



(51) International Patent Classification:

A61K 8/87 (2006.01) *C11D 17/00* (2006.01)
C11D 3/37 (2006.01)

(21) International Application Number:

PCT/US2012/043210

(22) International Filing Date:

20 June 2012 (20.06.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/498,772 20 June 2011 (20.06.2011) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: LIQUID CLEANING AND/OR CLEANSING COMPOSITION

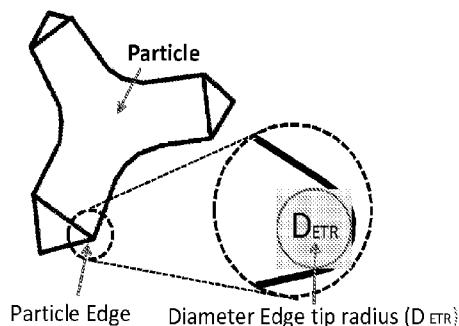


FIG. 1

(57) Abstract: The present invention relates to a liquid, cleaning and/or cleansing composition comprising biodegradable abrasive cleaning particles.

LIQUID CLEANING AND/OR CLEANSING COMPOSITION

TECHNICAL FIELD

The present invention relates to liquid compositions for cleaning and/or cleansing a variety of
5 inanimate and animate surfaces, including hard surfaces in and around the house, dish surfaces,
surfaces in oral cavity, such as teeth, human and animal skin, car and vehicles surfaces, etc.
More specifically, the present invention relates to liquid scouring composition comprising
suitable particles for cleaning and/or cleansing.

10 BACKGROUND OF THE INVENTION

Scouring compositions such as particulate compositions or liquid (incl. gel, paste-type)
compositions containing abrasive components are well known in the art. Such compositions are
used for cleaning and/or cleansing a variety of surfaces; especially those surfaces that tend to
become soiled with difficult to remove stains and soils.

15

Amongst the currently known scouring compositions, the most popular ones are based on
abrasive particles with shapes varying from spherical to irregular. The most common abrasive
particles are either inorganic like carbonate salt, clay, silica, silicate, shale ash, perlite and quartz
sand or organic polymeric beads like polypropylene, PVC, melamine, urea, polyacrylate and
20 derivatives, and come in the form of liquid composition having a creamy consistency with the
abrasive particles suspended therein.

The surface safety profile of such currently known scouring compositions is inadequate
alternatively, poor cleaning performances is shown for compositions with an adequate surface
25 safety profile. Indeed, due to the presence of very hard abrasive particles, these compositions can
damage, i.e., scratch, the surfaces onto which they have been applied. Indeed, the formulator
needs to choose between good cleaning/cleansing performance but featuring strong surface
damage or compromising on the cleaning/cleansing performance while featuring acceptable
surface safety profile. In addition, such currently known scouring compositions at least in certain
30 fields of application (e.g., hard surface cleaning) are perceived by consumers as outdated.

Furthermore, at least some of the above mentioned abrasives particles are not water soluble and
remain in particulate form within tap water after use. Indeed, abrasive particles can flow into
waste water pipes, wherein the abrasive particles will cluster and may cause blockages, and/or

the abrasive particles may cause problems in waste water treatment and eventually may be deposited in soil or landfills. Thus, it has been determined that there is a need to further improve currently known scouring compositions with regard to the degradation properties of the abrasive material therein. Namely, by substituting the currently known abrasive material with material
5 providing improved degradation process. Indeed, the use of abrasive material that undergoes rapid degradation even in mild biomedica, e.g.: like "readily biodegradable" material is highly desirable. Such readily biodegradable material is usually meeting biodegradation test and success criteria as described in OECD301 C test method.

10 It is thus an objective of the present invention to provide a liquid cleaning and/or cleansing composition suitable to clean/cleanse a variety of surfaces, including inanimate surfaces, such hard surfaces in and around the house, dish surfaces, etc., wherein the abrasive particles are fully or partially biodegradable according to OECD301 C.

15 It has been found that the above objective can be met by the composition according to the present invention.

It is an advantage of the compositions according to the present invention that they may be used to clean/cleanse inanimate surfaces made of a variety of materials like glazed and non-glazed
20 ceramic tiles, enamel, stainless steel, Inox®, Formica®, vinyl, no-wax vinyl, linoleum, melamine, glass, plastics, painted surfaces and the like.

In an another preferred embodiment, the compositions herein are suitable for cleaning/cleansing animate surfaces selected from the group consisting of human skin; animal skin; human hair;
25 animal hair; and hard and soft tissue surface of the oral cavity, such as teeth, gums, tongue and buccal surfaces, and the like.

Another advantage of the present invention is that the composition provides good cleaning/cleansing performance, whilst providing a good surface safety profile.

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A further advantage of the present invention is that in the compositions herein, the particles can be formulated at very low levels, whilst still providing the above benefits. Indeed, in general for other technologies, high levels of abrasive particles are needed to reach good cleaning/cleansing

performance, thus leading to high formulation and process cost, incompatibility with many package e.g.: squeeze or spray bottle, low incident usage ergonomics, difficult rinse and end cleaning profiles, as well as limitation for aesthetics and a pleasant hand feel of the cleaning/cleansing composition.

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SUMMARY OF THE INVENTION

The present invention relates to a liquid cleaning and/or cleansing composition comprising biodegradable abrasive cleaning particles, wherein said biodegradable abrasive cleaning particles comprise biodegradable polyurethane comprising an isocyanate monomer or mixtures thereof and a biodegradable polyol selected from the group consisting of : saccharides; oligosaccharides; glycosides; and carbohydrates; and mixtures thereof; and wherein said biodegradable polyurethane comprise isocyanate monomers from 10% to 35% by weight of said biodegradable polyurethane; and wherein said biodegradable polyurethane has a biodegradable rate above 50% according to OECD301 C.

The present invention further encompasses a process of cleaning and/or cleansing animate and/or inanimate surfaces with a liquid, cleaning and/or cleansing composition comprising biodegradable polyurethane abrasive cleaning particles, wherein said surface is contacted with said composition, preferably wherein said composition is applied onto said surface.

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BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 is an illustration of tip radius.

15

DETAILED DESCRIPTION OF THE INVENTION

The liquid cleaning/cleansing composition

The compositions according to the present invention are designed as cleaners/cleansers for a variety of surfaces. Preferably, the compositions herein are suitable for cleaning/cleansing inanimate surfaces and animate surfaces.

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In a preferred embodiment, the compositions herein are suitable for cleaning/cleansing inanimate surfaces selected from the group consisting of household hard surfaces; dish surfaces; surfaces like leather or synthetic leather; and automotive vehicles surfaces.

In an another preferred embodiment, the compositions herein are suitable for cleaning/cleansing animate surfaces selected from the group consisting of human skin; animal skin; human hair; animal hair; and hard and soft tissue surface of the oral cavity, such as teeth, gums, tongue and buccal surfaces, and the like.

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In a highly preferred embodiment, the compositions herein are suitable to clean household hard surfaces.

By "household hard surface", it is meant herein any kind of surface typically found in and around
10 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®, any plastics, plastified wood, metal or any painted or varnished or sealed surface and the like. Household hard surfaces also include household appliances including, but not limited to
15 refrigerators, freezers, washing machines, automatic dryers, ovens, microwave ovens, dishwashers cookers and so on. Such hard surfaces may be found both in private households as well as in commercial, institutional and industrial environments.

By "dish surfaces" it is meant herein any kind of surfaces found in dish cleaning, such as dishes,
20 cutlery, cutting boards, pans, and the like. Such dish surfaces may be found both in private households as well as in commercial, institutional and industrial environments.

The compositions according to the present invention are liquid compositions as opposed to a solid or a gas. Liquid compositions include compositions having a water-like viscosity as well as
25 thickened compositions, such as gels and pastes.

In a preferred embodiment herein, the liquid compositions herein are aqueous compositions. Therefore, they may comprise from 65% to 99.5% by weight of the total composition of water, preferably from 75% to 98% and more preferably from 80% to 95%.

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In an another preferred embodiment herein, the liquid compositions herein are mostly non-aqueous compositions although they may comprise from 0% to 10% by weight of the total

composition of water, preferably from 0% to 5%, more preferably from 0% to 1% and most preferably 0% by weight of the total composition of water.

In a preferred embodiment herein, the compositions herein are neutral compositions, and thus
5 have a pH, as is measured at 25°C, of 6 - 8, more preferably 6.5 - 7.5, even more preferably 7.

In other preferred embodiment compositions have pH preferably above pH 4 and alternatively have pH preferably below pH 9.

10 Accordingly, the compositions herein may comprise suitable bases and acids to adjust the pH.

A suitable base to be used herein is an organic and/or inorganic base. Suitable bases for use herein are the caustic alkalis, such as sodium hydroxide, potassium hydroxide and/or lithium hydroxide, and/or the alkali metal oxides such, as sodium and/or potassium oxide or mixtures
15 thereof. A preferred base is a caustic alkali, more preferably sodium hydroxide and/or potassium hydroxide.

Other suitable bases include ammonia, ammonium carbonate, all available carbonate salts such as K_2CO_3 , Na_2CO_3 , $CaCO_3$, $MgCO_3$, etc., alkanolamines (as e.g. monoethanolamine), urea
20 and urea derivatives, polyamine, etc.

Typical levels of such bases, when present, are of from 0.01% to 5.0% by weight of the total composition, preferably from 0.05% to 3.0% and more preferably from 0.1% to 0.6 %.

25 The compositions herein may comprise an acid to trim its pH to the required level, despite the presence of an acid, if any, the compositions herein will maintain their preferred neutral pH as described herein above. A suitable acid for use herein is an organic and/or an inorganic acid. A preferred organic acid for use herein has a pKa of less than 6. A suitable organic acid is selected from the group consisting of citric acid, lactic acid, glycolic acid, succinic acid, glutaric acid and
30 adipic acid and a mixture thereof. A mixture of said acids may be commercially available from BASF under the trade name Sokalan® DCS. A suitable inorganic acid is selected from the group consisting hydrochloric acid, sulphuric acid, phosphoric acid and a mixture thereof.

A typical level of such an acid, when present, is of from 0.01% to 5.0% by weight of the total composition, preferably from 0.04% to 3.0% and more preferably from 0.05% to 1.5 %.

5 In a preferred embodiment according to the present invention the compositions herein are thickened compositions. Preferably, the liquid compositions herein have a viscosity of up to 7500 cps at 20 s^{-1} , more preferably from 5000 cps to 50 cps, yet more preferably from 2000 cps to 50 cps and most preferably from 1500 cps to 300 cps at 20 s^{-1} and 20°C when measured with a Rheometer, model AR 1000 (Supplied by TA Instruments) with a 4 cm conic spindle in stainless steel, 2° angle (linear increment from 0.1 to 100 sec^{-1} in max. 8 minutes).

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In another preferred embodiment according to the present invention the compositions herein have a water-like viscosity. By “water-like viscosity” it is meant herein a viscosity that is close to that of water. Preferably the liquid compositions herein have a viscosity of up to 50 cps at 60 rpm, more preferably from 0 cps to 30 cps, yet more preferably from 0 cps to 20 cps and most
15 preferably from 0 cps to 10 cps at 60 rpm and 20°C when measured with a Brookfield digital viscometer model DV II, with spindle 2.

Biodegradable abrasive cleaning particles

The liquid cleaning and/or cleansing composition herein comprise biodegradable abrasive cleaning particles that are selected according to their degradation rate. Additionally, the biodegradable abrasive cleaning particles are also selected or synthesized to have effective shapes, e.g.: defined by circularity, solidity and adequate hardness.

By “biodegradable” it is meant herein chemical dissolution, disintegration or digestion of biodegradable abrasive particles by bacteria or other biological means at a rate above 50% according to the OECD301 C test method, which defines readily biodegradability of materials. In this test the biodegradable abrasive particles are suspended in a phosphate buffered media containing an activated sludge inoculum and the consumption of oxygen and or the formation of carbon dioxide is measured via an electrolytic respirometer. The test substance is the sole carbon and energy source and under aerobic conditions microorganisms metabolize organic substances producing CO_2 as the ultimate product.

The biodegradable polyurethane has a biodegradability rate above 50% according to OECD301 C, preferably a biodegradability rate above 60%, more preferably above 70% and yet more preferably above 80% and most preferably of 100% according to OECD301 C.

Biodegradation is the chemical dissolution, disintegration or digestion of materials by bacteria or other biological means. Currently biodegradability is commonly associated with environmentally friendly products that are capable of decomposing back into natural elements. Organic material can be degraded aerobically with oxygen, or anaerobically without oxygen. Readily biodegradable materials discussed herein are material which biodegrade according to protocol and requirement described in OECD301 C biodegradation test.

Polyurethane is a desirable material source to produce the abrasive cleaning particles, since the material is available and has the desired hardness range for variety of processes to produce the biodegradable polyurethane particles in various geometries especially from the form of foams. Abrasive cleaning particles obtained from the biodegradable polyurethane foam is particularly suitable to be used in the present invention.

It is commonly known that the polyurethane is formed by a crystalline, highly cross linked segment, the physical-chemical properties of which are mostly influenced by the selection of the isocyanate type and quantity, and soft segment, the physical-chemical properties of which are mostly influenced by the selection of the polyol. The biodegradation rate of a polyurethane material mostly depends on the ratio hard vs. soft segment and on the chemical nature of the monomer composition of these segments. Therefore, in order to synthesize biodegradable polyurethane, a low ratio of hard segment is desired and this is typically achieved by synthesizing polyurethane with low quantity of isocyanate monomer. On the other hand, an excessively low amount of isocyanate monomer is not desired, as the resulting biodegradable polyurethane material does not have sufficient material hardness to be used as an abrasive. Moreover, a low quantity of isocyanate monomer makes the foaming process ineffective.

In a preferred embodiment biodegradable polyurethane is produced from the reaction between isocyanate monomers and biodegradable polyols, wherein the isocyanate monomer is aromatic isocyanate, wherein biodegradable polyurethane comprises aromatic isocyanate from 10% to 35% by weight of the biodegradable polyurethane and wherein the biodegradable polyol is derived from a carbohydrate structure.

The applicant has found that a level of isocyanate monomer exceeding 35% by weight of biodegradable polyurethane exhibits mediocre to no biodegradation (e.g.: typically below 50% degradation according to OECD301 C). On the contrary, the applicant failed to produce a biodegradable polyurethane suitable for use as an effective abrasive cleaning particle when the quantity of isocyanate monomers was lower than 10% by weight of the biodegradable polyurethane.

Preferably the isocyanate level in the biodegradable polyurethane varies from 10% to 35% by weight of the biodegradable polyurethane, more preferable from 15% to 30% and most preferably from 20% to 25%.

In order to meet both hardness and degradation requirements, suitable isocyanate monomers used herein are aromatic isocyanate monomers preferably selected from the group consisting of toluene diisocyanate (TDI), methylene dianiline diisocyanate (MDI), xylene diisocyanate, triphenylmethane triisocyanate, polymeric forms of MDI, polymeric form of TDI and mixtures thereof.

More preferable isocyanate is selected from the group consisting of MDI, polymeric form of methylene dianiline diisocyanate with low molecular weight e.g.: featuring typically less than 4 repeating units and mixtures thereof.

Even more preferably, isocyanate is a mixture of polymeric form of MDI with a low molecular weight and MDI, wherein, said MDI content is preferably above 50% by weight of the mixture, more preferable above 70%.

The most preferred isocyanate monomer is methylene dianiline diisocyanate (MDI).

The choice of biodegradable polyol has a great impact on the polyurethane hardness but most critically impacts the biodegradability. In order to reach sufficient biodegradability, the biodegradable polyols used in the present invention are selected accordingly to their high level of biodegradation. The level of degradation of the biodegradable polyols suitable for the present invention is above 60%, preferably above 80% according to the OECD301 C (when only the polyol is tested as raw material).

The quantity of biodegradable polyols present in the polyurethane is another factor of biodegradability of polyurethane. Biodegradable polyurethane according to the present invention comprises biodegradable polyol from 40% to 90% by weight of the biodegradable polyurethane, preferably from 50% to 90% and most preferably from 60% to 90%.

The applicant has found that carbohydrate or sugars e.g.: including monosaccharide or oligosaccharides and glycosides are particularly suitable to make biodegradable polyurethane. Depending of the physical state of the biodegradable polyol, they can also be considered as polyurethane fillers with / without reaction with the isocyanate monomers. Alternatively, additional non-carbohydrate or non-sugar-based polyols can be added into the polyurethane reaction mixture in order to meet mechanical properties of the desired polyurethane and also to aid the synthesis process.

Suitable biodegradable polyols are solid at room temperature and have melting point above 60°C in order to maintain sufficient structural strength and hardness of the biodegradable polyurethane particles at usage condition e.g.: typically from 0 to 50°C. The choice of biodegradable polyols having higher melting point also prevents the foam from collapsing during or after the foaming process.

Hydrolytic stability is a preferred feature of the biodegradable polyurethane foam when compositions are formulated in pH below 4 and in pH above 9.

Examples of suitable biodegradable polyols used herein are sugar compounds including monosaccharides, and oligosaccharides (having less than 5 repeating units). Such sugar compounds are preferably selected from the group consisting of glucose, galactose, xylose, lactose, mannose, talose, rhamnose, arabinose, glucosylmannose, lyxose, allose, altrose, gulose, idose, ribose, erythrose, threose, psicose, fructose, sorbose, tagatose, pentulose, tetrose, sucrose, maltose, isomaltose, cellobiose, lactose, trehalose, kojibiose, sophorose, nigerose, laminaribiose, isomaltose, gentiobiose, melibiose, planteobiose, turanose, vicianose, agarobiose, scillabiose, rutinose, raffinose, melezitose, maltotriose, acarbose, stachyose, xylobiose, rhodimenabiose, erythritol, mesoerythritol, maltitol, lactitol, D-threitol, D-arabinitol, ribitol, xylitol, sorbitol, galactitol, D-mannitol, allitol, higher alditols and mixture thereof. Most preferred mono and oligosaccharides are selected from the group consisting of sucrose, glucose and mixtures thereof.

Alternatively natural media can be also used as source of sugar. Vegetable sources, wherein the amount of sugar is present in large excess are especially preferred. Generally molasses are good example of media containing a large excess of sugars.

5

Additional examples of suitable biodegradable polyols are glycosides. Glycosides are molecules in which a sugar is bound to a non-carbohydrate moiety, usually a small organic molecule via a glycosidic bond.

10 Carbohydrates can be used as biodegradable polyols in the present invention. Suitable carbohydrates are preferably substantially non-soluble or non-miscible as raw materials in the cleaner / cleanser product. In this scenario, the biodegradable polyols can also be considered to be as reactive fillers. Suitable examples are high molecular weight carbohydrates derived from natural cellulose or modified cellulose selected from the group consisting of methylcellulose,
15 ethylcellulose, ethyl methyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxyethyl methyl cellulose, hydroxypropyl methyl cellulose, ethyl hydroxyethyl cellulose, carboxymethyl cellulose and mixtures thereof. Lignin, starch and starch derived raw material selected from the group consisting of amylose, pectin, dextran, alginic, glucan, mannan, galactan, fructan, chitin and mixtures thereof are also suitable for the present invention. Most
20 preferably the carbohydrate is starch.

Due to the low solubility of the carbohydrate polyol, the carbohydrate polyol is in a form of a fine powder, wherein the powder has low particle size cutoff in order to ensure homogeneous dispersion of the carbohydrate in the biodegradable polyurethane reaction mixture. Preferably
25 the carbohydrate particle size is below 30 microns, more preferably below 10 microns, and most preferably below 5 microns.

An additional polyol can be used in the biodegradable polyurethane formation to ensure good product homogeneity, and to facilitate the synthesis process including the foaming process. The
30 additional polyol also helps to define the final mechanical properties of the biodegradable polyurethane, especially the hardness of the final biodegradable polyurethane.

The additional polyol is preferably a liquid polyol at room temperature or the additional polyol is liquid at processing temperature during the synthesis of the biodegradable polyurethane. The

additional polyol can be biodegradable according to the OECD301 C, although this is not a requirement. Separately polyols which are hydrophilic or substantially hydrophilic are particularly suitable polyols to favor the biodegradation of the final polyurethane. Other particularly suitable additional polyols are polyester based polyols wherein the polyester bond
5 can be decomposed even if not according to the OECD301 C e.g.: via hydrolytic or biological (e.g.: in soil/compostable degradation).

The quantity of additional polyol in the biodegradable polyurethane is preferably below 35% by weight of the biodegradable polyurethane, more preferably below 25% and most preferably
10 below 20%.

Preferably the additional polyols have a low molecular weight e.g.: typically below 4000, more preferably below 2000 and most preferably below 1000.

15 Examples of suitable additional polyols with low molecular weight are ethylene glycol, diethylene glycol, triethylene glycol, 1,4-butanediol, 1,6-hexanediol, neopentyl alcohol, trimethylolpropane, glycerin, triethanolamine including their polymeric derivatives such as polyethylene glycol diol, propylene glycol diol, ethylene oxide/propylene oxide copolymers and their copolymers and also although less desirable from a degradation viewpoint
20 polytetramethylene glycol and derivatives.

Other suitable examples of additional polyols used herein are preferably castor and/or soybean oil (including ethoxylated or propoxylated oils and including sulfated oils).

25 Particularly preferred additional polyols are low molecular weight polyester polyols obtained from the reaction between acids and alcohols wherein the polymeric form is bearing at least two hydroxyl groups. Suitable examples of polyester diols are aliphatic polyesters diols produced by catalyzed condensation reaction between aliphatic dicarboxylic (or alternatively their anhydride form) and alkanediol wherein number of carbons in dicarboxylic acid varies from 2 to 6 and
30 number of carbons in alkanediol varies from 2 to 4. Higher number of carbon in the diacids (e.g.: dodecanedioc, azelaic, phthalic anhydride, isophthalic, terephthalic) or in the alcohol (e.g.: 1,6-hexanediol) is possible although less desirable from biodegradation point of view. Suitable aliphatic polyester diols are for example polybutylene succinate, polybutylene adipate,

polybutylene succinate-co-adipate, polyethylene succinate, polyethylene succinate-co-adipate, polypropylene succinate, polypropylene succinate-co-adipate and mixtures thereof.

Other particularly preferred additional polyols are low molecular weight polyhydroxyalkanoate derivatives bearing at least 2 hydroxyls groups. Suitable examples of polyhydroxyalkanoate polyols are based on poly-3-hydroxybutyrate, poly-3-hydroxyhexanoate, poly-3-hydroxyvalerate, poly-3-hydroxy-butyrate-co-3-hydroxyvalerate, poly-3-hydroxybutyrate-co-3-hydroxyhexanoate and mixtures thereof.

A catalyst is used in the polyurethane reaction. The catalyst type and quantity in the final polyurethane has some impact on the biodegradation profile. Combination of a metal and an amine catalyst are commonly used in the polyurethane synthesis. Suitable metal catalysts are based on stannous or zinc (e.g.: dibutyl tin dilaurate or tin-2-ethylhexanoate). Suitable amine catalysts are triethylene diamine, dimethylethanolamine, aliphatic amino ethers. The amine catalyst has no impact on the polyurethane degradation and can be used at useful level in the synthesis and the process of the present invention. On the other hand, excessive amount of metal catalyst has a negative impact on the degradation of the polyurethane, and therefore, metal catalyst can be used in the polyurethane synthesis only at very low level to obtain biodegradable polyurethane.

20

In the present invention the level of metal catalyst, if used, is below 0.02% by weight of the biodegradable polyurethane, preferably below 0.01% and in most preferred embodiment only amine catalyst is used.

In a highly preferred embodiment, the biodegradable polyurethane is blended with abundant amount of mineral or vegetable (soluble or insoluble) filler. Inclusion of a large quantity of filler helps reduce the polymer into particles and feature biodegradable particle with large surface area e.g.: via porosity and capillarity which favor the degradation kinetics. This is especially the case when selected filler is water soluble. Typical filler to be used with biodegradable polyurethane polymer is mineral e.g., chloride salt e.g., NaCl, KCl, etc, carbonate salt e.g., Na₂CO₃, NaHCO₃, etc., sulfate salt e.g., MgSO₄, and generally all mineral adsorbent provide hardness is compatible with overall target hardness of the biodegradable particle. Filler can also be derived from vegetal feedstock essentially cellulose or lignocellulose based material e.g.: nut shell, wood or bamboo

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fibers, corn cob, rice hull, etc. Typically, biodegradable polyurethane comprises filler below 35% by weight of the biodegradable polyurethane.

Alternatively, polymeric fillers may also be blended into the biodegradable polyurethane in order to meet mechanical, rheological and/or hardness requirements. The polymeric fillers are preferably biodegradable and solid at reaction and use temperatures (from 0°C to 50°C) to provide effective hardness for the abrasive particles obtained from the biodegradable polyurethane. Suitable examples of polymer fillers are selected from the group consisting of polyhydroxyalkanoates, polylactic, aliphatic polyesters and mixtures thereof. Typically biodegradable polyurethane may comprise biodegradable polymeric fillers below 35% by weight of the biodegradable polyurethane. Preferred biodegradable polymeric fillers are selected from the group consisting of polyhydroxybutyrate, polyhydroxybutyrate-co-valerate, polybutylenesuccinate, polybutylenesuccinate-co-adipate and mixtures thereof.

Alternatively, non-biodegradable polymeric fillers may be used, although it is preferred not to use them in high quantities in order to maintain a sufficient biodegradation level. If, however, non-biodegradable polymers are used as fillers, the quantity should not exceed 10% of the weight of the biodegradable polyurethane. Preferably the quantity of non-biodegradable polymeric filler should not exceed 5% of the weight of the biodegradable polyurethane. Suitable non-biodegradable polymeric fillers can be selected from the group consisting of polyethylene, polypropylene, polystyrene, PVC, polyacrylate, non-biodegradable polyurethane, and their derivatives and mixtures thereof.

The applicant has surprisingly found that abrasive cleaning particles according to present invention provide, wherein in the composition, good cleaning/cleansing performance, whilst providing a good surface safety profile and abrasive particles are fully or partially biodegradable according to OECD301 C.

In a preferred embodiment, the biodegradable abrasive cleaning particles are preferably non-rolling. Additionally, in a preferred embodiment the biodegradable abrasive cleaning particles are preferably sharp.

The applicant has found that non-rolling and sharp biodegradable abrasive cleaning particles provide good soil removal and low surface damage. Indeed the applicant has found that very

specific particle shapes e.g.: defined by circularity to promote effective sliding of the biodegradable abrasive particles vs. typical abrasive particles, where rolling movement is rather promoted and is less effective as displacing soil from the surface. The circularity to meet the criteria, to promote effective sliding of the particles is at range from 0.1 to 0.6.

5

The shape of the biodegradable abrasive cleaning particle can be defined in various ways. The present invention defines the cleaning particle shape in a form of particle, which reflects the geometrical proportions of a particle and more pragmatically of the particle population. Very recent analytical techniques allow an accurate simultaneous measurement of particle shapes from
10 a large number of particles, typically greater than 10000 particles (preferably above 100 000). This enables accurate tuning and/or selection of average particle population shape with discriminative performance. These measurement analyses of particle shape are conducted using on Occhio Nano 500 Particle Characterisation Instrument with its accompanying software Callistro version 25 (Occhio s.a. Liege, Belgium). This instrument is used to prepare, disperse,
15 image and analyse the particle samples, as per manufacturer's instructions, and the following instrument setting selections: White Requested = 180, vacuum time = 5000ms, sedimentation time = 5000ms, automatic threshold, number of particles counted/analyses = 8000 to 500000, minimum number of replicates/sample = 3, lens setting 1x/1.5x.

20 The biodegradable abrasive cleaning particles of the present invention are defined by quantitative description of a shape. In quantitative description, shape descriptor is understood as numbers that can be calculated from particle images or physical particle properties via mathematical or numerical operations. While particle shape can be defined in 3-dimension with dedicated analytical technique, the applicant has found, that the characterization of the particles
25 shape in 2-dimension is most relevant and correlates with the biodegradable abrasive performance of the cleaning particles. During the particle shape analysis protocol, the particles are orientated toward the surface – via gravity deposition - similarly to the expected particle orientation during the cleaning process. Hence, the object of the present invention regards the characterization of 2-D shape of a particle/particle population as defined by the projection of its
30 shape on the surface on which the particle/particle population is deposited.

In a preferred embodiment, the biodegradable abrasive cleaning particles have a mean ECD from 10 μm to 1000 μm , preferably from 50 μm to 500 μm , more preferably from 100 μm to 350 μm and most preferably from 150 to 250 μm .

Indeed, the Applicant has found that the biodegradable abrasive cleaning particle size can be critical to achieve efficient cleaning performance whereas excessively biodegradable abrasive population with small particle sizes e.g.: typically below 10 micrometers feature polishing action vs. cleaning despite featuring a high number of particles per particle load in cleaner inherent to the small particle size. On the other hand, biodegradable abrasive cleaning particle population with excessively high particle size, e.g.: above 1000 micrometers, do not deliver optimal cleaning efficiency, because the number of particles per particle load in cleaner, decreases significantly inherently to the large particle size. Additionally, excessively small particle size are not desirable in cleaner / for cleaning task since in practice, small and numerous particles are often hard to remove from the various surface topologies which requires excessive effort to remove from the user unless leaving the surface with visible particles residue. On the other hand, excessively large particle are too easily detected visually or provide bad tactile experience while handling or using the cleaner. Therefore, the applicants define herein an optimal particle size range that delivers both optimal cleaning performance and usage experience.

The biodegradable abrasive cleaning particles have a size defined by their area-equivalent diameter (ISO 9276-6:2008(E) section 7) also called Equivalent Circle Diameter ECD (ASTM F1877-05 Section 11.3.2). Mean ECD of particle population is calculated as the average of respective ECD of each particles of a particle population of at least 10 000 particles, preferably above 50 000 particles, more preferably above 100 000 particles after excluding from the measurement and calculation the data of particles having area-equivalent diameter (ECD) of below 10 micrometers. Mean data are extracted from volume-based vs. number-based measurements.

In one preferred example, the size of the biodegradable abrasive cleaning particles used in the present invention is altered during usage especially undergoing significant size reduction. Hence the particle remain visible or tactile detectable in liquid composition and in the beginning of the usage process to provide effective cleaning. As the cleaning process progresses, the biodegradable abrasive particles disperse or break into smaller particles and become invisible to an eye or tactile undetectable.

In the present invention shape descriptors are calculations of geometrical descriptors/shape factors. Geometrical shape factors are ratios between two different geometrical properties; such

properties are usually a measure of proportions of the image of the whole particle or a measure of the proportions of an ideal geometrical body enveloping the particle or form an envelope around the particle. These results are macroshape descriptors similar to aspect ratio, however the Applicant has discovered that mesoshape descriptors - a specific sub-class of macroshape descriptors- are particularly critical to the cleaning effectiveness and surface safety performances of the biodegradable abrasive cleaning particles, while more typical shape parameters such as aspect ratio have proved insufficient. These mesoshape descriptors describe how different a particle is compared to an ideal geometrical shape, especially how different compared to a sphere, and incidentally help define its ability for non-rolling, e.g., a sliding, effective cleaning movement pattern. The biodegradable abrasive cleaning particles of the present invention are different from typical spherical or spherical-resembling (e.g., granular) biodegradable abrasives forms.

The biodegradable abrasive cleaning particles of the present invention are preferably non-spherical.

The non-spherical particles herein preferably have sharp edges and each particle has at least one edge or surface having concave curvature. More preferably, the non-spherical particles herein have a multitude of sharp edges and each particle has at least one edge or surface having concave curvature. The sharp edges of the non-spherical particles are defined by edge having a tip radius below 20 μm , preferably below 8 μm , most preferably below 5 μm . The tip radius is defined by the diameter of an imaginary circle fitting the curvature of the edge extremity.

Figure 1 is an illustration of tip radius.

Circularity

Circularity is a quantitative, 2-dimension image analysis shape description and is being measured according to ISO 9276-6:2008(E) section 8.2 as implemented via the Occhio Nano 500 Particle Characterisation Instrument with its accompanying software Callistro version 25 (Occhio s.a. Liege, Belgium). Circularity is a preferred Mesoshape descriptor and is widely available in shape analysis instrument such as in Occhio Nano 500 or in Malvern Morphologi G3. Circularity is sometimes described in literature as being the difference between a particle's shape and a perfect sphere. Circularity values range from 0 to 1, where a circularity of 1 describes a perfectly spherical particles or disc particle as measured in a two dimensional image.

$$C = \sqrt{\frac{4 \pi A}{P^2}}$$

Where A is projection area, which is 2D descriptor and P is the length of the perimeter of the particle.

- 5 The applicant has found out that the biodegradable abrasive cleaning particles having a mean circularity from 0.1 to 0.6, preferably from 0.15 to 0.40 and more preferably from 0.2 to 0.35 are providing improved cleaning performance and surface safety. Mean data are extracted from volume-based vs. number-based measurements.
- 10 Thus, in a preferred embodiment of the present invention the biodegradable abrasive cleaning particles herein have a mean circularity from 0.1 to 0.6, preferably from 0.15 to 0.4, and more preferably from 0.2 to 0.35.

Solidity

Solidity is a quantitative, 2-dimensional image analysis shape description, and is being measured according to ISO 9276-6:2008(E) section 8.2 as implemented via the Occhio Nano 500 Particle Characterisation Instrument with its accompanying software Callistro version 25 (Occhio s.a. Liege, Belgium). The non-spherical particle herein has preferably at least one edge or surface having a concave curvature. Solidity is a mesoshape parameter, which describes the overall concavity of a particle/particle population. Solidity values range from 0 to 1, where a solidity number of 1 describes a non-concave particle, as measured in literature as being:

$$\text{Solidity} = A/A_c$$

- Where A is the area of the particle and A_c is the area of the convex hull (envelope) of bounding
15 the particle.

- The applicant has found out that the biodegradable abrasive cleaning particles having a mean solidity from 0.4 to 0.9, preferably solidity from 0.5 to 0.8 and more preferably from 0.55 to 0.65 are providing improved cleaning performance and surface safety. Mean data are extracted from
20 volume-based vs. number-based measurements.

Thus, in a preferred embodiment of the present invention the biodegradable abrasive cleaning particles herein have a mean solidity from 0.4 to 0.9, preferably solidity from 0.5 to 0.8, and more preferably from 0.55 to 0.65.

5 Solidity is sometime also named convexity in literature or in some apparatus software using the solidity formula in place of its definition described in ISO 9276-6 (convexity = P_c/P where P is the length of the perimeter of the particle and P_c is length of the perimeter of the convex hull – envelope- bounding the particle). Despite solidity and convexity being similar mesoshape descriptors in concept, the applicants refer herein to the solidity measure expressed above by the
10 Occhio Nano 500, as indicated above.

In a highly preferred embodiment the biodegradable abrasive cleaning particles have a mean circularity from 0.1 to 0.6 (preferably from 0.15 to 0.4 and more preferably from 0.2 to 0.35) and mean solidity from 0.4 to 0.9 (preferably solidity from 0.5 to 0.8, and more preferably from 0.55
15 to 0.65).

By the term “mean circularity” and “mean solidity”, the applicant considers the average of the circularity or solidity or roughness values of each particle taken from a population of at least 10 000 particles, preferably above 50 000 particles, more preferably above 100 000 particles, after
20 excluding from the measurement and calculation, the circularity or solidity or roughness data of particles having area-equivalent diameter (ECD) of below 10 micrometers. Mean data are extracted from volume-based vs. number-based measurements.

Typical shearing or graining methods to reduce the above material in biodegradable abrasive
25 powder featuring useful shape defined by the targeted circularity range, so other preparation e.g.: grain shaping methods described in the art may be employed such as agglomerating, printing, carving, etc. Previous shaping processes are sometimes facilitated by mixing previous biodegradable abrasive materials as fillers within a thermoplastic or solidifying matrix. Such processes e.g.: including selection of matrix and respective load of filler are well known in art. A
30 specifically preferred process to achieve particles matching effective circularity range consists at foaming the biodegradable abrasive raw material per se or biodegradable abrasive material dispersed within a matrix and reducing the achieved foam into biodegradable abrasive particles with improved efficiency. Foaming processes and foam structure are typically achieved via gas expansion process, e.g.: either by injecting gas or solvent within the biodegradable abrasive

precursor and allowing expansion by pressure drop and/or increasing of temperature e.g.: extrusion foaming process or more conveniently with in-situ generated gas followed by hardening of the biodegradable abrasive precursor e.g.: polyurethane foaming process. Alternatively, foam structures can also be achieved via emulsion process, followed by hardening and drying step.

In a highly preferred embodiment herein, in order to achieve the geometrical shape descriptors of the biodegradable abrasive cleaning particles (i.e. circularity, solidity and/or roughness) the biodegradable abrasive cleaning particles are obtained from foamed polymeric material, which is reduced into the biodegradable abrasive particles preferably by grinding or milling as described herein later on.

The applicant has found that good cleaning efficiency will be achieved with the biodegradable abrasive cleaning particles, which have been made from a polyurethane foam having density above 100 kg/m^3 , and even up to 500 kg/m^3 . However, the applicant has surprisingly found that significantly better cleaning effect can be achieved with the foam density being below 200 kg/m^3 , more preferably from 5 kg/m^3 to 100 kg/m^3 and most preferably from 25 kg/m^3 to 50 kg/m^3 .

Similarly, the applicant has found that good cleaning efficiency can be achieved with biodegradable abrasive cleaning particles which have been made from the foams featuring close-cell structures; however, the applicant has surprisingly found that significantly better cleaning effect can be achieved with foam with open-cell structure.

Similarly, the applicant has found that good cleaning efficiency can be achieved the biodegradable abrasive cleaning particles which have been made from the foams featuring cell size ranging from 20 micrometers to 2000 micrometers. However the applicant has surprisingly found that significantly better cleaning effect can be achieved with the foam featuring cell size between 100-1000 micrometers, more preferably from 200 to 500 micrometers and most preferably from 300 to 450 micrometers. Foam cell size can be measured for instance using protocol described in ASTM D3576.

In a preferred embodiment, in order to favor the reduction of the biodegradable polyurethane foam into a particle, the biodegradable polyurethane foam has preferably sufficient brittleness,

e.g.; upon stress, the biodegradable polyurethane foam has little tendency to deform but rather break into particles.

Efficient particles are then produced by accurately grinding the biodegradable polyurethane foam structure to target size and shape as described herein. Hence, for instance, when large particle size is desired, foam with large cell size is desirable and vice-et-versa. Additionally, in order to preserve an optimal particle shape while reducing the foam structure into a particle, it is recommended to not target particle size excessively below the dimension of the cell size of the foam. Typically, target particle size is not below about half of the foam cell size.

In order to favor the reduction of the biodegradable polyurethane foam into particles, the foam has preferably sufficient brittleness, e.g.: upon stress, the foam has little tendency to deform and is liable to fracture. This behavior may result if the polymer has a glass transition temperature significantly higher than the usage temperature or if the polymer has a high degree of crystallinity and the crystalline melting temperature is significantly above the usage temperature.

One suitable way of reducing the foam into the biodegradable abrasive cleaning particles herein is to grind or mill the foam. A preferred grinding process is described in US 6,699,963 B2, in which the polymer is ground in slurry of ice and water, maintaining the polymer in a brittle state and utilizing ice as an abrasive medium. Other suitable means include the use of eroding tools such as a high speed eroding wheel with dust collector wherein the surface of the wheel is engraved with a pattern or is coated with abrasive sandpaper or the like to promote the foam to form the biodegradable abrasive cleaning particles herein.

Alternatively and in a highly preferred embodiment herein, the foam may be reduced to particles in several stages. First the bulk foam can be broken into pieces of a few cm dimensions by manually chopping or cutting, or using a mechanical tool such as a lumpbreaker, for example the Model 2036 from S Howes, Inc. of Silver Creek, NY.

Preferably the biodegradable abrasive cleaning particles obtained via grinding or milling operation are single particles, which have little remaining cell structure.

In one preferred example, the size of the biodegradable abrasive cleaning particles used in the present invention is altered during usage especially undergoing significant size reduction. Hence

the particle remain visible or tactile detectable in liquid composition and in the beginning of the usage process to provide effective cleaning. As the cleaning process progresses, the abrasive particles disperse or break into smaller particles and become invisible to an eye or tactile undetectable.

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Incidentally, it has surprisingly been found that the biodegradable abrasive cleaning particles of the present invention show a good cleaning performance even at relatively low levels, such as preferably from 0.1% to 20%, preferably from 0.3% to 10%, more preferably from 0.5% to 5%, even more preferably from 1.0% to 3.0%, by weight of the total composition of said

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biodegradable abrasive cleaning particles.

In a preferred embodiment the biodegradable abrasive cleaning particles are obtained from a foam by reducing (preferably by grinding or milling) the biodegradable foam into biodegradable abrasive cleaning particles. More preferably the biodegradable abrasive particles are obtained

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from foamed biodegradable polyurethane according to present invention.

The biodegradable abrasive cleaning particles used in the present invention can be white, transparent or colored by use of suitable dyes and/or pigments. Additionally suitable color stabilizing agents can be used to stabilize desired color. The abrasive particles are preferable

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color stable particles. By "color stable" it is meant herein that color of the particles used in the present invention will not turn yellow during storage and use.

In one preferred example, the biodegradable abrasive cleaning particles used in the present invention remain visible when liquid composition is stored into a bottle while during the effective cleaning process abrasive cleaning particles break into smaller particles and become

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invisible to an eye.

30 Hardness of the biodegradable abrasive particles:

Preferred biodegradable abrasive cleaning particles suitable for used herein are hard enough to provide good cleaning/cleansing performance, whilst providing a good surface safety profile.

The hardness of the biodegradable abrasive particles reduced from the foam can be modified by changing the raw material used to prepare the foam.

Preferred biodegradable abrasive cleaning particles in the present invention have hardness from
5 3 to 50 kg/mm², preferably from 4 to 25 kg/mm² and most preferably from 5 to 15 kg/mm² on the HV Vickers hardness

Vickers Hardness test method:

Vickers hardness HV is measured at 23 °C according to standard methods ISO 14577-1, ISO
10 14577-2, ISO 14577-3. The Vickers hardness is measured from a solid block of the raw material at least 2 mm in thickness. The Vickers hardness micro indentation measurement is carried out by using the Micro-Hardness Tester (MHT), manufactured by CSM Instruments SA, Peseux, Switzerland.

15 As per the ISO 14577 instructions, the test surface should be flat and smooth, having a roughness (Ra) value less than 5% of the maximum indenter penetration depth. For a 200 µm maximum depth this equates to a Ra value less than 10 µm. As per ISO 14577, such a surface may be prepared by any suitable means, which may include cutting the block of test material with a new sharp microtome or scalpel blade, grinding, polishing or by casting melted material onto a flat,
20 smooth casting form and allowing it to thoroughly solidify prior testing.

Suitable general settings for the Micro-Hardness Tester (MHT) are as follows:

Control mode: Displacement, Continuous

Maximum displacement: 200 µm

25 Approach speed: 20 nm/s

Zero point determination: at contact

Hold period to measure thermal drift at contact: 60s

Force application time: 30s

Frequency of data logging: at least every second

30 Hold time at maximum force: 30s

Force removal time: 30s

Shape / Material of indenter tip: Vickers Pyramid Shape / Diamond Tip

Alternatively, the biodegradable abrasive cleaning particles in the present invention hardness may also expressed accordingly to the MOHS hardness scale. Preferably, the MOHS hardness is comprised between 0.5 and 3.5 and most preferably between 1 and 3. The MOHS hardness scale is an internationally recognized scale for measuring the hardness of a compound versus a compound of known hardness, see Encyclopedia of Chemical Technology, Kirk-Othmer, 4th Edition Vol 1, page 18 or Lide, D.R (ed) CRC Handbook of Chemistry and Physics, 73rd edition, Boca Raton, Fla.: The Rubber Company, 1992-1993. Many MOHS Test kits are commercially available containing material with known MOHS hardness. For measurement and selection of biodegradable abrasive material with selected MOHS hardness, it is recommended to execute the MOHS hardness measurement with un-shaped particles e.g.: with spherical or granular forms of the biodegradable abrasive material since MOHS measurement of shape particles will provide erroneous results.

The applicant has found that by choosing the biodegradable abrasive cleaning particles according to 2 dimensional shape parameters as described herein, biodegradable abrasive cleaning particles having a mean circularity from 0.1 to 0.6 and Vickers hardness from 3 kg/mm² to 50 kg/mm² and preferably a mean solidity from 0.4 to 0.9 and/or a mean roughness from 0.1 to 0.3 will provide good cleaning effectiveness and surface safety.

Optional ingredients

The compositions according to the present invention may comprise a variety of optional ingredients depending on the technical benefit aimed for and the surface treated.

Suitable optional ingredients for use herein include chelating agents, surfactants, radical scavengers, perfumes, surface-modifying polymers, solvents, builders, buffers, bactericides, hydrotropes, colorants, stabilizers, bleaches, bleach activators, suds controlling agents like fatty acids, enzymes, soil suspenders, brighteners, anti dusting agents, dispersants, pigments, and dyes.

Suspending aid

The biodegradable abrasive cleaning particles present in the composition herein are solid particles in a liquid composition. Said biodegradable abrasive cleaning particles may be suspended in the liquid composition. However, it is well within the scope of the present invention that such biodegradable abrasive cleaning particles are not-stably suspended within the composition and either settle or float on top of the composition. In this case, a user may have to

temporally suspend the biodegradable abrasive cleaning particles by agitating (e.g., shaking or stirring) the composition prior to use.

However, it is preferred herein that the biodegradable abrasive cleaning particles are stably
5 suspended in the liquid compositions herein. Thus the compositions herein comprise a suspending aid.

The suspending aid herein may either be a compound specifically chosen to provide a suspension
of the biodegradable abrasive cleaning particles in the liquid compositions of the present
10 invention, such as a structurant, or a compound that also provides another function, such as a thickener or a surfactant (as described herein elsewhere).

Any suitable organic and inorganic suspending aids typically used as gelling, thickening or
suspending agents in cleaning/cleansing compositions and other detergent or cosmetic
15 compositions may be used herein. Indeed, suitable organic suspending aids include polysaccharide polymers. In addition or as an alternative, polycarboxylate polymer thickeners may be used herein. Also, in addition or as an alternative of the above, layered silicate platelets e.g.: Hectorite, bentonite or montmorillonites can also be used. Suitable commercially available layered silicates are Laponite RD® or Optigel CL® available from Rockwood Additives.

20 Suitable polycarboxylate polymer thickeners include (preferably lightly) crosslinked polyacrylate. A particularly suitable polycarboxylate polymer thickener is Carbopol commercially available from Lubrizol under the trade name Carbopol 674®.

25 Suitable polysaccharide polymers for use herein include substituted cellulose materials like carboxymethylcellulose, ethyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxymethyl cellulose, succinoglycan and naturally occurring polysaccharide polymers like Xanthan gum, gellan gum, guar gum, locust bean gum, tragacanth gum, succinoglucan gum, or derivatives thereof, or mixtures thereof. Xanthan gum is commercially available from Kelco
30 under the tradename Kelzan T.

Preferably the suspending aid herein is Xanthan gum. In an alternative embodiment, the suspending aid herein is a polycarboxylate polymer thickeners preferably a (preferably lightly) crosslinked polyacrylate. In a highly preferred embodiment herein, the liquid compositions

comprise a combination of a polysaccharide polymer or a mixture thereof, preferably Xanthan gum, with a polycarboxylate polymer or a mixture thereof, preferably a crosslinked polyacrylate.

As a preferred example, Xanthan gum is preferably present at levels between 0.1% to 5% by weight of the total composition, more preferably from 0.5% to 2%, even more preferably from 0.8% to 1.2%.

Organic Solvent

As an optional but highly preferred ingredient the composition herein comprises an organic solvents or mixtures thereof.

The compositions herein comprise from 0% to 30% by weight of the total composition of an organic solvent or a mixture thereof, more preferably 1.0% to 20% and most preferably, 2% to 15%.

Suitable solvents can be selected from the group consisting of: aliphatic alcohols, ethers and diethers having from 4 to 14 carbon atoms, preferably from 6 to 12 carbon atoms, and more preferably from 8 to 10 carbon atoms; glycols or alkoxylated glycols; glycol ethers; alkoxylated aromatic alcohols; aromatic alcohols; terpenes; and mixtures thereof. Aliphatic alcohols and glycol ether solvents are most preferred.

Aliphatic alcohols, of the formula $R-OH$ wherein R is a linear or branched, saturated or unsaturated alkyl group of from 1 to 20 carbon atoms, preferably from 2 to 15 and more preferably from 5 to 12, are suitable solvents. Suitable aliphatic alcohols are methanol, ethanol, propanol, isopropanol or mixtures thereof. Among aliphatic alcohols, ethanol and isopropanol are most preferred because of their high vapor pressure and tendency to leave no residue.

Suitable glycols to be used herein are according to the formula $HO-CR_1R_2-OH$ wherein R_1 and R_2 are independently H or a C_2-C_{10} saturated or unsaturated aliphatic hydrocarbon chain and/or cyclic. Suitable glycols to be used herein are dodecaneglycol and/or propanediol.

In one preferred embodiment, at least one glycol ether solvent is incorporated in the compositions of the present invention. Particularly preferred glycol ethers have a terminal C_3-C_6 hydrocarbon attached to from one to three ethylene glycol or propylene glycol moieties to

provide the appropriate degree of hydrophobicity and, preferably, surface activity. Examples of commercially available solvents based on ethylene glycol chemistry include mono-ethylene glycol n-hexyl ether (Hexyl Cellosolve®) available from Dow Chemical. Examples of commercially available solvents based on propylene glycol chemistry include the di-, and tri-
5 propylene glycol derivatives of propyl and butyl alcohol, which are available from Arco under the trade names Arcosolv® and Dowanol®.

In the context of the present invention, preferred solvents are selected from the group consisting of mono-propylene glycol mono-propyl ether, di-propylene glycol mono-propyl ether, mono-
10 propylene glycol mono-butyl ether, di-propylene glycol mono-propyl ether, di-propylene glycol mono-butyl ether; tri-propylene glycol mono-butyl ether; ethylene glycol mono-butyl ether; di-ethylene glycol mono-butyl ether, ethylene glycol mono-hexyl ether and di-ethylene glycol mono-hexyl ether, and mixtures thereof. "Butyl" includes normal butyl, isobutyl and tertiary butyl groups. Mono-propylene glycol and mono-propylene glycol mono-butyl ether are the most
15 preferred cleaning solvent and are available under the tradenames Dowanol DPnP® and Dowanol DPnB®. Di-propylene glycol mono-t-butyl ether is commercially available from Arco Chemical under the tradename Arcosolv PTB®.

In a particularly preferred embodiment, the cleaning solvent is purified so as to minimize
20 impurities. Such impurities include aldehydes, dimers, trimers, oligomers and other by-products. These have been found to deleteriously affect product odor, perfume solubility and end result. The inventors have also found that common commercial solvents, which contain low levels of aldehydes, can cause irreversible and irreparable yellowing of certain surfaces. By purifying the cleaning solvents so as to minimize or eliminate such impurities, surface damage is attenuated or
25 eliminated.

Though not preferred, terpenes can be used in the present invention. Suitable terpenes to be used herein monocyclic terpenes, dicyclic terpenes and/or acyclic terpenes. Suitable terpenes are: D-limonene; pinene; pine oil; terpinene; terpene derivatives as menthol, terpineol, geraniol, thymol;
30 and the citronella or citronellol types of ingredients.

Suitable alkoxyated aromatic alcohols to be used herein are according to the formula $R-(A)_n-OH$ wherein R is an alkyl substituted or non-alkyl substituted aryl group of from 1 to 20 carbon

atoms, preferably from 2 to 15 and more preferably from 2 to 10, wherein A is an alkoxy group preferably butoxy, propoxy and/or ethoxy, and n is an integer of from 1 to 5, preferably 1 to 2. Suitable alkoxyated aromatic alcohols are benzoxyethanol and/or benzoxypropanol.

- 5 Suitable aromatic alcohols to be used herein are according to the formula R-OH wherein R is an alkyl substituted or non-alkyl substituted aryl group of from 1 to 20 carbon atoms, preferably from 1 to 15 and more preferably from 1 to 10. For example a suitable aromatic alcohol to be used herein is benzyl alcohol.

10 Surfactants

The compositions herein may comprise a nonionic, anionic, zwitterionic, cationic and amphoteric surfactant or mixtures thereof. Suitable surfactants are those selected from the group consisting of nonionic, anionic, zwitterionic, cationic and amphoteric surfactants, having hydrophobic chains containing from 8 to 18 carbon atoms. Examples of suitable surfactants are described in McCutcheon's Vol. 1: Emulsifiers and Detergents, North American Ed.,
15 McCutcheon Division, MC Publishing Co., 2002.

Preferably, the composition herein comprises from 0.01% to 20% by weight of the total composition of a surfactant or a mixture thereof, more preferably from 0.5% to 10%, and most
20 preferably from 1% to 5%.

Non-ionic surfactants are highly preferred for use in the compositions of the present invention. Non-limiting examples of suitable non-ionic surfactants include alcohol alkoxyates, alkyl polysaccharides, amine oxides, block copolymers of ethylene oxide and propylene oxide, fluoro
25 surfactants and silicon based surfactants. Preferably, the aqueous compositions comprise from 0.01% to 20% by weight of the total composition of a non-ionic surfactant or a mixture thereof, more preferably from 0.5% to 10%, and most preferably from 1% to 5%.

A preferred class of non-ionic surfactants suitable for the present invention is alkyl ethoxylates. The alkyl ethoxylates of the present invention are either linear or branched, and contain from 8
30 carbon atoms to 16 carbon atoms in the hydrophobic tail, and from 3 ethylene oxide units to 25 ethylene oxide units in the hydrophilic head group. Examples of alkyl ethoxylates include Neodol 91-6[®], Neodol 91-8[®] supplied by the Shell Corporation (P.O. Box 2463, 1 Shell Plaza,

Houston, Texas), and Alfonic 810-60[®] supplied by Condea Corporation, (900 Threadneedle P.O. Box 19029, Houston, TX). More preferred alkyl ethoxylates comprise from 9 to 12 carbon atoms in the hydrophobic tail, and from 4 to 9 oxide units in the hydrophilic head group. A most preferred alkyl ethoxylate is C₉₋₁₁ EO₅, available from the Shell Chemical Company under the tradename Neodol 91-5[®]. Non-ionic ethoxylates can also be derived from branched alcohols. For example, alcohols can be made from branched olefin feedstocks such as propylene or butylene. In a preferred embodiment, the branched alcohol is either a 2-propyl-1-heptyl alcohol or 2-butyl-1-octyl alcohol. A desirable branched alcohol ethoxylate is 2-propyl-1-heptyl-EO7/AO7, manufactured and sold by BASF Corporation under the tradename Lutensol XP 79 /XL 79[®].

Another class of non-ionic surfactant suitable for the present invention is alkyl polysaccharides. Such surfactants are disclosed in U.S. Patent Nos. 4,565,647, 5,776,872, 5,883,062, and 5,906,973. Among alkyl polysaccharides, alkyl polyglycosides comprising five and/or six carbon sugar rings are preferred, those comprising six carbon sugar rings are more preferred, and those wherein the six carbon sugar ring is derived from glucose, i.e., alkyl polyglucosides ("APG"), are most preferred. The alkyl substituent in the APG chain length is preferably a saturated or unsaturated alkyl moiety containing from 8 to 16 carbon atoms, with an average chain length of 10 carbon atoms. C₈-C₁₆ alkyl polyglucosides are commercially available from several suppliers (e.g., Simusol[®] surfactants from Seppic Corporation, 75 Quai d'Orsay, 75321 Paris, Cedex 7, France, and Glucopon 220[®], Glucopon 225[®], Glucopon 425[®], Plantaren 2000 N[®], and Plantaren 2000 N UP[®], from Cognis Corporation, Postfach 13 01 64, D 40551, Dusseldorf, Germany).

Another class of non-ionic surfactant suitable for the present invention is amine oxide. Amine oxides, particularly those comprising from 10 carbon atoms to 16 carbon atoms in the hydrophobic tail, are beneficial because of their strong cleaning profile and effectiveness even at levels below 0.10%. Additionally C₁₀₋₁₆ amine oxides, especially C₁₂-C₁₄ amine oxides are excellent solubilizers of perfume. Alternative non-ionic detergent surfactants for use herein are alkoxyated alcohols generally comprising from 8 to 16 carbon atoms in the hydrophobic alkyl chain of the alcohol. Typical alkoxylation groups are propoxy groups or ethoxy groups in combination with propoxy groups, yielding alkyl ethoxy propoxylates. Such compounds are commercially available under the tradename Antarox[®] available from Rhodia (40 Rue de la

Haie-Coq F-93306, Aubervilliers Cédex, France) and under the tradename Nonidet® available from Shell Chemical.

The condensation products of ethylene oxide with a hydrophobic base formed by the
5 condensation of propylene oxide with propylene glycol are also suitable for use herein. The hydrophobic portion of these compounds will preferably have a molecular weight of from 1500 to 1800 and will exhibit water insolubility. The addition of polyoxyethylene moieties to this hydrophobic portion tends to increase the water solubility of the molecule as a whole, and the liquid character of the product is retained up to the point where the polyoxyethylene content is
10 about 50% of the total weight of the condensation product, which corresponds to condensation with up to 40 moles of ethylene oxide. Examples of compounds of this type include certain of the commercially available Pluronic® surfactants, marketed by BASF. Chemically, such surfactants have the structure $(EO)_x(PO)_y(EO)_z$ or $(PO)_x(EO)_y(PO)_z$ wherein x, y, and z are from 1 to 100, preferably 3 to 50. Pluronic® surfactants known to be good wetting surfactants are
15 more preferred. A description of the Pluronic® surfactants, and properties thereof, including wetting properties, can be found in the brochure entitled "BASF Performance Chemicals Plutonic® & Tetronic® Surfactants", available from BASF.

Other suitable though not preferred non-ionic surfactants include the polyethylene oxide
20 condensates of alkyl phenols, e.g., the condensation products of alkyl phenols having an alkyl group containing from 6 to 12 carbon atoms in either a straight chain or branched chain configuration, with ethylene oxide, the said ethylene oxide being present in amounts equal to 5 to 25 moles of ethylene oxide per mole of alkyl phenol. The alkyl substituent in such compounds can be derived from oligomerized propylene, diisobutylene, or from other sources of *iso*-octane
25 *n*-octane, *iso*-nonane or *n*-nonane. Other non-ionic surfactants that can be used include those derived from natural sources such as sugars and include C₈-C₁₆ N-alkyl glucose amide surfactants.

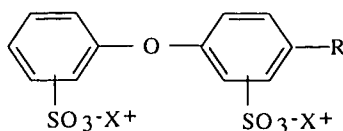
Suitable anionic surfactants for use herein are all those commonly known by those skilled in the
30 art. Preferably, the anionic surfactants for use herein include alkyl sulphonates, alkyl aryl sulphonates, alkyl sulphates, alkyl alkoxyated sulphates, C₆-C₂₀ alkyl alkoxyated linear or branched diphenyl oxide disulphonates, or mixtures thereof.

- Suitable alkyl sulphonates for use herein include water-soluble salts or acids of the formula RSO_3M wherein R is a $\text{C}_6\text{-C}_{20}$ linear or branched, saturated or unsaturated alkyl group, preferably a $\text{C}_8\text{-C}_{18}$ alkyl group and more preferably a $\text{C}_{10}\text{-C}_{16}$ alkyl group, and M is H or a cation, e.g., an alkali metal cation (e.g., sodium, potassium, lithium), or ammonium or substituted ammonium (e.g., methyl-, dimethyl-, and trimethyl ammonium cations and quaternary ammonium cations, such as tetramethyl-ammonium and dimethyl piperdinium cations and quaternary ammonium cations derived from alkylamines such as ethylamine, diethylamine, triethylamine, and mixtures thereof, and the like).
- 10 Suitable alkyl aryl sulphonates for use herein include water-soluble salts or acids of the formula RSO_3M wherein R is an aryl, preferably a benzyl, substituted by a $\text{C}_6\text{-C}_{20}$ linear or branched saturated or unsaturated alkyl group, preferably a $\text{C}_8\text{-C}_{18}$ alkyl group and more preferably a $\text{C}_{10}\text{-C}_{16}$ alkyl group, and M is H or a cation, e.g., an alkali metal cation (e.g., sodium, potassium, lithium, calcium, magnesium and the like) or ammonium or substituted ammonium (e.g., methyl-,
15 , dimethyl-, and trimethyl ammonium cations and quaternary ammonium cations, such as tetramethyl-ammonium and dimethyl piperdinium cations and quaternary ammonium cations derived from alkylamines such as ethylamine, diethylamine, triethylamine, and mixtures thereof, and the like).
- 20 An example of a $\text{C}_{14}\text{-C}_{16}$ alkyl sulphonate is Hostapur® SAS available from Hoechst. An example of commercially available alkyl aryl sulphonate is Lauryl aryl sulphonate from Su.Ma.. Particularly preferred alkyl aryl sulphonates are alkyl benzene sulphonates commercially available under trade name Nansa® available from Albright&Wilson.
- 25 Suitable alkyl sulphate surfactants for use herein are according to the formula $\text{R}_1\text{SO}_4\text{M}$ wherein R_1 represents a hydrocarbon group selected from the group consisting of straight or branched alkyl radicals containing from 6 to 20 carbon atoms and alkyl phenyl radicals containing from 6 to 18 carbon atoms in the alkyl group. M is H or a cation, e.g., an alkali metal cation (e.g., sodium, potassium, lithium, calcium, magnesium and the like) or ammonium or substituted
30 ammonium (e.g., methyl-, dimethyl-, and trimethyl ammonium cations and quaternary ammonium cations, such as tetramethyl-ammonium and dimethyl piperdinium cations and quaternary ammonium cations derived from alkylamines such as ethylamine, diethylamine, triethylamine, and mixtures thereof, and the like).

Particularly preferred branched alkyl sulphates to be used herein are those containing from 10 to 14 total carbon atoms like Isalchem 123 AS®. Isalchem 123 AS® commercially available from Enichem is a C₁₂₋₁₃ surfactant which is 94% branched. This material can be described as CH₃-
 5 (CH₂)_m-CH(CH₂OSO₃Na)-(CH₂)_n-CH₃ where n+m=8-9. Also preferred alkyl sulphates are the alkyl sulphates where the alkyl chain comprises a total of 12 carbon atoms, i.e., sodium 2-butyl octyl sulphate. Such alkyl sulphate is commercially available from Condea under the trade name Isofol® 12S. Particularly suitable linear alkyl sulphonates include C₁₂-C₁₆ paraffin sulphonate like Hostapur® SAS commercially available from Hoechst.

Suitable alkyl alkoxyated sulphate surfactants for use herein are according to the formula RO(A)_mSO₃M wherein R is an unsubstituted C₆-C₂₀ alkyl or hydroxyalkyl group having a C₆-C₂₀ alkyl component, preferably a C₁₂-C₂₀ alkyl or hydroxyalkyl, more preferably C₁₂-C₁₈ alkyl or hydroxyalkyl, A is an ethoxy or propoxy unit, m is greater than zero, typically between 0.5 and
 15 6, more preferably between 0.5 and 3, and M is H or a cation which can be, for example, a metal cation (e.g., sodium, potassium, lithium, calcium, magnesium, etc.), ammonium or substituted-ammonium cation. Alkyl ethoxylated sulfates as well as alkyl propoxylated sulfates are contemplated herein. Specific examples of substituted ammonium cations include methyl-, dimethyl-, trimethyl-ammonium and quaternary ammonium cations, such as tetramethyl-
 20 ammonium, dimethyl piperdinium and cations derived from alkanolamines such as ethylamine, diethylamine, triethylamine, mixtures thereof, and the like. Exemplary surfactants are C₁₂-C₁₈ alkyl polyethoxylate (1.0) sulfate (C₁₂-C₁₈E(1.0)SM), C₁₂-C₁₈ alkyl polyethoxylate (2.25) sulfate (C₁₂-C₁₈E(2.25)SM), C₁₂-C₁₈ alkyl polyethoxylate (3.0) sulfate (C₁₂-C₁₈E(3.0)SM), C₁₂-C₁₈ alkyl polyethoxylate (4.0) sulfate (C₁₂-C₁₈E (4.0)SM), wherein M is conveniently selected from
 25 sodium and potassium.

Suitable C₆-C₂₀ alkyl alkoxyated linear or branched diphenyl oxide disulphonate surfactants for use herein are according to the following formula:



wherein R is a C₆-C₂₀ linear or branched, saturated or unsaturated alkyl group, preferably a C₁₂-C₁₈ alkyl group and more preferably a C₁₄-C₁₆ alkyl group, and X⁺ is H or a cation, e.g., an alkali metal cation (e.g., sodium, potassium, lithium, calcium, magnesium and the like). Particularly suitable C₆-C₂₀ alkyl alkoxyated linear or branched diphenyl oxide disulphonate
5 surfactants to be used herein are the C₁₂ branched di phenyl oxide disulphonic acid and C₁₆ linear diphenyl oxide disulphonate sodium salt respectively commercially available by DOW under the trade name Dowfax 2A1® and Dowfax 8390®.

Other anionic surfactants useful herein include salts (including, for example, sodium, potassium,
10 ammonium, and substituted ammonium salts such as mono-, di- and triethanolamine salts) of soap, C₈-C₂₄ olefinsulfonates, sulphonated polycarboxylic acids prepared by sulphonation of the pyrolyzed product of alkaline earth metal citrates, e.g., as described in British patent specification No. 1,082,179, C₈-C₂₄ alkylpolyglycoethersulfates (containing up to 10 moles of ethylene oxide); alkyl ester sulfonates such as C₁₄-C₁₆ methyl ester sulfonates; acyl glycerol
15 sulfonates, fatty oleyl glycerol sulfates, alkyl phenol ethylene oxide ether sulfates, alkyl phosphates, isethionates such as the acyl isethionates, N-acyl taurates, alkyl succinamates and sulfosuccinates, monoesters of sulfosuccinate (especially saturated and unsaturated C₁₂-C₁₈ monoesters) diesters of sulfosuccinate (especially saturated and unsaturated C₆-C₁₄ diesters), acyl sarcosinates, sulfates of alkylpolysaccharides such as the sulfates of alkylpolyglucoside (the
20 nonionic nonsulfated compounds being described below), alkyl polyethoxy carboxylates such as those of the formula RO(CH₂CH₂O)_kCH₂COO⁻M⁺ wherein R is a C₈-C₂₂ alkyl, k is an integer from 0 to 10, and M is a soluble salt-forming cation. Resin acids and hydrogenated resin acids are also suitable, such as rosin, hydrogenated rosin, and resin acids and hydrogenated resin acids present in or derived from tall oil. Further examples are given in "Surface Active Agents and
25 Detergents" (Vol. I and II by Schwartz, Perry and Berch). A variety of such surfactants are also generally disclosed in U.S. Patent 3,929,678, issued December 30, 1975 to Laughlin, et al. at Column 23, line 58 through Column 29, line 23.

Zwitterionic surfactants represent another class of preferred surfactants within the context of the
30 present invention.

Zwitterionic surfactants contain both cationic and anionic groups on the same molecule over a wide pH range. The typical cationic group is a quaternary ammonium group, although other

positively charged groups like sulfonium and phosphonium groups can also be used. The typical anionic groups are carboxylates and sulfonates, preferably sulfonates, although other groups like sulfates, phosphates and the like, can be used. Some common examples of these detergents are described in the patent literature: U.S. Patent Nos. 2,082,275, 2,702,279 and 2,255,082.

5

A specific example of a zwitterionic surfactant is 3-(N-dodecyl-N,N-dimethyl)-2-hydroxypropane-1-sulfonate (Lauryl hydroxyl sultaine) available from the McIntyre Company (24601 Governors Highway, University Park, Illinois 60466, USA) under the tradename Mackam LHS®. Another specific zwitterionic surfactant is C₁₂₋₁₄ acylamidopropylene (hydroxypropylene) sulfobetaine that is available from McIntyre under the tradename Mackam 50-SB®. Other very useful zwitterionic surfactants include hydrocarbyl, e.g., fatty alkylene betaines. A highly preferred zwitterionic surfactant is Empigen BB®, a coco dimethyl betaine produced by Albright & Wilson. Another equally preferred zwitterionic surfactant is Mackam 35HP®, a coco amido propyl betaine produced by McIntyre.

15

Another class of preferred surfactants comprises the group consisting of amphoteric surfactants. One suitable amphoteric surfactant is a C₈-C₁₆ amido alkylene glycinate surfactant ('ampho glycinate'). Another suitable amphoteric surfactant is a C₈-C₁₆ amido alkylene propionate surfactant ('ampho propionate'). Other suitable, amphoteric surfactants are represented by surfactants such as dodecylbeta-alanine, N-alkyltaurines such as the one prepared by reacting dodecylamine with sodium isethionate according to the teaching of U.S. Patent No. 2,658,072, N-higher alkylaspartic acids such as those produced according to the teaching of U.S. Patent No. 2,438,091, and the products sold under the trade name "Miranol®", and described in U.S. Patent No. 2,528,378.

25

Chelating agents

One class of optional compounds for use herein includes chelating agents or mixtures thereof. Chelating agents can be incorporated in the compositions herein in amounts ranging from 0.0% to 10.0% by weight of the total composition, preferably from 0.01% to 5.0%.

30

Suitable phosphonate chelating agents for use herein may include alkali metal ethane 1-hydroxy diphosphonates (HEDP), alkylene poly (alkylene phosphonate), as well as amino phosphonate compounds, including amino aminotri(methylene phosphonic acid) (ATMP), nitrilo trimethylene phosphonates (NTP), ethylene diamine tetra methylene phosphonates, and diethylene triamine

penta methylene phosphonates (DTPMP). The phosphonate compounds may be present either in their acid form or as salts of different cations on some or all of their acid functionalities. Preferred phosphonate chelating agents to be used herein are diethylene triamine penta methylene phosphonate (DTPMP) and ethane 1-hydroxy diphosphonate (HEDP). Such phosphonate chelating agents are commercially available from Monsanto under the trade name DEQUEST®.

Polyfunctionally-substituted aromatic chelating agents may also be useful in the compositions herein. See U.S. patent 3,812,044, issued May 21, 1974, to Connor et al. Preferred compounds of this type in acid form are dihydroxydisulfobenzenes such as 1,2-dihydroxy -3,5-disulfobenzene.

A preferred biodegradable chelating agent for use herein is ethylene diamine N,N'- disuccinic acid, or alkali metal, or alkaline earth, ammonium or substitutes ammonium salts thereof or mixtures thereof. Ethylenediamine N,N'- disuccinic acids, especially the (S,S) isomer have been extensively described in US patent 4, 704, 233, November 3, 1987, to Hartman and Perkins. Ethylenediamine N,N'- disuccinic acids is, for instance, commercially available under the tradename ssEDDS® from Palmer Research Laboratories.

Suitable amino carboxylates for use herein include ethylene diamine tetra acetates, diethylene triamine pentaacetates, diethylene triamine pentaacetate (DTPA), N-hydroxyethylethylenediamine triacetates, nitrilotri-acetates, ethylenediamine tetrapropionates, triethylenetetraaminehexa-acetates, ethanol-diglycines, propylene diamine tetracetic acid (PDTA) and methyl glycine di-acetic acid (MGDA), both in their acid form, or in their alkali metal, ammonium, and substituted ammonium salt forms. Particularly suitable amino carboxylates to be used herein are diethylene triamine penta acetic acid, propylene diamine tetracetic acid (PDTA) which is, for instance, commercially available from BASF under the trade name Trilon FS® and methyl glycine di-acetic acid (MGDA).

Further carboxylate chelating agents for use herein include salicylic acid, aspartic acid, glutamic acid, glycine, malonic acid or mixtures thereof.

Radical scavenger

The compositions of the present invention may further comprise a radical scavenger or a mixture thereof.

Suitable radical scavengers for use herein include the well-known substituted mono and dihydroxy benzenes and their analogs, alkyl and aryl carboxylates and mixtures thereof. Preferred such radical scavengers for use herein include di-tert-butyl hydroxy toluene (BHT), hydroquinone, di-tert-butyl hydroquinone, mono-tert-butyl hydroquinone, tert-butyl-hydroxy anisole, benzoic acid, toluic acid, catechol, t-butyl catechol, benzylamine, 1,1,3-tris(2-methyl-4-hydroxy-5-tert-butylphenyl) butane, n-propyl-gallate or mixtures thereof and highly preferred is di-tert-butyl hydroxy toluene. Such radical scavengers like N-propyl-gallate may be commercially available from Nipa Laboratories under the trade name Nipanox S1®.

Radical scavengers, when used, may be typically present herein in amounts up to 10% by weight of the total composition and preferably from 0.001% to 0.5% by weight. The presence of radical scavengers may contribute to the chemical stability of the compositions of the present invention.

Perfume

Suitable perfume compounds and compositions for use herein are for example those described in EP-A-0 957 156 under the paragraph entitled "Perfume", on page 13. The compositions herein may comprise a perfume ingredient, or mixtures thereof, in amounts up to 5.0% by weight of the total composition, preferably in amounts of from 0.1% to 1.5%.

Dye

The liquid compositions according to the present invention may be coloured. Accordingly, they may comprise a dye or a mixture thereof.

Delivery form of the compositions

The compositions herein may be packaged in a variety of suitable packaging known to those skilled in the art, such as plastic bottles for pouring liquid compositions, squeeze bottles or bottles equipped with a trigger sprayer for spraying liquid compositions. Alternatively, the paste-like compositions according to the present invention may be packed in a tube.

In an alternative embodiment herein, the liquid composition herein is impregnated onto a substrate; preferably the substrate is in the form of a flexible, thin sheet or a block of material, such as a sponge.

- 5 Suitable substrates are woven or non-woven sheets, cellulosic material based sheets, sponge or foam with open cell structures e.g.: polyurethane foams, cellulosic foam, melamine foam, etc.

The process of cleaning a surface

- 10 The present invention encompasses a process of cleaning and/or cleansing a surface with a liquid composition according to the present invention. Suitable surfaces herein are described herein above under the heading "The liquid cleaning/cleansing composition".

In a preferred embodiment said surface is contacted with the composition according to the present invention, preferably wherein said composition is applied onto said surface.

15

In another preferred embodiment, the process herein comprises the steps of dispensing (e.g., by spraying, pouring, squeezing) the liquid composition according to the present invention from a container containing said liquid composition and thereafter cleaning and/or cleansing said surface.

20

The composition herein may be in its neat form or in its diluted form.

- 25 By "in its neat form", it is to be understood that said liquid composition is applied directly onto the surface to be treated without undergoing any dilution, i.e., the liquid composition herein is applied onto the surface as described herein.

- 30 By "diluted form", it is meant herein that said liquid composition is diluted by the user typically with water. The liquid composition is diluted prior to use to a typical dilution level of up to 10 times its weight of water. A usually recommended dilution level is a 10% dilution of the composition in water.

The composition herein may be applied using an appropriate implement, such as a mop, paper towel, brush (e.g., a toothbrush) or a cloth, soaked in the diluted or neat composition herein. Furthermore, once applied onto said surface said composition may be agitated over said surface

using an appropriate implement. Indeed, said surface may be wiped using a mop, paper towel, brush or a cloth.

The process herein may additionally contain a rinsing step, preferably after the application of said composition. By “rinsing”, it is meant herein contacting the surface cleaned/cleansed with the process according to the present invention with substantial quantities of appropriate solvent, typically water, directly after the step of applying the liquid composition herein onto said surface. By “substantial quantities”, it is meant herein between 0.01 lt. and 1 lt. of water per m² of surface, more preferably between 0.1 lt. and 1 lt. of water per m² of surface.

10

Preferred embodiment herein, process of cleaning/cleansing is a process of cleaning household hard surfaces with a liquid composition according to present invention.

Examples

These following compositions were made comprising the listed ingredients in the listed proportions (weight %). Examples 1-43 herein are met to exemplify the present invention but are not necessarily used to limit or otherwise define the scope of the present invention.

Abrasive particle used in the examples below were ground from rigid polyurethane foam (controlled foam structure e.g.: foam density, cell size, strut aspect ratio and % closed cell content). Polyurethane foam is synthesized from reaction of a diisocyanate (e.g.: base on polymeric methylene diphenyl diisocyanate and methylene diphenyl diisocyanate e.g.: iso/126/1(>65% MDI content)) or Lupranate M20S (MDI >50%) and biodegradable polyols (e.g.: polyether or polyester-based polyol e.g.: Lupranol 3423, pluronic). Wherein the diisocyanate is for example Lupranate M200R from BASF and the polyol is for example Lupranol 3423 from BASF. Foam were ground into small particles and sieved using a rotary mill and particle selection was done with used of air jet sieving instrument from Retsch.

30

Hard surface cleaner Bathroom composition:

% Weight	1	2	3
C9-C11 EO8 (Neodol 91-8®)	3	2.5	3.5
Alkyl Benzene sulfonate		1	

C12-14-dimethyl Aminoxide		1	
n-Butoxy Propoxy Propanol		2	2.5
Hydrogene Peroxide	3		
Hydrophobic ethoxylated polyurethane (Acusol 882®)	1.5	1	0.8
Lactic Acid	3		3.5
Citric Acid		3	0.5
Polysaccharide (Xanthan Gum, Keltrol CG-SFT® Kelco)	0.25	0.25	0.25
Perfume	0.35	0.35	0.35
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	1	1	1
Water	Balance	Balance	Balance

Hard surface cleaner Bathroom composition (cont.):

% Weight	4	5	6
Chloridric acid	2		
Linear C10 alkyl sulphate	1.3	2	3
n-Butoxy Propoxy Propanol	2		1.75
Citric Acid		3	3
PolyvinylPyrrolidone (Luviskol K60®)	0.1	0.1	0.1
NaOH		0.2	0.2
Perfume	0.4	0.4	0.4
Polysaccharide (Xanthan Gum Kelzan T®, Kelco)	0.3	0.35	0.35
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	2	2	2
Water	Balance	Balance	Balance

Hand-dishwashing detergent compositions:

% Weight	7	8	9
N-2-ethylhexyl sulfocuccinamate	3	3	3
C11EO5	7	14	
C11-EO7			7
C10-EO7	7		7
Trisodium Citrate	1	1	1
Potassium Carbonate	0.2	0.2	0.2
Perfume	1	1	1
Polysaccharide (Xanthan Gum Kelzan T®, Kelco)	0.35	0.35	0.35
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	2	2	2
Water (+ minor e.g.; pH adjusted to 10.5)	Balance	Balance	Balance

General degreaser composition:

% Weight	10	11
C9-C11 EO8 (Neodol 91-8®)	3	3
N-Butoxy Propoxy Propanol	15	15
Ethanol	10	5
Isopropanol		10
Polysaccharide (Xanthan Gum-glyoxal modified Optixan-T)	0.35	0.35
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	1	1
Water (+ minor e.g.; pH adjusted to alkaline pH)	Balance	Balance

Scouring composition:

% Weight	12	13	14
Sodium C13-16 prafin sulfonate	2.5	2.5	2.5
C12-14-EO7 (Lutensol AO7®)	0.5	0.5	0.5
Coconut Fatty Acid	0.3	0.3	0.3
Sodium Citrate	3.3	3.3	3.3
Sodium Carbonate	3	3	3
Orange terpenes	2.1	2.1	2.1
Benzyl Alcohol	1.5	1.5	
Polyacrylic acid 1.5Mw	0.75	0.75	0.75
Diatomaceous earth (Celite 499® median size 10 μ m)	25		
Calcium Carbonate (Merk 2066® median size 10 μ m)		25	
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	5	5	5
Water	Balance	Balance	Balance

Liquid glass cleaner:

% Weight	15	16
Butoxypropanol	2	4
Ethanol	3	6
C12-14 sodium sulphate	0.24	
NaOH/Citric acid	To pH 10	
Citric Acid		
Abrasive particles made from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	0.5	0.5
Water (+ minor)	Balance	Balance

5

Cleaning wipe (Body cleansing wipe):

% Weight	17	18	19
C10 Amine Oxide	-	0.02	-

C12,14 Amine Oxide	0.4	-	-
Betaine (Rewoteric AM CAS 15 U)	-	-	0.2
C9,11 A5EO (Neodol E 91.5®)	-	0.1	-
C9,11 A8EO (Neodol E 91.8®)	-	-	0.8
C12,14 A5EO	0.125	-	-
2-Ethyl Hexyl Sulphate	-	0.05	0.6
Silicone	0.001	0.003	0.003
EtOH	9.4	8.0	9.5
Propylene Glycol Butyl Ether	0.55	1.2	-
Geraniol	-	-	0.1
Citric acid	1.5	-	-
Lactic acid	-	-	1.5
Perfume	0.25	0.15	0.15
Abrasive particles made from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	0.5gram/m ²	1gram/m ²	3gram/m ²
Nonwoven : Spunlace 100% viscose 50gsm (lotion loading fact)			(x3.5)
Nonwoven : Airlaid walkisoft (70% cellulose, 12% Viscose, 18% binder) 80gsm (lotion loading factor)		(x3.5)	
Carded thermobonded (70% polypropylene, 30% rayon), 70gsm (Lotion loading factor)	(x3.5)		

Cleaning wipe (Body cleansing wipe):

% Weight	20
Benzalkonium Chloride (Alkaquat DMB-451®)	0.1
Cocamine Oxide (C10/C16 alkyl dimethyl amine oxide; AO-1214 LP supplied by Procter & Gamble Co.)	0.5
Pyroglutamic Acid (pidolidone) (2-pyrrolidone-5 carboxylic acid)	4
Ethanol-denatured 200 proof (SD alcohol 40®)	10
DC Antiform H-10 (dimethicone)	0.03
Sodium Benzoate	0.2
Tetrasodium EDTA (Hampene 220®)	0.1
Sodium Chloride	0.4
Perfume	0.01
Abrasive particles made from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	2
Water and minors	balance

- The above wipes lotion composition is loaded onto a water-insoluble substrate, being a patterned hydroentangled non-woven substrate having a basis weight of 56 grams per square meter comprising 70% polyester and 30% rayon approximately 6.5 inches wide by 7.5 inches long with a caliper of about 0.80 mm. Optionally, the substrate can be pre-coated with dimethicone (Dow

Corning 200 Fluid 5cst) using conventional substrate coating techniques. Lotion to wipe weight ratio of about 2:1 using conventional substrate coating techniques.

Oral care composition (toothpaste):

% Weight	20	21
Sorbitol (70% sol.)	24.2	24.2
Glycerin	7	7
Carboxymethylcellulose	0.5	0.5
PEG-6	4	4
Sodium Fluoride	0.24	0.24
Sodium Saccharine	0.13	0.13
Mono Sodium phosphate	0.41	0.41
Tri Sodium phosphate	0.39	0.39
Sodium Tartrate	1	1
TiO ₂	0.5	0.5
Silica	35	
Sodium lauroyl sarcosinate (95% active)	1	1
Flavor	0.8	0.8
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	2	5
Water	Balance	Balance

5

Body Cleansing composition:

% Weight	22	23
Cocoamidopropyl betaine	5.15	5.15
Sodium Laureth sulfate	5.8	5.8
Sodium Lauroyl sarcosinate	0.5	0.5
Polyquaternium 10	0.1	0.1
C12-14 fatty alcohol	0.45	0.45
Zinc Stearate	1.5	1.5
Glycol DiStearate	0.25	0.25
Sodium lauryl sulfate	0.53	0.53
Cocamidopropyl betaine	0.17	0.17
Lauramide Diethanolamide	0.48	0.48
Sodium sulfate	0.05	0.05
Citric Acid	0.05	0.05
DMDM hydantoin (1,3-Dimethylol-5,5-dimethylhydantoin Glydant)	0.2	0.2
Tetra Sodium EDTA	0.1	0.1
Fragrance	0.5	0.5
Polysaccharide (Xanthan Gum-glyoxal modified Optixan-T)	0.2	0.2
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives :	2	1

Iso126/1 (25%), Starch (60%, PSD<10µm), Lupranol 3423 (15%))		
Water and minors		1
Water	Balance	Balance

Facial Cleansing Compositions

Ingredients	24	25	26	27
Acrylates Copolymer ¹	1.50	2.0	1.25	--
Acrylates/C ₁₀₋₃₀ alkyl acrylate crosspolymer ²	--	--	--	1.0
Sodium Lauryl Sulfate	2.0	--	--	--
Sodium Laureth Sulfate	8.0	--	--	--
Ammonium Lauryl Sulfate	--	6.0	--	--
Sodium Trideceth Sulfate	--	--	3.0	2.5
Sodium Myristoyl Sarcosinate	--	2.0	3.0	2.5
Sodium Lauroamphoacetate ³	--	--	6.0	5.0
Sodium Hydroxide*	pH >6	--	--	--
Triethanolamine*	--	pH >6	--	pH 5.2
Cocamidopropyl Betaine	4.0	7.0	--	--
Glycerin	4.0	5.0	2.0	2.0
Sorbitol	--	--	2.0	2.0
Salicylic Acid	--	--	2.0	2.0
Fragrance	0.1	0.1	0.1	0.1
Preservative	0.3	0.3	0.15	0.15
Abrasive particles obtained from polyurethane foam (± 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10µm), Lupranol 3423 (15%))	1.0	1.0	2.0	2.0
PEG 120 Methyl Glucose Trioleate ⁴	0.5	--	0.25	0.25
PEG 150 Pentaerythrityl Tetrastearate ⁵	--	0.40	--	--
Citric Acid**	pH 5.5	pH 5.5	pH 5.5	pH 5.5
Water	QS to 100%	QS to 100%	QS to 100%	QS to 100%

* per the supplier use directions, the base is used to activate the acrylates copolymer

** acid can be added to adjust the formula to a lower pH

- 5
1. Carbopol Aqua SF-1[®] from Noveon[™], Inc.
 2. Carbopol Ultrez 21[®] from Noveon[™], Inc.
 3. Miranol[®] Ultra L32 from Rhodia
 4. Glucamate LT[®] from Chemron
 5. Crothix[®] from Croda

Examples 24 to 27 are made the following way:

Add Carbopol® to de-ionized free water of the formulation. Add all surfactants except cationics and betaines. If the pH is less than 6 then add a neutralizing agent (typically a base i.e., Triethanolamine, sodium hydroxide) to adjust to a pH greater than 6. If necessary, apply gentle heat to reduce viscosity and help minimize air entrapment. Add betaine and/or cationic surfactants. Add conditioning agents, additional rheology modifiers, pearlizing agents, encapsulated materials, exfoliants, preservatives, dyes, fragrances, abrasive particles and other desirable ingredients. Lastly, if desired reduce the pH with an acid (i.e. citric acid) and increase viscosity by adding sodium chloride.

10 Oral care composition (toothpaste)

	28	29	30	31	32
Sodium Gluconate	1.064	1.064	1.064	1.064	0.600
Stannous fluoride	0.454	0.454	0.454	0.454	0.454
Sodium fluoride					
Sodium monofluorophosphate					
Zinc Lactate	0.670	0.670	0.670	0.670	2.500
Glycerin	-	-	-	-	36.000
Polyethylene glycol 300					7.000
Propylene Glycol					7.000
Sorbitol(LRS) USP	39.612	39.612	39.612	39.612	-
Sodium lauryl sulfate solution (28%)	5.000	5.000	5.000	5.000	3.500
Abrasive particles obtained from polyurethane foam ($\pm 2\%$ excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	10.000	10.000	1.000	5.000	5.000
Zeodent 119	-	-	-	-	-
Zeodent 109			10.000	10.000	10.000
Hydrogen peroxide (35% soln)					
Sodium hexametaphosphate	-	-	-	-	13.000
Gantrez		2.000	2.000	2.000	-
Natural CaCO ₃ -600M	-	-	-	-	-
Sodium phosphate (mono basic)	-	-	-	-	-
Sodium phosphate (Tri basic)	-	-	-	-	1.000
Zeodent 165	-	-	-	-	-
Cocoamidopropyl Betaine (30% Soln)	-	-	-	-	-
Cetyl Alcohol	3.000	-	-	-	-

Stearyl Alcohol	3.000	-	-	-	-
Hydroxyethyl cellulose (HEC Natrasol 250M)	-	0.500	0.500	0.500	-
CMC 7M8SF	-	1.300	1.300	1.300	-
Xanthan Gum	-	-	-	-	0.250
Poloxamer 407	-	-	-	-	-
Carrageenan mixture	-	0.700	0.700	0.700	0.600
Titanium dioxide	-	-	-	-	-
Saccharin Sodium	0.500	0.500	0.500	0.500	0.500
Flavor	1.000	1.000	1.000	1.000	1.000
Water	QS	QS	QS	QS	QS

Zeodent 119, 109 and 165 are precipitated silica materials sold by the J. M. Huber Corporation.

Gantrez is a copolymer of maleic anhydride or acid and methyl vinyl ether.

CMC 7M8SF is a sodium carboxymethylcellulose.

Poloxamer is a difunctional block-polymer terminating in primary hydroxyl groups.

	33	34	35	36	37
Sodium Gluconate	-	-	-	-	-
Stannous fluoride	-	-	-	-	-
Sodium fluoride	-	0.243	0.243	0.243	-
Sodium monofluorophosphate	1.10				-
Zinc Lactate	-	-	-	-	-
Glycerin	-	-	-	-	40.000
Polyethylene glycol 300	-	-	-	-	-
Propylene Glycol					
Sorbitol(LRS) USP	24.000	42.500	42.500	42.500	30.000
Sodium lauryl sulfate solution (28%)	4.000	4.000	-	4.000	-
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	5.000	10.000	10.000	5.000	15.000
Zeodent 119	-	-	-	10.000	-
Zeodent 109					
Hydrogen peroxide (35% soln)					
Sodium hexametaphosphate	-	-	-	-	-
Gantrez					
Natural CaCO ₃ -600M	35.00	-	-	-	-
Sodium phosphate (mono basic)	0.10	0.420	0.420	0.420	0.420
Sodium phosphate (Tri basic)	0.40	1.100	1.100	1.100	1.100
Zeodent 165	2.00	-	-	-	2.000

Cocoamidopropyl Betaine (30% Soln)	-	-	5.000	-	-
Cetyl Alcohol	0.000	-	-	-	-
Stearyl Alcohol	0.000	-	-	-	-
Hydroxyethyl cellulose (HEC Natrasol 250M)	-	0.500	0.500	0.500	-
CMC 7M8SF	1.300	1.300	1.300	1.300	1.300
Xanthan Gum	-	-	-	-	-
Poloxamer 407	-	-	-	-	-
Carrageenan mixture	-	0.700	0.700	0.700	-
Titanium dioxide	-	-	-	-	-
Saccharin Sodium	0.250	0.500	0.500	0.500	0.500
Flavor	1.000	1.000	1.000	1.000	1.000
Water	QS	QS	QS	QS	QS

	38	39	40
Sodium Gluconate	-	-	1.500
Stannous fluoride	-	-	0.454
Sodium fluoride	-	-	-
Sodium monofluorophosphate	-	-	-
Zinc Lactate	-	-	-
Glycerin	40.000	10.000	25.000
Polyethylene glycol 300	3.000	-	-
Propylene Glycol	-	-	-
Sorbitol(LRS) USP	-	39.612	-
Sodium lauryl sulfate solution (28%)	5.000	4.000	4.000
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	15.000	5.000	5.000
Zeodent 119	-	-	-
Zeodent 109			
Hydrogen peroxide (35% soln)	-	8.570	8.570
Sodium hexametaphosphate	14.000	-	-
Gantrez	-	-	-
Natural CaCO ₃ -600M	-	-	-
Sodium phosphate (mono basic)	0.420	-	-
Sodium phosphate (Tri basic)	1.100	-	-
Zeodent 165	2.000	-	-
Cocoamidopropyl Betaine (30% Soln)	-	-	-
Cetyl Alcohol	-	3.000	-

Stearyl Alcohol	-	3.000	-
Hydroxyethyl cellulose (HEC Natrasol 250M)	-	-	-
CMC 7M8SF	1.000	-	-
Xanthan Gum	0.300	-	-
Poloxamer 407	0.500	-	18.000
Carrageenan mixture	-	-	-
Titanium dioxide	0.500	-	-
Saccharin Sodium	0.500	0.500	0.500
Flavor	1.000	1.000	1.000
Water	QS	QS	QS

Hair Shampoo

	41	42	43
Water	q.s.	q.s.	q.s.
Polyquaterium 76 ¹	0.25	--	-
Guar, Hydroxylpropyl Trimonium Chloride ²	--	0.25	--
Polyquaterium 6 ³	-	-	0.25
Sodium Laureth Sulfate	12	10.5	10.5
Sodium Lauryl Sulfate		1.5	1.5
Silicone ⁴	0.75	1.00	0.5
Cocoamidopropyl Betaine	3.33	3.33	3.33
Cocoamide MEA	1.0	1.0	1.0
Ethylene Glycol Distearate	1.50	1.50	1.50
Abrasive particles obtained from polyurethane foam (\pm 2% excluding catalyst / other polyurethane additives : Iso126/1 (25%), Starch (60%, PSD<10 μ m), Lupranol 3423 (15%))	1		2
Crosslinked PS-DVB (50% DVB 55, mean diameter D(v,0.9) 75 μ m) abrasive cleaning particles		1	
Fragrance	0.70	0.70	0.70
Preservatives, pH & Visc. adjusters	Up to 1%	Up to 1%	Up to 1%

- 1 Copolymer of Acrylamide(AM) and TRIQUAT, MW=1,000,000; CD= 1.6 meq./gram; Rhodia
- 2 Jaguar C500, MW – 500,000, CD=0.7, Rhodia
- 3 Mirapol 100S, 31.5% active, Rhodia
- 4 Dimethicone Fluid, Viscasil 330M; 30 micron particle size; Momentive Silicones

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is

intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm”.

CLAIMS

What is claimed is:

1. A liquid cleaning and/or cleansing composition comprising biodegradable abrasive cleaning particles, wherein said biodegradable abrasive cleaning particles comprise biodegradable polyurethane comprising an isocyanate monomer or mixtures thereof and a biodegradable polyol selected from the group consisting of : saccharides; oligosaccharides; glycosides; and carbohydrates; and mixtures thereof; and wherein said biodegradable polyurethane comprise isocyanate monomers from 10% to 35% by weight of said biodegradable polyurethane; and wherein said biodegradable polyurethane has a biodegradable rate above 50% according to OECD301 C.
2. A liquid cleaning and/or cleansing composition according to claim 1, wherein said biodegradable polyurethane comprises biodegradable polyol from 40% to 90% by weight of said biodegradable polyurethane, preferably from 50% to 90%, more preferably from 60% to 90%; and wherein the degradation rate of said biodegradable polyol is above 60%, and more preferably above 80% according to OECD301 C.
3. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said biodegradable polyurethane comprises isocyanate preferably from 15% to 30% by weight of the said biodegradable polyurethane, and more preferably from 20% to 25%; wherein the biodegradation rate of said isocyanate is above 50%, and more preferably above 60% according to OECD301 C.
4. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said isocyanate monomer is aromatic isocyanate monomer selected from the group consisting of toluene diisocyanate (TDI), methylene dianiline diisocyanate (MDI), xylene diisocyanate, triphenylmethane triisocyanate, polymeric forms of MDI, polymeric form of TDI, and mixtures thereof, more preferably aromatic isocyanate monomer selected from the group consisting of MDI and polymeric form of MDI, most preferably said isocyanate monomer is methylene dianiline diisocyanate (MDI).
5. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said biodegradable polyol is preferably selected from the group consisting of saccharides, oligosaccharides and glycosides having melting point above 60 °C.

6. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said biodegradable polyol is preferably selected from the group consisting of sucrose, glucose, starch and mixtures thereof.
7. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said biodegradable abrasive cleaning particles have a mean circularity from 0.1 to 0.6, preferably from 0.15 to 0.4 and more preferably from 0.2 to 0.35 and wherein the circularity is measured according to ISO 9276-6, and mean solidity from 0.4 to 0.9, preferably from 0.5 to 0.8 and more preferably from 0.55 to 0.65, wherein mean solidity is measured according to ISO 9276-6.
8. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said biodegradable abrasive cleaning particles are obtained from biodegradable polyurethane foam.
9. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said composition comprises said biodegradable polyurethane particles from 0.1%, to 20% by weight of the composition, preferably from 0.3% to 10%, more preferably from 0.5% to 5% and most preferably from 0.5% to 3%.
10. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said biodegradable abrasive cleaning particles have a HV Vickers hardness from 3 to 50 kg/mm², preferably from 4 to 25 kg/mm² and more preferably from 5 to 15 kg/mm², wherein the Vickers hardness is measured according to method disclosed herein.
11. A liquid cleaning and/or cleansing composition according to any of the preceding claims, wherein said biodegradable abrasive cleaning particles have a mean particle size as expressed by the area-equivalent diameter from 10 to 1000 µm, preferably from 50 to 500 µm and more preferably from 100 to 350 µm and most preferably from 150 to 250 µm according to ISO 9276-6.
12. A liquid cleaning and/or cleansing composition according any of the preceding claims, wherein the cleaning composition is loaded on a cleaning substrate wherein the substrate is a paper or nonwoven towel or wipe or a sponge.

13. A process of cleaning and/or cleansing a surface with a liquid, cleaning and/or cleansing composition according to any of the preceding claims, wherein said surface is contacted with said composition, preferably wherein said composition is applied onto said surface.
14. A process according to claim 13, wherein said surface is an inanimate surface, preferably selected from the group consisting of: household hard surfaces; dish surfaces; surfaces like leather or synthetic leather; and automotive vehicles surfaces.
15. A process according to claim 13 wherein said surface is an animate surface, preferably selected from the group consisting of: human skin; animal skin; human hair; animal hair; and hard and soft tissue surface of the oral cavity, such as teeth, gums, tongue and buccal surfaces.

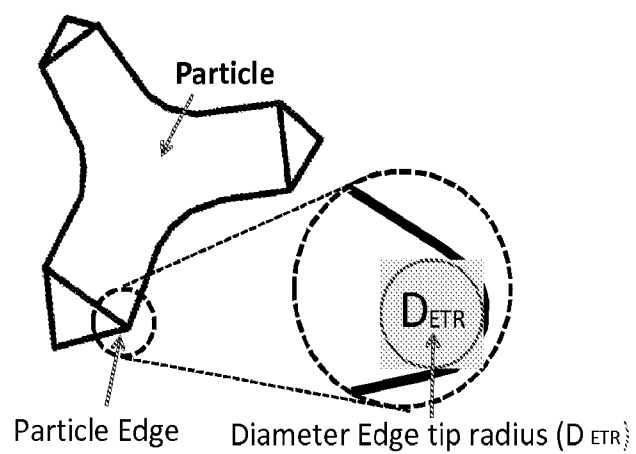


FIG. 1

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/043210

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K8/87 C11D3/37 C11D17/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61K C11D G08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

27 August 2012

Date of mailing of the international search report

04/09/2012

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/043210

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	----- EP 1 162 222 A2 (SMITHERS OASIS CO [US]) 12 December 2001 (2001-12-12) paragraphs [0001], [0012], [0020], [0025], [0026]; claims 1-11; figures 1-3; table 1 -----	1-15

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