, operated according to supplier instructions.

[0035] Preferably the calcite particles have sharp edges and on average a particle has at least one sharp edge. More preferably, a particle on average has a multitude of sharp edges. A sharp edge is an edge having a tip radius below 20 pm, preferably below 8 pm, most preferably below 5 pm. The tip radius is defined by the diameter of an imaginary circle fitting the curvature of the edge extremity.

Citrus fibre

[0036] Activated citrus fibre may suitably be made from powdered citrus fibre. Powdered citrus fibre can be made according to the following general process:

> Citrus fruits (mainly lemons and limes) are de-juiced to leave the insoluble plant cell wall material and some internally contained sugars and pectin. It is dried and sieved and then washed to increase the fibre content. The dried material comprises large (100's micron) cell fragments, which consist of tightly bound/ bonded fibrils. After milling a powdered citrus fibre material is obtained. The process used leaves much of the natural cell wall intact while the sugars are removed. The resulting highly swelling citrus fibre materials are typically used as food additives and have been used in low fat mayonnaise. The pH of the dispersed powder is acidic.

[0037] Microscopy shows that powdered citrus fibre is a heterogeneous mixture of particles with various sizes and shapes. The majority of the material consists of aggregated lumps of cell walls and cell wall debris. However, a number of tube-like structures with an open diameter of about 10 micron, often arranged in clusters, can be identified. These, so called, xylem vessels are water transport channels that are mainly located in the peel of citrus fruits. The xylem vessels consist of stacks of dead cells, joined together to form relatively long tubes, 200 to 300 micron long. The outsides of the tubes are reinforced by lignin, which is often laid down in rings or helices, preventing the tubes from collapse due to the capillary forces acting on the tube walls during water transport.

[0038] A preferred type of powdered citrus fibre is Herbafoods' Herbacel AQ+ type N citrus fibre. This citrus fibre has a total (soluble and insoluble) fibre content of greater than 80% and soluble fibre content of greater than 20%. It is supplied as a fine dried powder with low colour and has a water binding capacity of about 20 kg water per kg of powder.

Activated citrus fibre

[0039] Activated citrus fibre may suitably be made from the powdered citrus fibre by 'activating' the powdered citrus fibre (hydrated and opened up structurally) via a high shear dispersion at a low concentration in water to form a premix. Because the dispersed activated citrus fibre is biodegradable, it is advantageous to include a preservative into the premix.

[0040] The shear should not be high enough to lead to defibrillation. If a high-pressure homogeniser is used it should be operated between 200 and 600 bar. The more shear that is applied the less dense the resulting particles. Whilst the morphology is changed by the high shear, process aggregate size appears not to be changed. The fibres break down and then fill the water phase. The shear also rubs loose the outer parts of the cell walls and these are able to form a matrix that structures the water outside of the volume of the original fibre.

[0041] An activated citrus fibre structuring premix may alternatively be made by milling using a high shear mixer, such as a Silverson. The premix may be passed through several sequential high-shear stages in order to ensure full hydration and dispersal of the citrus fibre to form the activated citrus fibre dispersion.

[0042] The premix may be left to hydrate further (age) after the high shear dispersal. The activated premix is preferably used fresh.

[0043] High Pressure Homogenised premixes are preferred over milled premixes, as they are more weight effective to provide sufficient suspending duty to liquids. Increasing the homogenisation pressure gives further increased weight efficacy to the premix. A suitable operational pressure is about 500 barg.

[0044] The level of activated citrus fibre in a premix preferably lies in the range 1 to 5 wt%, more preferably 1.5 to 2.5 wt%. The concentration of activated citrus fibre in the pre-mix depends on the ability of the equipment to deal with the higher viscosity due to higher concentrations. Preferably the amount of water in the premix is at least 20 times greater than the amount of citrus fibres, more preferably at least 25 times even as much as 50 times. It is advantageous that there is excess water in order to hydrate the activated citrus fibre fully.

[0045] Preferred premixes have a measured yield stress of at least 70 Pa measured using an Anton Paar serrated cup and bob geometry at 25°C.

[0046] Activated citrus fibre is compatible with enzymes used in laundry and household care detergent compositions.

[0047] The amount of activated citrus fibre in the liquid cleaning composition according to the invention is 0.025 to 5 wt. %, preferably 0.05 to 5 wt. %, more preferably 0.1 to 4 wt. %, even more preferably 0.15 to 3 wt. % and still even more preferably from 0.2 to 2 wt. %.

Surfactants

[0048] Although it is desirable to reduce the amount of surfactant, the cleaning composition used according to the invention may comprise surfactant. Said surfactant (detergent active) is generally chosen from anionic and nonionic detergent actives. The cleaning composition may further or alternatively comprise cationic, amphoteric and zwitterionic surfactants.Typically the amount of surfactant is from 0.1 to 75 wt. %.

[0049] Preferably liquid hard surface cleaning composition according to the invention comprises at most 50 wt. %, more preferably at most 20 wt. % even more preferably at most 10 wt. %, still even more preferably at most 5 wt. % and still even more preferably at most 1 wt. % of surfactant.

[0050] Suitable synthetic (non-soap) anionic surfactants are water-soluble salts of organic sulphuric acid mono-esters and sulphonic acids which have in the molecular structure a branched or straight chain alkyl group containing from 6 to 22 carbon atoms in the alkyl part.

[0051] Examples of such anionic surfactants are water soluble salts of:

- (primary) long chain (e.g. 6-22 C-atoms) alcohol sulphates (hereinafter referred to as PAS), especially those obtained by sulphating the fatty alcohols produced by reducing the glycerides of tallow or coconut oil;
- alkyl benzene sulphonates, such as those in which the alkyl group contains from 6 to 20 carbon atoms;
- secondary alkanesulphonates;

and mixtures thereof.

[0052] Also suitable are the salts of:

- alkylglyceryl ether sulphates, especially of the ethers of fatty alcohols derived from tallow and coconut oil;
- fatty acid monoglyceride sulphates;
- sulphates of ethoxylated aliphatic alcohols containing 1-12 ethyleneoxy groups;
- alkylphenol ethylenoxy-ether sulphates with from 1 to 8 ethyleneoxy units per molecule and in which the alkyl groups contain from 4 to 14 carbon atoms;
- the reaction product of fatty acids esterified with isethionic acid and neutralised with alkali,

and mixtures thereof.

[0053] The preferred water-soluble synthetic anionic surfactants are the alkali metal (such as sodium and potassium) and alkaline earth metal (such as calcium and magnesium) salts of alkyl-benzenesulphonates and mixtures with olefin-sulphonates and alkyl sulphates, and the fatty acid mono-glyceride sulphates.

[0054] The most preferred anionic surfactants are alkyl-aromatic sulphonates such as alkylbenzenesulphonates containing from 6 to 20 carbon atoms in the alkyl group in a straight or branched chain, particular examples of which are sodium salts of alkylbenzenesulphonates or of alkyl-toluene-, xylene-or phenolsulphonates, alkylnaphthalene-sulphonates, ammonium diamylnaphthalene-sulphonate, and sodium dinonyl-naphthalene-sulphonate.

[0055] If synthetic anionic surfactant is to be employed the amount present in the cleaning compositions of the invention will generally be at least 0.1 wt. %, preferably at least 0.5 wt. %, more preferably at least 1.0 wt. %, but not more than 20 wt. %, preferably at most 10 wt. % and more preferably not more than 5 wt. %.

[0056] A suitable class of nonionic surfactants can be broadly described as compounds produced by the condensation of simple alkylene oxides, which are hydrophilic in nature, with an aliphatic or alkyl-aromatic hydrophobic compound having a reactive hydrogen atom. The length of the hydrophilic or polyoxyalkylene chain which is attached to any particular hydrophobic group can be readily adjusted to yield a compound having the desired balance between hydrophilic and hydrophobic elements. This enables the choice of nonionic surfactants with the right HLB. Particular examples include:

- the condensation products of aliphatic alcohols having from 8 to 22 carbon atoms in either straight or branched chain configuration with ethylene oxide, such as a coconut alcohol/ethylene oxide condensates having from 2 to 15 moles of ethylene oxide per mole of coconut alcohol;
- condensates of alkylphenols having C6-C15 alkyl groups with 5 to 25 moles of ethylene oxide per mole of alkylphenol;
- condensates of the reaction product of ethylene-diamine and propylene oxide with ethylene oxide, the condensates containing from 40 to 80% of ethyleneoxy groups by weight and having a molecular weight of from 5,000 to 11,000.

[0057] Other classes of nonionic surfactants are:

- tertiary amine oxides of structure R1R2R3N-O, where R1 is an alkyl group of 8 to 20 carbon atoms and R2 and R3 are each alkyl or hydroxyalkyl groups of 1 to 3 carbon atoms, e.g. dimethyldodecylamine oxide;
- tertiary phosphine oxides of structure R1R2R3P-O, where R1 is an alkyl group of 8 to 20 carbon atoms and R2 and R3 are each alkyl or hydroxyalkyl groups of 1 to 3 carbon atoms, for instance dimethyl-dodecylphosphine oxide;
- dialkyl sulphoxides of structure R1R2S=O, where R1 is an alkyl group of from 10 to 18 carbon atoms and R2 is methyl or ethyl, for instance methyl-tetradecyl sulphoxide;
- fatty acid alkylolamides, such as the ethanol amides;
- alkylene oxide condensates of fatty acid alkylolamides;
- alkyl mercaptans.

[0058] If nonionic surfactant is to be employed the amount present in the cleaning compositions of the invention will generally be at least 0.1 wt. %, preferably at least 0.5 wt. %, more preferably at least 1.0 wt. %, but not more than 20 wt. %, preferably at most 10 wt. % and more preferably not more than 5 wt. %.

[0059] It is also possible optionally to include amphoteric, cationic or zwitterionic surfactants in said compositions.

[0060] Suitable amphoteric surfactants are derivatives of aliphatic secondary and tertiary amines containing an alkyl group of 8 to 20 carbon atoms and an aliphatic group substituted by an anionic water-solubilising group, for instance sodium 3-dodecylamino-propionate, sodium 3-dodecylaminopropane-sulphonate and sodium N 2-hydroxy-dodecyl-N-methyltaurate.

[0061] Examples of suitable cationic surfactants can be found among quaternary ammonium salts having one or two alkyl or aralkyl groups of from 8 to 20 carbon atoms and two or three small aliphatic (e.g. methyl) groups, for instance cetyltrimethylammonium chloride.

[0062] A specific group of surfactants are the tertiary amines obtained by condensation of ethylene and/or propylene oxide with long chain aliphatic amines. The compounds behave like nonionic surfactants in alkaline medium and like cationic surfactants in acid medium.

[0063] Examples of suitable zwitterionic surfactants can be found among derivatives of aliphatic quaternary ammonium, sulphonium and phosphonium compounds having an aliphatic group of from 8 to 18 carbon atoms and an aliphatic group substituted by an anionic water-solubilising group, for instance betaine and betaine derivatives such as alkyl betaine, in particular C12-C16 alkyl betaine, 3-(N,N-dimethyl-N-hexadecylammonium)-propane 1-sulphonate betaine, 3-(dodecyl-methyl-sulphonium)-propane 1-sulphonate betaine, 3-(cetylmethyl-phosphonium)-propane-1-sulphonate betaine and N,N-dimethyl-N-dodecyl-glycine. Other well known betaines are the alkylamidopropyl betaines e.g. those wherein the alkylamido group is derived from coconut oil fatty acids.

[0064] Further examples of suitable surfactants are compounds commonly used as surface-active agents given in the

well-known textbooks: 'Surface Active Agents' Vol.1, by Schwartz & Perry, Interscience 1949; 'Surface Active Agents' Vol.2 by Schwartz, Perry & Berch, Interscience 1958; the current edition of 'McCutcheon's Emulsifiers and Detergents' published by Manufacturing Confectioners Company; 'Tenside-Taschenbuch', H. Stache, 2nd Edn., Carl Hauser Verlag, 1981.

Mixed surfactant system

[0065] Synthetic surfactants preferably form a major part of the surfactant system. Mixtures of synthetic anionic and nonionic surfactants, or a wholly anionic mixed surfactant system or admixtures of anionic surfactants, nonionic surfactants and amphoteric or zwitterionic surfactants may all be used according to the choice of the formulator for the required cleaning duty and the required dose of the detergent composition.

Liquid solvent

[0066] The liquid hard surface cleaning compositions according to the invention comprises 10 to 95 wt. % of a liquid solvent, which is preferably water, an organic solvent (e.g. ethanol, glycerol) or a mixture thereof.

[0067] The composition according to the invention comprises preferably 35 to 92 wt. %, more preferably 55 to 90 wt. % and even more preferably 65 to 85 wt. % of liquid solvent.

[0068] Preferably the composition according to the invention comprises liquid solvent, wherein the liquid solvent comprises at least 50 wt. %, more preferably at least 75 wt. %, even more preferably at least 85 wt. % and still even more preferably at least 95 wt. % of water, based on the total weight of liquid solvent.

pH

[0069] The liquid hard surface cleaning composition according to the invention has a pH of at least 8. It was found that at a pH below 8 the cleaning efficiency of the composition according to the invention is reduced.

[0070] Preferably the pH of the liquid composition according to the invention is at least 8.5, more preferably at least 9, even more preferably at least 9.5, still even more preferably at least 10, still even more preferably at least 10.5 and still even more preferably at least 11.

[0071] Preferably the liquid hard surface cleaning composition according to the invention has a pH of at most 13.

[0072] The pH of the cleaning composition according to the invention may be suitably adjusted with organic or inorganic acids or bases. Preferred inorganic bases are preferably alkali or alkaline earth hydroxides, ammonia, carbonates or bicarbonates, the alkali metal preferably being sodium or potassium or the alkaline earth metal preferably being calcium or magnesium. The organic bases are preferably amines, alkanolamines and other suitable amino compounds. Inorganic acids may include hydrochloric acid, sulphuric acid or phosphoric acid, and organic acids may include acetic acid, citric acid or formic acid as well as dicarboxylic acid mixtures such as Radimix (trade mark, Radici Group) and Sokalan DCS (trade mark, BASF).

Other optional ingredients

[0073] The composition may include additional optional ingredients, such as non-calcite abrasive particles and additional ingredients which aids cleaning performance.

[0074] For example, in particular when the composition contains one or more anionic surfactants, the composition may preferably comprise detergent builders in an amount of more preferably from 0.1 to 25 wt. %. Suitable inorganic and organic builders are well known to those skilled in the art.

[0075] For example, the composition according to the invention may comprise a suds regulating material, which can be employed in compositions which have a tendency to produce excessive suds in use. Where a hydrocarbon solvent is present at a sufficiently high level this may itself provide some or all of the required antifoaming activity.

[0076] For example, the composition according to the invention may also comprise ingredients such as colorants, whiteners, optical brighteners, soil suspending agents, detersive enzymes, compatible bleaching agents (particularly peroxide compounds and active chlorine releasing compounds), solvents, co-solvents, gel-control agents, further freeze-thaw stabilisers, bactericides, preservatives (for example 1,2-benziso¬thiazolin-3-one), hydrotropes, polymers and perfumes.

[0077] Examples of optional enzymes include lipase, cellulase, protease, mannanase, amylase and pectate lyase.

Thickness of the liquid hard surface cleaning composition

[0078] The liquid cleaning composition according to the invention preferably has a viscosity from 100 to 10,000 mPa.s,

more preferably from 200 to 8,000 mPa.s, even more preferably from 400 to 6,500 mPa.s, and still even more preferably from 800 to 5,000 mPa.s, as measured at a shear rate of 20 s^{-1} and at a temperature of 25 degrees Celsius.

[0079] The viscosity can be suitable determined with a HAAKE viscotester VT550 (Gebrüder HAAKE GmbH, Karlsruhe, Germany), using a 18/8 stainless steel MV measuring cup and a MV2 bob. Viscosity was measured at a shear rate of 20 s^{-1} and at a temperature of 25 degrees Celsius.

[0080] It will be appreciated that the viscosity of the composition according to the invention may be modified by adding a suitable viscosity enhancing or lowering agent as know in the art.

Manufacturing process

[0081] The premix comprising activated citrus fibre may either be added to the other ingredients of the liquid hard surface composition as a post dosed ingredient, or alternatively the composition can be formed by starting with the premix and then adding the other ingredients to it. Some high shear is preferably applied to disperse the premix in the composition fully but the duty is not as demanding as for the premix preparation.

[0082] Activated citrus fibre benefits from substantially air free processing as this improves the stability of the resulting liquid compositions, especially to bottom clear layer separation. Substantially air free processing can be achieved according to known techniques in the art, such as by processing the ingredients under at least partial, preferably essentially complete vacuum.

[0083] Therefore according to a second section the invention relates to a process to manufacture the liquid cleaning composition according to the invention, comprising the following steps:

a) providing liquid solvent;
b) providing a premix comprising activated citrus fibre;
c) providing abrasive calcite particles;
d) mixing said ingredients provided at steps 'a', 'b' and 'c' under at least partial vacuum.

[0084] At the higher levels of activated citrus fibre in the final composition the amount of water that may be removed from the base to make up the premix separately becomes too large so post dosing of a structuring premix is not a viable option. Instead structured detergent compositions may be prepared starting with the activated fibre to which the other ingredients are added in their normal order of addition. In addition to enabling the incorporation of the higher level of activated fibre into the detergent liquid this has the further advantage that dispersion of the activated fibre by high shear continues during the addition of the later ingredients rather than as a post shearing step, thereby reducing the batch time.

Method of cleaning

[0085] Cleaning of a hard surface may be carried out by simply applying the liquid hard surface cleaning composition according to the invention on the surface and leaving it for a sufficient period of time. Preferably, however, after application of the composition on the hard surface, the composition is agitated. Said agitation improves cleaning efficiency by increasing the abrasive force of the abrasive calcite particles on the stains/soils. The agitation may be manual, such as by the act of rubbing and/or swiping. The agitation may also be carried out using suitable mechanical devices known in the art. It was observed that further improved cleaning results are obtained when the composition is agitated using non-absorbent means, such by using a brush or non-absorbent cloth. An example of an absorbent means is a sponge or paper towel.

[0086] Therefore, in a second aspect the invention relates to a method for the cleaning of a hard surface using the liquid hard surface cleaning composition according to the invention comprising the following steps:

a) applying the liquid hard surface cleaning composition according to the invention to the hard surface;
b) agitating said composition on the hard surface with a non-absorbent means,

Product Form

[0087] The liquid hard surface cleaning composition according to the invention can be concentrated liquid, which may be diluted with for example water before use or may be read-to-use liquids. Preferably, the liquid compositions are pourable liquids.

[0088] In addition it was found that the a liquid hard surface cleaning composition comprising only natural and non-toxic ingredients, such as water, calcite particles and activated citrus fibre had good cleaning efficiency.

[0089] Therefore in a further aspect the invention relates to the use of activated citrus fibre and abrasive calcite particles in a liquid hard surface cleaning composition to provide an efficient cleaning composition which essentially consists of

natural ingredients.

Package g

[0090] The liquid hard surface cleaning composition according to the invention may be packaged in any suitable form of container. Preferably the composition is packaged in a plastic bottle with a detachable closure /pouring spout. The bottle may be rigid or deformable. A deformable bottle allows the bottle to be squeezed to aid dispensing. If clear bottles are used they may be formed from PET. Polyethylene or clarified polypropylene may be used. Preferably the container is clear enough that the liquid, with any visual cues therein, is visible from the outside. The bottle may be provided with one or more labels, or with a shrink wrap sleeve which is desirably at least partially transparent, for example 50% of the area of the sleeve is transparent. The adhesive used for any transparent label should preferably not adversely affect the transparency.

Liquid Dispensers

[0091] The liquid cleaning composition according to the invention may be stored and dispensed by any suitable means, but containers which allow easy and efficient application are particularly preferred, such as pump dispensers, more preferably spray dispensers, which even more preferably are hand-driven.

[0092] Preferably the composition according to the invention is packaged in a container comprising a spray dispenser for dispensing said composition in the form of a spray. The spray dispenser is preferably a trigger spray but may be any mechanical means for ejecting the liquid in a spray or aerosol form.

[0093] The invention will now be further described with reference to the following non-limiting examples.

EXAMPLES

Assessment of cleaning performance

[0094] The cleaning performance was assessed using a Pellicle Cleaning Ratio (PCR) on a WIRA brushing machine (a.k.a. Martindale brushing machine) (SDLATLAS, M235, Manchester UK), as set out below. The method was derived from Stookey, G.K., Burkhard. T. A., Schemehorn, B. R., In Vitro Removal of Stain with Dentifrices, J Dent Res 61 (11):1236-1239, 1982.

Pellicle Cleaning Ratio (PCR) Test

[0095] A stained film is slowly deposited on bovine enamel slabs over a period of time and subsequently removed using a mechanical brushing procedure. PCR is assessed by removal of stain after brushing and measuring the change in L^* value using a Chromameter. The L^* values represent a black-white scale and these are then used to calculate the PCR cleaning percentage.

Sample Preparation

[0096] Bovine incisors were cut into square slabs, polished and mounted in acrylic plastic. The thus obtained enamel slabs were stained by a broth comprising Tea/Coffe/Mucin.

[0097] The staining broth was prepared by mixing 40 g instant coffee (Supplier Nescafe), 40 g instant tea (Supplier PG Tips), 30 g mucin (from porcine stomach, type II), 0.063 g ferric chloride, with 1 litre Tryptone Soy Broth (30 g Trypton soy broth powder per litre).

[0098] The slabs were threaded onto wires on a staining rig and incubated at a slanted angle and at a constant temperature of 50 degrees Celsius, while rotating at 2 rpm. In this way, the slab surface was alternatively immersed in the staining broth and air dried. The broth is changed daily and after five days the slabs are taken off and washed with distilled water until all the loose debris is removed.

[0099] The slabs are then brushed with soft toothbrushes (Mentadent soft 0.20mm diameter bristles, flat trim) which have been soaked for 30 minutes to hydrate the bristles. The slabs are brushed thus with 10ml distilled water to remove loose stain.

[0100] Next, the slabs are air-dried and the L^* values (L^* stained) are measured with a Minolta CR321 chromameter set to L a b colour space.

[0101] The enamel slabs are then ranked according to ascending L^* baseline values to have an even representation of the stain range. Using a standard randomisation the slabs are then allocated to the different cleaning solutions.

[0102] The WIRA machine has four brush heads and eight enamel tooth slabs are used per treatment group with two

replicates per head. The WIRA machine is set to about 5 minutes of brushing at 160 cycles per minute (about 800 brush strokes) using a liquid cleaning solution to be tested.

[0103] After brushing on the WIRA machine, the enamel slabs are rinsed with water to remove the liquid cleaning solution and dried using a soft tissue, to prevent any variability in colour.

[0104] The chromameter is used to re-measure the L^* value (L^* brushed), taking four measurements per slab.

[0105] Finally, the enamel slabs are pumiced, using a cloth (ercu twill) and flour of pumice,on a Buehler Grinder Polisher to remove all traces of visible stain. The enamel slab is then rinsed with distilled water, dried and L* value (L* pumiced) measured and recorded.

[0106] The cleaning efficiency is expressed as a PCR value using the following equation:

$$PCR = 100*(L^* \text{ Brushed} - L^* \text{ Stained}) / (L^* \text{ Pumiced} - L^* \text{ Stained})$$

[0107] The results are analysed using JMP software to assess the significance of the results obtained.

Activated Citrus Fibre Premix

[0108] A premix comprising 2 wt% of activated citrus fibre (ACF) was prepared using the materials given in Table 2, according to the following method.

Table 1

Material	% As supplied	Weight (g)
Demin. Water	97.92	1958.4
Proxel GXL	0.08	1.6
Herbacel AQ + type N	2.00	40.0

[0109] The demineralised water was stirred using an agitator stirrer with overhead drive operated at 160 rpm. The Proxel GXL preservative was added. Then Herbacel AQ plus N Citrus Fibre (ex: Herbafoods) was added gradually to ensure no clumping. Stirring was continued for a further 15 minutes to allow the fibres to swell sufficiently prior to the activation stage. The activation stage was carried out by high pressure homogenisation (HPH) at 500 barg.

Preparation of the cleaning solutions

[0110] Cleaning solution as specified in the following examples were made using the premix as described above. Sufficient freshly made premix was added to a mixer to give the required level of activated citrus fibre in the finished composition and it was milled for 10 minutes. The remaining ingredients of the cleaning solutions were then added. A homogenous dispersion was made using an in-line Silverson (L5T), operating at 9000 rpm with a residence time of 2 minutes.

Composition of the cleaning solutions

[0111] Liquid cleaning composition of Examples 1 to 3 and Comparatives 1 to 6 were prepared with a composition as set out in Table 1.

Table 1. composition of liquid cleaning compositions

	Wt. %		
Ingredients	**Ex. 1**	**Comp. 1**	**Comp. 2**
ACF	0.25	0.25	-
calcite 5 AV[1]	10	-	10
water	to balance	to balance	to balance

1: Tradename Omyacarb 5-AV, Supplier: Omya Greater South

Table 1 continued

	Wt. %					
Ingredients	**Ex. 2**	**Ex. 3**	**Comp. 3**	**Comp. 4**	**Comp. 5**	**Comp. 6**
primary Alcohol ethoxylate[2]	5.0	5.0	5.0	5.0	5.0	5.0
polyacrylic acid[3]	0.5	0.5	0.5	0.5	0.5	0.5
citric acid	1.0	1.0	1.0	1.0	1.0	1.0
2-Aminoethanol	1.0	1.0	1.0	1.0	1.0	1.0
Citroswan[4]	0.3	0.3	0.3	0.3	0.3	0.3
dipropylene glycol N-butylether	1.0	1.0	1.0	1.0	1.0	1.0
1,2- benzisothiazolin-3-one	0.016	0.016	0.016	0.016	0.016	0.016
palm kernel fatty acid	0.18	0.18	0.18	0.18	0.18	0.18
antifoam[5]	0.001	0.001	0.001	0.001	0.001	0.001
opacifier[6]	0.1	0.1	0.1	0.1	0.1	0.1
sodium hydroxide	0.89	0.89	0.89	0.89	0.89	0.89
ACF[7]	0.25	0.25	-	0.25	-	-
calcite 5 AV	10	-	-	-	10	-
calcite 30 AV[8]	-	10	-	-	-	10
water	to balance	to balance	to balance	to balance	to balance	to balance

2. Tradename: Neodol 91.8EO, Supplier: Shell

3. Tradename: Acusol 190, Supplier: Rohm & Haas

4. Tradename: Citroswan UN 195940, Supplier Firmenich

5. Tradename: silicone DB301, Supplier: VLD Factory

6. Tradename: Acusol OP 301, Supplier: Rohm & Haas

7: HPH activated citrus fibre 2 wt% premix (500 Barg)

8. Tradename: Omyacarb 30-AV, Supplier: Omya Greater South

Results

	PCR-value	
	Average	Standard deviation
Example 1	73	8.4
Comparative 1	4.4	4.1
Comparative 2	45.0	5.2
Example 2	73.8	9.0
Example 3	66.6	8.7
Comparative 3	11.4	3.8
Comparative 4	10.8	3.5
Comparative 5	57.5	6.0
Comparative 6	28.9	8.7

[0112] The results clearly show that the combination of calcite particles and activated citrus fibre have a greatly improved effect on hard surface cleaning efficiency (Example 1).

[0113] A greatly improved cleaning efficiency is also seen in a composition comprising other typical ingredients found in hard surface cleaning compositions, such as surfactant (Example 2, Example 3). In fact, the cleaning efficiency of the Example 1 (i.e. natural liquid cleaning composition) is comparable to that of Example 2 and Example 3. Therefore, firstly the composition according to the invention allows an all-natural liquid hard surface cleaning composition with good cleaning efficiency. Secondly, the composition according to the invention allows a reduction in surfactant content with little or no effect of cleaning efficiency.

Claims

1. Liquid hard surface cleaning composition comprising

- from 10 to 95 wt. % of liquid solvent, and
- from 0.025 to 5 wt. % of activated citrus fibre, and
- from 1 to 75 wt. % of abrasive calcite particles,

wherein the pH of the liquid hard surface cleaning composition is at least 8.

2. Composition according to claim 1, wherein the amount of calcite particles is from 2 to 65 wt. %, preferably from 3 to 60 wt. %, more preferably from 4 to 55 wt. %, even more preferably from 5 to 50 wt. % and still even more preferably from 6 to 45 wit. %.

3. Composition according to claim 1 or claim 2, wherein the average size of the calcite particles is from 0.1 to 500 μm, preferably is from 0.5 to 200 μm, more preferably is from 1 to 100 μm, more preferably is from 2 to 75 μm, even more preferably is from 3 to 50 μm and still even more preferably is from 4 to 25 μm.

4. Composition according to any one of claims 1 to 3, wherein the amount of activated citrus fibre in the final composition from 0.05 to 5 wt. %, more preferably 0.1 to 4 wt. %, even more preferably 0.15 to 3 wt. % and still even more preferably from 0.2 to 2 wt. %..

5. Composition according to any one of claims 1 to 4, wherein the composition comprises at most 50 wt. %, preferably at most 20 wt. % even more preferably at most 10 wt. %, still even more preferably at most 5 wt. % still even more preferably at most 1 wt. % of surfactant.

6. Composition according to any one of claims 1 to 5, wherein the composition comprises 35 to 92 wt. %, preferably 55 to 90 wt. % and more preferably 65 to 85 wt. % of liquid solvent.

7. Composition according to any one of claims 1 to 6, wherein the liquid solvent comprises at least 50 wt. %, preferably at least 75 wt. %, more preferably at least 85 wt. % and even more preferably at least 95 wt. % of water, based on the total weight of liquid solvent.

8. Composition according to any one of claims 1 to 7, wherein the composition has a pH of at least 8.5, more preferably at least 9, even more preferably at least 9.5, still even more preferably at least 10, still even more preferably at least 10.5 and still even more preferably at least 11.

9. Composition according to any one of claims 1 to 8, wherein the composition has a viscosity from 100 to 10,000 mPa.s, more preferably from 200 to 8,000 mPa.s, even more preferably from 400 to 6,500 mPa.s, and still even more preferably from 800 to 5,000 mPa.s, as measured at a shear rate of 20 s^{-1} and at a temperature of 25 degrees Celsius.

10. Process to manufacture the liquid cleaning composition according to any one of claims 1 to 9, comprising the following steps:

    a) providing liquid solvent;
    b) providing a premix comprising activated citrus fibre;
    c) providing abrasive calcite particles;
    d) mixing said ingredients provided at steps 'a', 'b' and 'c' under at least partial vacuum.

11. Method for the cleaning of a hard surface comprising the following steps:

    a) applying the liquid composition according to any one of claims 1 to 9 to the hard surface;
    b) agitating said composition on the hard surface with a non-absorbent means.

12. Method according to claim 11 wherein the non-absorbent means is a non-absorbent cloth of a brush.

13. Use of activated citrus fibre in a liquid hard surface cleaning composition comprising abrasive calcite particles and liquid solvent to replace part or all of the surfactant, with little or no effect on cleaning efficiency.

14. Use of activated citrus fibre in a liquid hard surface cleaning composition comprising abrasive calcite particles and liquid solvent to provide an efficient cleaning composition which essentially consists of natural ingredients.

15. Use of activated citrus fibre in a liquid hard surface cleaning composition comprising abrasive calcite particles and liquid solvent to improve the cleaning efficiency.

Patentansprüche

1. Flüssige Reinigungszusammensetzung für harte Oberflächen, umfassend

    • von 10 bis 95 Gew.-% flüssiges Lösungsmittel und
    • von 0,025 bis 5 Gew.-% aktivierte Citrusfaser und
    • von 1 bis 75 Gew.-% abrasive Calcitpartikel,

    wobei der pH der flüssigen Reinigungszusammensetzung für harte Oberflächen mindestens 8 beträgt.

2. Zusammensetzung nach Anspruch 1, wobei die Menge der Calcitpartikel von 2 bis 65 Gew.-%, vorzugsweise von 3 bis 60 Gew.-%, bevorzugter von 4 bis 55 Gew.-%, sogar bevorzugter von 5 bis 50 Gew.-% und sogar noch bevorzugter von 6 bis 45 Gew.-% beträgt.

3. Zusammensetzung nach Anspruch 1 oder 2, wobei die durchschnittliche Größe der Calcitpartikel von 0,1 bis 500 μm, vorzugsweise von 0,5 bis 200 μm, bevorzugter von 1 bis 100 μm, bevorzugter von 2 bis 75 μm, sogar bevorzugter von 3 bis 50 μm und sogar noch bevorzugter von 4 bis 25 μm beträgt.

4. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 3, wobei die Menge der aktivierten Citrusfaser in der Endzusammensetzung von 0,05 bis 5 Gew.-%, bevorzugter 0,1 bis 4 Gew.-%, sogar bevorzugter 0,15 bis 3 Gew.-

% und sogar noch bevorzugter von 0,2 bis 2 Gew.-% beträgt.

5. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 4, wobei die Zusammensetzung höchstens 50 Gew.-%, vorzugsweise höchstens 20 Gew.-%, sogar bevorzugter höchstens 10 Gew.-%, sogar noch bevorzugter höchstens 5 Gew.-%, sogar noch bevorzugter höchstens 1 Gew.-% Tensid umfasst.

6. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 5, wobei die Zusammensetzung 35 bis 92 Gew.-%, vorzugsweise 55 bis 90 Gew.-% und bevorzugter 65 bis 85 Gew.-% flüssiges Lösungsmittel umfasst.

7. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 6, wobei das flüssige Lösungsmittel mindestens 50 Gew.-%, vorzugsweise mindestens 75 Gew.-%, bevorzugter mindestens 85 Gew.-% und sogar bevorzugter mindestens 95 Gew.-% Wasser, bezogen auf das Gesamtgewicht des flüssigen Lösungsmittels, umfasst.

8. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 7, wobei die Zusammensetzung einen pH von mindestens 8,5, vorzugsweise mindestens 9, sogar bevorzugter mindestens 9,5, sogar noch bevorzugter mindestens 10, sogar noch bevorzugter mindestens 10,5 und sogar noch bevorzugter mindestens 11 aufweist.

9. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 8, wobei die Zusammensetzung eine Viskosität von 100 bis 10.000 mPa.s, bevorzugter von 200 bis 8.000 mPa.s, sogar bevorzugter von 400 bis 6.500 mPa.s und sogar noch bevorzugter von 800 bis 5.000 mPa.s, gemessen bei einer Scherrate von 20 s^{-1} und bei einer Temperatur von 25 Grad Celsius, aufweist.

10. Verfahren zur Herstellung der flüssigen Reinigungszusammensetzung nach irgendeinem der Ansprüche 1 bis 9, umfassend die folgenden Schritte:

a) Bereitstellen eines flüssigen Lösungsmittels,
b) Bereitstellen einer Vormischung, die aktivierte Citrusfaser umfasst,
c) Bereitstellen abrasiver Calcitpartikel,
d) Mischen der Bestandteile, bereitgestellt in den Schritten 'a', 'b' und 'c', unter mindestens Teilvakuum.

11. Verfahren zum Reinigen einer harten Oberfläche, umfassend die folgenden Schritte:

a) Aufbringen der flüssigen Zusammensetzung nach irgendeinem der Ansprüche 1 bis 9 auf die harte Oberfläche,
b) Bewegen der Zusammensetzung auf der harten Oberfläche mit einem nicht-absorbierenden Mittel.

12. Verfahren nach Anspruch 11, wobei das nicht-absorbierende Mittel ein nichtabsorbierender Stoff einer Bürste ist.

13. Verwendung aktivierter Citrusfaser in einer flüssigen Reinigungszusammensetzung für harte Oberflächen, umfassend abrasive Calcitpartikel und flüssiges Lösungsmittel, um einen Teil oder sämtliches Tensid mit wenig oder keinem Effekt auf die Reinigungsleistung zu ersetzen.

14. Verwendung aktivierter Citrusfaser in einer flüssigen Reinigungszusammensetzung für harte Oberflächen, umfassend abrasive Calcitpartikel und flüssiges Lösungsmittel, um eine effiziente Reinigungszusammensetzung bereitzustellen, die im Wesentlichen aus natürlichen Bestandteilen besteht.

15. Verwendung aktivierter Citrusfaser in einer flüssigen Reinigungszusammensetzung für harte Oberflächen, umfassend abrasive Calcitpartikel und flüssiges Lösungsmittel, um die Reinigungsleistung zu verbessern.

Revendications

1. Composition de nettoyage de surface dure liquide comprenant

- de 10 à 95 % en masse de solvant liquide, et
- de 0,025 à 5 % en masse de fibre d'agrume activée, et
- de 1 à 75 % en masse de particules de calcite abrasives,

dans laquelle le pH de la composition de nettoyage de surface dure liquide est d'au moins 8.

2. Composition selon la revendication 1, dans laquelle la quantité de particules de calcite est de 2 à 65 % en masse, de préférence de 3 à 60 % en masse, encore mieux de 4 à 55 % en masse, bien mieux encore de 5 à 50 % en masse et particulièrement de préférence de 6 à 45 % en masse.

3. Composition selon la revendication 1 ou la revendication 2, dans laquelle la taille moyenne des particules de calcite est de 0,1 à 500 μm, de préférence de 0,5 à 200 μm, encore mieux de 1 à 100 μm, bien mieux encore de 2 à 75 μm, particulièrement de préférence de 3 à 50 μm et particulièrement encore mieux de 4 à 25 μm.

4. Composition selon l'une quelconque des revendications 1 à 3, dans laquelle la quantité de fibre d'agrume activée dans la composition finale est de 0,05 à 5 % en masse, encore mieux de 0,1 à 4 % en masse, bien mieux encore de 0,15 à 3 % en masse et particulièrement de préférence de 0,2 à 2 % en masse.

5. Composition selon l'une quelconque des revendications 1 à 4, dans laquelle la composition comprend au plus 50 % en masse, de préférence au plus 20 % en masse, encore mieux au plus 10 % en masse, bien mieux encore au plus 5 % en masse, particulièrement de préférence au plus 1 % en masse de tensioactif.

6. Composition selon l'une quelconque des revendications 1 à 5, dans laquelle la composition comprend de 35 à 92 % en masse, de préférence de 55 à 90 % en masse et encore mieux de 65 à 85 % en masse de solvant liquide.

7. Composition selon l'une quelconque des revendications 1 à 6, dans laquelle le solvant liquide comprend au moins 50 % en masse, de préférence au moins 75 % en masse, encore mieux au moins 85 % en masse et bien mieux encore au moins 95 % en masse d'eau, rapporté à la masse totale de solvant liquide.

8. Composition selon l'une quelconque des revendications 1 à 7, dans laquelle la composition présente un pH d'au moins 8,5, encore mieux d'au moins 9, bien mieux encore d'au moins 9,5, particulièrement de préférence d'au moins 10, particulièrement encore mieux d'au moins 10,5 et particulièrement bien mieux encore d'au moins 11.

9. Composition selon l'une quelconque des revendications 1 à 8, dans laquelle la composition présente une viscosité de 100 à 10 000 mPa.s, encore mieux de 200 à 8 000 mPa.s, bien mieux encore de 400 à 6 500 mPa.s, et particulièrement de préférence de 800 à 5 000 mPa.s, comme mesurée à une vitesse de cisaillement de 20 s^{-1} et à une température de 25 degrés Celsius.

10. Procédé de fabrication de la composition de nettoyage liquide selon l'une quelconque des revendications 1 à 9, comprenant les étapes suivantes :

    a) de fourniture de solvant liquide ;
    b) de fourniture d'un pré-mélange comprenant une fibre d'agrume activée ;
    c) de fourniture de particules de calcite abrasives ;
    d) de mélange desdits ingrédients fournis dans les étapes 'a', 'b' et 'c' sous un vide au moins partiel.

11. Procédé pour le nettoyage d'une surface dure comprenant les étapes suivantes :

    a) d'application de la composition liquide selon l'une quelconque des revendications 1 à 9 à la surface dure ;
    b) d'agitation de ladite composition sur la surface dure avec un moyen non-absorbant.

12. Procédé selon la revendication 11, dans lequel le moyen non-absorbant est un tissu non-absorbant d'une brosse.

13. Utilisation de fibre d'agrume activée dans une composition de nettoyage de surface dure liquide comprenant des particules de calcite abrasives et un solvant liquide pour remplacer une partie ou la totalité du tensioactif, avec peu ou pas d'effet sur l'efficacité de nettoyage.

14. Utilisation de fibre d'agrume activée dans une composition de nettoyage de surface dure liquide comprenant des particules de calcite abrasives et un solvant liquide pour fournir une composition de nettoyage efficace qui est essentiellement constituée d'ingrédients naturels.

15. Utilisation de fibre d'agrume activée dans une composition de nettoyage de surface dure liquide comprenant des particules de calcite abrasives et un solvant liquide pour améliorer l'efficacité de nettoyage.

REFERENCES CITED IN THE DESCRIPTION

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