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(54) UNIT DOSE CLEANING COMPOSITION

EINZELDOSISREINIGUNGSMITTELZUSAMMENSETZUNG

COMPOSITION DE NETTOYAGE DE DOSE UNITAIRE

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Description

Field of the Invention

[0001] The present invention relates to unit dose cleaning compositions. The invention particularly relates to a tablet composition, and methods of treating surfaces with such compositions.

Background of the Invention

[0002] Unit dose cleaning compositions such as detergent tablets are one of the most preferred consumer products, due to ease of handling, dosage and storage. Such compositions are used to clean surfaces, such as bathroom, kitchen surfaces as well as to clean laundry surfaces.

[0003] Unit dose compositions in the form of tablets are typically prepared by pre-mixing the ingredients of the composition and thereafter using any suitable equipment to convert the pre-mixed ingredients to form a tablet. The tablets are preferably formed by sufficiently compressing the pre-mixed ingredients, to provides the tablets with sufficient strength to withstand handling and transportation. Along with sufficient strength the tablets must also dissolve and released into wash water.

[0004] Polymer disintergrants and water-soluble hydrated salts are well-known components of the tablet composition for improving the dissolution behaviour of detergent tablets while maintaining good tablet strength to withstand transportation and storage conditions.

[0005] US6974789 B1 (Whitaker et al., 2005) discloses a detergent tablet for use in a washing machine which displays improved dissolution, strength and long-term storage characteristics. It discloses specific mixtures of polymeric disintegrants and water-soluble hydrated salts for improving dissolution behaviour of detergent tablets whilst providing excellent strength and robustness during long-term storage.

[0006] Single and multi-phase tablets are known.

[0007] WO 00/43488 (Procter & Gamble, 2000) discloses a detergent tablet having one or more phase for use in washing machine which provides for improved dissolution, strength and long-term storage characteristics. The multiphase tablet has a phase in the form of a compressed particulate solid having polymeric disintergrants, water soluble hydrated salt and optionally an effervescent agent.

[0008] EP 1358311 B1 (Unilever, 2011) discloses a cleaning composition in the form of tablets, the tablet has a disintegrant granule prepared by co-granulating a water swellable disintegrating aid with a water insoluble inorganic material before incorporating into a tablet.

[0009] EP 0976820 A1 (Chimiotechnic, 2000) discloses a detergent tablet for washing clothes it has a core layer with at least one disintegrating agent. The disintegration agent is selected from the group including clays, cellulose and its derivatives, polyvinyl pyrrolidone, modified or cross-linkable starch.

[0010] EP 0419036 B1 (Unilever, 1998) discloses a detergency builder additive and a detergent composition including the detergency builder additive.

[0011] WO 01/38478 A1 (Unilever, 2001) discloses a multi-region detergent tablet of compressed particulate composition having a detergent active compound, a detergency builder and particles which contain sodium tripolyphosphate.

[0012] Unit dose detergent composition have also been designed to provide for separating individual components of a laundry or dishwashing composition from other components of the same composition for the purpose of avoiding incompatibilities of the individual components during production, storage and/or transit and thus to ensure that the components pass into the washing or cleaning liquor without loss of activity at a defined point in time.

[0013] Unit dose cleaning composition where at least two different components are to be released into the liquor at different points in time in a laundering, dishwashing or cleaning process are also known. Such composition has discrete regions where each region having different detersive components additionally include at least one release controlling (physico)chemical switch which may be subject to temperature control or to a shift in pH.

[0014] However, the present inventors have found that in addition to quick dissolution and integrity of the unit dose composition during transport and storage, the consumers also look for unit dose composition, particularly tablet composition that give improved stain removal and cleaning performance and wherein the performance of the active ingredients is pronounced.

[0015] It is thus an object of the present invention to provide for a unit dose cleaning composition having discrete regions that provides improved stain removal and cleaning performance.

[0016] It is another object of the present invention to provide a unit dose cleaning composition which sequentially releases ingredients contained therein.

[0017] It is another object of the present invention to provide a unit dose cleaning composition that disintegrates quickly but has low friability.

[0018] It is yet another object of the present invention to provide a unit dose cleaning composition that provides for lowering the amounts of the ingredients in the cleaning composition whilst maintaining the cleaning performance.

[0019] It is further object of the invention to provide unit dose composition having improved dissolution characteristics and which also delivers excellent cleaning performance.

Summary of the Invention

[0020] The present inventors have found that when a unit dose cleaning composition has a first region having water hardness removing agent and a second region having detersive surfactant and where the weight ratio between the water hardness removing agent and the disintegrant in the first region and the weight ratio between the detersive surfactant and the disintegrant in the second region is maintained between specific ranges, the unit dose composition achieves good cleaning and stain removal performance. The unit dose composition according to the present invention achieves the quick release of the first region having a water hardness removing agent into the water which takes place within 5 seconds to 5 minute of addition, and this is followed by the slower releasing second region having a detersive surfactant, this sequential release of the different discrete regions ensures that the unit dose composition provides good cleaning performance even when the levels of the active ingredients are reduced.

[0021] It is surprisingly found by the present inventors that delayed release of the second region with respect to the first region of the unit dose composition of the present invention is independent of the thickness of the first region and/or the second region.

[0022] Preferably the first region and/or the second region is not coated.

[0023] According to a first aspect of the present invention disclosed is a unit dose cleaning composition comprising:

i) a first region comprising:

a) a water hardness removing agent;
b) a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof;

ii) a second region comprising:

a) a detersive surfactant;
b) a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof;

wherein the weight ratio of the water hardness removing agent to the disintegrant in the first region is from 5:1 to 20:1 and wherein the weight ratio of the detersive surfactant to the disintegrant in the second region is from 0.1:1 to 5:1.

[0024] According to a second aspect of the present specification, disclosed is a process for preparing a unit dose cleaning composition according to the first aspect, comprising the steps of:

i) blending a water hardness removing agent and a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof to form a first region mix;
ii) blending a detersive surfactant and a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof to form a second region mix;
iii) adding the first region mix to a mould and the second region mix to the mould to form discrete regions;
iv) applying pressure to form a unit dose cleaning composition.

wherein the weight ratio of the water hardness removing agent to the disintegrant in the first region is from 5:1 to 20:1 and wherein the weight ratio of the detersive surfactant to the disintegrant in the second region is from 0.1:1 to 5:1.

[0025] In a third aspect the present specification provides a method of cleaning a surface comprising the step of dissolving a unit-dose cleaning composition as defined herein in a liquid, preferably water, to provide a solution of the cleaning composition, and contacting the surface with the cleaning composition, preferably wherein the surface is an inanimate surface, selected from a hard surface or a soft surface. The soft surface includes textile and laundry fabric.

[0026] In a fourth aspect the present specification provides a use of a unit-dose cleaning composition as defined herein for cleaning a surface, preferably wherein the surface is a hard surface or a soft surface.

[0027] The term "sequential release" as used herein means that the dissolution of the first region and the dissolution of the second region are separated in time. The time interval between start of dissolution of the first region and the start of dissolution of the second region is generally from 5 seconds to 5 minutes.

[0028] All region of the unit dose cleaning composition disintegrate in the aqueous liquor however it is not necessary that each ingredient of the unit dose cleaning composition described herein is water soluble, all regions of the tablet must dissolve, disperse, disintegrate or become dissipated in the aqueous cleaning environment of the wash liquor, so that no structural elements of the unit dose cleaning composition remain in the wash liquor at the end of the cleaning process.

[0029] These and other aspects, features and advantages will become apparent to those of ordinary skill in the art from a reading of the following detailed description and the appended claims. For the avoidance of doubt, any feature of one aspect of the present invention may be utilised in any other aspect of the invention. The word "comprising" is intended to mean "including" but not necessarily "consisting of" or "composed of." In other words, the listed steps or options need not be exhaustive. It is noted that the examples given in the description below are intended to clarify the invention and are not intended to limit the invention to those examples per se. Except in the operating and comparative examples, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material or conditions of reaction, physical properties of materials and/or use are to be understood as modified by the word "about" Numerical ranges expressed in the format "from x to y" are understood to include x and y. When for a specific feature multiple preferred ranges are described in the format "from x to y", it is understood that all ranges combining the different endpoints are also contemplated.

Detailed Description of the Invention

[0030] According to the first aspect of the present invention disclosed is a unit-dose cleaning composition having a first region which includes a water hardness removing agent and a disintegrant and a second region which includes a detersive surfactant and a disintegrant.

First region

[0031] The unit dose cleaning composition according to the first aspect of the invention includes a first region having a water hardness removing agent and a disintegrant.

[0032] Preferably the first region has a pH ranging from 10 to 13 pH, preferably from 10.5 to 12 when measured in a 10% solution prepared with distilled water at a temperature of 25°C.

[0033] The first region is released into the wash liquor within 5 seconds to 5 minutes of addition in the water, more preferably the first region is released into the wash liquor from 5 seconds to 1 minutes, and still more preferably the first region is released into the wash liquor from 10 seconds to 30 seconds.

[0034] Water hardness removing agent:
The term "water hardness removing agent' as used herein means a material which tend to remove polyvalent metal ions (usually calcium and/or magnesium) from a solution either by ion exchange, complexation and/or sequestration, suspension or precipitation. The water hardness removing agent is preferably a builder. Preferably the water hardness removing agent is an inorganic builder or an organic builder. Preferably the inorganic builder is a precipitation builder.

[0035] The first region preferably includes from 20 wt.% to 80 wt.% water hardness removing agent. More preferably the first region includes from 30 wt.% to 80 wt.% water hardness removing agent. Preferably the first region comprises at least 30 wt.%, still preferably at least 40 wt.%, still preferably at least 50 wt.%, most preferably at least 55 wt.% of the water hardness removing agent, but typically not more than 80 wt.%, still preferably not more than 78 wt.%, still further preferably not more than 75 wt.%, still more preferably not more than 70 wt.% of the water hardness removing agent based on the weight of the first region.

Builder

[0036] The water hardness removing agent in the first region of the unit dose cleaning composition according to the present invention is preferably a builder. Preferably the builder is an inorganic builder, organic builder or a combination thereof.

[0037] Preferably the builder may be selected from calcium sequestrant material, precipitating materials, calcium ion-exchange materials and mixtures thereof.

[0038] Preferably the builder is an inorganic builder. Non-limiting examples of inorganic builders includes zeolites, silicates, carbonates, sesquicarbonates, bicarbonates and combinations thereof. Preferably the inorganic builder includes those selected from carbonate, bicarbonate, silicate and mixtures thereof. Still preferably the inorganic builder includes carbonate, silicate and mixtures thereof. Preferably the inorganic builder is an alkali metal salt of carbonate, alkali metal salt of silicate or mixtures thereof. Other inorganic builder may also optionally include phosphate builder such as alkali metal ortho-, pyro, metaphosphate, and tripolyphosphates and hexametaphosphates. However, it is highly preferred that the unit dose cleaning composition of the present invention may be formulated in substantial absence of any phosphate builders. More preferably the amount of the phosphate builder is 0 wt.% based on the weight of the first region.

[0039] Preferably the inorganic builder is a carbonate and/or bicarbonate builder. The carbonate builder is preferably an alkali metal carbonate, alkaline earth metal carbonate, alkali metal bicarbonate, alkali metal sesquicarbonate or mixtures thereof. Preferred alkali metal carbonates are sodium and/or potassium carbonate, most preferably the alkali metal carbonate builder is sodium carbonate. Preferably the unit dose cleaning composition according to the present invention includes carbonate and/or bicarbonate builder in an amount ranging from 10 wt.% to 80 wt.% (bi)carbonate salt, still preferably 20 wt.% to 75 wt.% (bi)carbonate, and more preferably from 30 wt.% to 70 wt.% (bi)carbonate salt by weight of the unit dose cleaning composition. The carbonate builder may be obtained from a mined source or from a renewable source or a mixture thereof. More preferably the renewable source is from a carbon capture source which is then converted to alkali metal carbonate or bicarbonate builder by known process.

[0040] It is further preferred that sodium carbonate makes up at least 50 wt.%, at least 75 wt.%, more preferably at least 85 wt.% and even more preferably at least 90 wt.% of the total weight of the builder.

[0041] In addition to the carbonate builder the unit dose cleaning composition of the present invention may preferably include an inorganic non-carbonate builder. The preferred inorganic non-carbonate builders may be selected from the group consisting of silicates, silica, zeolites, phosphates or mixtures thereof. More preferably the inorganic non-carbonate builder is selected from the group consisting of silicates, silica or mixtures thereof.

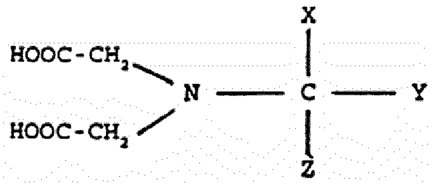
[0042] Suitable silicates include alkali metal silicates, alkali metal metasilicates, alkali metal disilicate or combinations thereof. More preferably the silicates are alkali metal silicates. It is preferred that the amount of alkali metal disilicate present as water hardness removing agent in the composition is less than 4 wt.%, still preferably less than 3 wt.%, further preferably 0 wt.%. Silicates may have different degrees of hydration, such as non-hydrate, pentahydrate or anhydrous silicate may be employed in the present invention. Preferably, silicate is used in a solid form. Preferably silicates have a weight ratio of SiO_2: Na_2O and/or SiO_2: K_2O from 4:1 to 1:1. Suitable silicates include the water soluble sodium silicates with an SiO_2: Na_2O ratio of from 1.0 to 2.8, with ratios of from 1.6 to 2.4 being preferred, and 2.0 ratio being most preferred. The silicates may be in the form of either the anhydrous salt or a hydrated salt. Sodium silicate with an SiO_2: Na_2O ratio of 2.0 is the most preferred silicate. Silicates are preferably present in the unit dose detergent compositions in accordance with the invention in an amount ranging from 0 wt.% to 10 wt.% by weight of the unit dose cleaning composition, more preferably from 0 wt.% to 7 wt.%, still preferably from 0 wt.% to 5 wt.% in the unit dose cleaning composition.

[0043] The unit dose cleaning composition may include crystalline sheet silicates such as amorphous silicates. However, according to the invention the unit dose composition preferably does not contain any zeolite. Crystalline sheet silicates of the general formula $NaMSi_xO_{2x+1}.yH_2O$ wherein M denotes sodium or hydrogen, x is a number from 1.9 to 22 preferably from 1.9 to 4, wherein preferred values for x are 2, 3 or 4, and y stands for a number from 0 to 33, preferably from 0 to 20, are preferred for use. The amount by weight of the crystalline sheet silicate of the formula $NaMSi_xO_{2x+1}.yH_2O$ or zeolite present in the unit dose cleaning composition is from 0.1 wt.% to 20 wt.%, preferably 0.2 wt.% to 15 wt.% and 0.4 wt.% to 10 wt.%. Preferred unit dose composition contains less than 8.0 wt.% amorphous silicate or zeolite, preferably less than 6.0 wt.% amorphous silicate or zeolite and in particular less than 4.0 wt.% amorphous silicate or zeolite. Preferably from 0.1 wt.% and 5 wt.% amorphous silicate or zeolite. Amorphous sodium silicates preferably have a Na_2O:SiO_2 modulus of 1:2 to 1:3.3, preferably from 1:2 to 1:2.8, and in particular from 1:2 to 1:2.6 may also be used. Most preferably the composition of the present invention does not include any amorphous sodium silicate or zeolite, that is the water hardness removing agent includes 0 wt.% amorphous sodium silicate or zeolite.

[0044] The first region preferably includes from 0 wt.% to 15 wt.% silicate builder. Preferably the first region includes at least 1 wt.% silicate builder, still preferably at least 3 wt.% silicate builder, still more preferably at least 5 wt.% and preferably not more than 12 wt.%, still preferably not more than 10 wt.%, and furthermore preferably not more than 8 wt.% in the first region. Preferably the silicate builder is an alkali metal silicate.

[0045] Suitable organic builders include the polycarboxylates, in acid and/or salt form. When utilized in salt form, alkali metal (e.g. sodium and potassium) or alkanolammonium salts are preferred. Specific examples include sodium and potassium citrates, sodium and potassium tartrates, the sodium and potassium salts of tartaric acid monosuccinate, the sodium and potassium salts of tartaric acid disuccinate, sodium and potassium ethylenediaminetetraacetate, sodium and potassium N(2-hydroxyethyl)- ethylenediamine triacetate, sodium and potassium nitrilotriacetates and sodium and potassium N-(2-hydroxyethyl)-nitrilodiacetate, polyacrylic acid, N,N-Dicarboxymethyl glutamic acid tetrasodium salt (GLDA), sodium gluconate, methylglycinediacetic acid trisodium salt (MGDA) and sodium polyitaconate.

[0046] Preferably the organic builder has a general formula (I)



wherein,

X = a COOH group or an alkyl chain comprising a COOH group,
Y = H atom

Z = H atom or C_1 to C_{30}, preferably C_2 to C_{30} alkenyl group.

[0047] When the Z group is an alkenyl group it preferably includes one or more of the following: (i) hydroxyl group, preferably not more than five; (ii) formyl group; (iii) C_1 to C_4 alkoxy group; (iv) Phenoxy group; (v) C_1 to C_4 alkoxycarbonyl group; (vi) a phenyalkyl with 1 to 20 carbon atoms in the alkyl group; (vii) a five or 6-membered unsaturated or saturated heterocyclic ring preferably with upto 3 herteroatoms most preferably selected from the group containing nitrogen, oxygen and sulphur.

[0048] Further preferably the phenylalkyl group and/or heterocyclic ring may comprise one or more of the following groups: (i) a C_1 to C_4 alkyl group, (ii) a hydroxyl group, (iii) a carboxyl group, (iv) a sulpho group, (v) a phosphono group, (vi) a sulphate ester, (vii) a phosphate ester, and (viii) a C_1 to C_4 alkoxycarbonyl group.

[0049] The organic builder may preferably be selected from nitrile triacetic acid (NTA), β-alanine diacetic acid (β-ADA, serine diacetic acid (SDA), ethyl glycine diacetic acid (EGDA).

[0050] It is preferred that the organic builder has a chelating capacity of more than 140 mg Ca/g, still preferably more than 200 mg Ca/g, still preferably more than 250 mg Ca/g, preferably the chelating capacity of the organic builder is from 200 mg Ca/g to 500 mg Ca/g.

[0051] When present in the unit dose cleaning composition according to the present invention, the organic builder is either in its salt form or in its acid form and is considered as a water hardness removing agent when present in an amount of 20 wt.% or more in the first region. Organic builder in acid form present in an amount less than 20 wt.% in the first region will be considered as a disintegrant in accordance with the present invention.

Sequestrant

[0052] Preferably the first region includes a sequestrant. Preferably the sequestrant is a heavy metal ion chelating sequestrant, especially those chelating transition metal such as iron, copper and manganese. Preferably, said sequestrant are phosphonic acids and/or salts thereof. When the sequestrant is present in an amount of 20 wt.% or more it is considered as a water hardness removing agent in accordance with the present invention.

[0053] The phosphonic acid (or salt thereof) sequestrant is preferably selected from the group consisting of 1-Hydroxyethylidene-1,1 -diphosphonic acid (HEDP);

Diethylenetriaminepenta(methylenephosphonic acid) (DTPMP);
hexamethylenediaminetetra(methylenephosphonic acid) (HDTMP);
Aminotris(methylenephosphonic acid) (ATMP); Ethylenediaminetetra(methylenephosphonic acid) (EDTMP); Tetramethylenediaminetetra(methylenephosphonic acid) (TDTMP); and, Phosphonobutanetricarboxylic acid (PBTC).

[0054] The sequestrant is preferably in acid form. This means that it is a phosphonic acid. The preferred phosphonic acid sequestrant is 1-Hydroxyethylidene-1,1 -diphosphonic acid (HEDP).

[0055] When a sequestrant is present in the composition, it is present preferably in an amount of at least 20 wt.% of the first region. Still preferably the amount of the sequestrant is at least 30 wt.%, further preferably at least 40 wt.% of the first region.

[0056] Preferably the composition of the present invention includes less than 2 wt.% of the unit dose composition of a phosphate such as STPP, sodium or potassium tripolyphosphate or sodium or potassium hexametaphosphate. More preferably the composition of the present invention is substantially free of these phosphate salt. By substantially free it is meant that there is no deliberately added phosphate salt in the composition.

[0057] When the unit dose cleaning composition is meant to be used as a laundry cleaning composition the water hardness removing agent in the first region is a builder, preferably an inorganic builder. Still preferably the inorganic builder is selected from silicate, carbonates or mixtures thereof. Preferably the carbonate builder is present in an amount ranging from 40 wt.% to 80 wt.%, still preferably from 50 wt.% to 70 wt.% in the first region. Preferably the silicate builder is present in an amount ranging from 5 wt.% to 20 wt.%, still preferably from 7 wt.% to 18 wt.% of the first region.

[0058] When the unit dose cleaning composition is a dishwashing composition, then the water hardness removing agent preferably includes a builder. The builder is preferably a combination of organic builder and an inorganic builder. Preferably a combination of MGDA and carbonate builder. The organic builder in the first region constitutes from 40 wt.% to 70 wt.%, still preferably from 40 wt.% to 55 wt.% of the first region. The inorganic builder in the first region preferably ranges from 10 wt.% to 50 wt.%, still preferably from 10 wt.% to 30 wt.% of the first region.

[0059] In a dishwashing composition, preferably the amount of the sequestrant is higher than or equal to the concentration of the precipitation builder.

[0060] The water hardness removing agent employed in the first region may be preferably composed of 100% inorganic builder, preferably all of which is a carbonate or silicate builder. In some embodiments the water hardness removing agent in the first region may preferably be composed of 100% organic builder, still preferably where the organic builder is MGDA.

Disintegrant:

[0061] The unit dose cleaning composition of the present invention includes a disintegrant. To facilitate the disintegration of the unit dose cleaning composition in use, preferably where the unit dose composition is in the form of a prefabricated molded bodies (example tablet or an extruded particle) the disintegrant enables to shorten the disintegration time.

[0062] The unit dose cleaning composition according to the present invention includes a disintegrant in the first region. The disintegrant is also present in the second region. The disintegrant in the first region and the disintegrant in the second region may be same or different.

[0063] In the first region, the weight ratio of the water hardness removing agent to the disintegrant is from 5:1 to 20:1, most preferably from 6:1 to 20:1, still more preferably from 7.5:1 to 15:1.

[0064] In the second region, the weight ratio of the detersive surfactant to the disintegrant is from 0.1:1 to 5:1, more preferably from 0.5:1 to 3:1, still more preferably from 1:1 to 3:1. And most preferably from 1.5:1 to 2.5:1.

[0065] The disintegrant is selected from a swellable disintegrant agent, an effervescent disintegrant agent or combinations thereof.

Swellable agent

[0066] Swellable agent are substances which increase their volume upon contact with water. An increase in the volume of the swellable disintegrant agent present in the unit dose cleaning composition is believed to cause a corresponding increase in the inherent volume (swelling) of the unit dose composition and consequently the unit dose cleaning composition disintegrates into smaller particles.

[0067] The disintegrant is preferably a swellable disintegrant agent. The swellable disintegrant agent is preferably a polymer material. The polymer material is preferably water-swellable. The water swellable polymeric material are typically water insoluble and are generally dispersible in water. The polymers that swell on contact with water as well as those that facilitate water influx and/or efflux by forming channels in the unit dose cleaning composition are preferred. Preferably the swellable disintegrant agent has sufficient water absorptivity, the swellable disintegrant agent can preferably absorb at least one time their own weight of water, preferably at least two times, still preferably at least three times, further preferably at least four times their own weight of water. Preferably the swellable disintegrant has a water uptake of at least 14 grams of water per gram of the swellable disintegrant agent. A number of such materials are known. Examples of suitable swellable disintegrant agent includes starch, cellulose and derivatives thereof, alginates, sugars, polysaccharides, cross-linked polyvinylpyrrolidones, swellable clays and mixtures thereof. Water-swellable polymer material include for example, synthetic polymers such as cross-linked polyvinylpyrrolidone (PVP) or natural polymers and/or modified natural substances such as polysaccharides, cellulose, microcrystalline cellulose, starch and their derivatives or alginates or casein derivatives.

[0068] Examples of suitable swellable disintergrants include starches, for example, maize, rice and potato starches and starch derivatives, such as Primojel™, carboxymethyl starch and Explotab™, sodium starch glycolate; celluloses, for example, Vivapur, Arbocel®-B and Arbocel®-BC (beech cellulose) , Arbocel®-BE (beech-sulphite cellulose) , Arbocel®-B-SCH (cotton cellulose), Arbocel®-FIC (pine cellulose) as well as further Arbocel® types from Rettenmaier and cellulose derivatives, for example Courlose™ and Nymcel™, sodium carboxymethyl cellulose, Ac-di-Sol™ cross-linked modified cellulose, and Hanfloc™ microcrystalline cellulosic fibres; and various synthetic organic polymers. These swellable disintegrants are commercially available from suppliers which include Rettenmaier in Germany and FMC Corporation in USA. Other suitable swellable disintegrant include burkeite, methyl cellulose, hydroxypropylcellulose, carboxymethylcellulose, cross-linked celluloses such as cross-linked carboxy methylcellulose (CMC), dextrans, cross-linked polyvinylpyrrolidones. More preferably the water swellable disintegrant is selected from the group consisting of wholly or partially cross-linked polymer, still preferably from the group consisting of cross-linked cellulose, cross-linked sodium carboxy methyl cellulose, cross-linked starch, cross-linked polyvinyl pyrrolidone, microcrystalline cellulose or mixtures thereof. Most preferably, the polymeric disintegrant is microcrystalline cellulose, cross-linked polyvinyl pyrrolidone or mixtures thereof.

[0069] Preferably the water-swellable polymer material is modified cellulose. Preferably chemically modified to enhance its water uptake capacity. The chemically modified cellulose may have ionic substitutions, preferably it is nonionic. The water-swellable cellulosic polymeric material is preferably not used in finely divided form, but instead it is converted to a coarser form, for example, by granulating or compacting, before being added to the premixes to be pressed.

[0070] Preferably the swellable disintegrant material is in a form of particles with a mean particle size in a range from 250 to 1,500 micrometers. The particle size of the water-swellable disintegrant, still preferably the cellulosic polymeric material is usually greater than 200 micrometers. Preferably at least 400 micrometers, still preferably at least 500 micrometers. More preferably at least 90 wt.% of the swellable disintegrant agent has an average particle size between 300 micrometers and 1600 micrometers, and still preferably at least 90 wt % of the swellable disintegrant agent has an average particle size between 400 micrometers and 1200 micrometers. It is preferred that the swellable disintegrant polymer material is an agglomerate of smaller particles whose largest dimension is no greater than 200 micrometres, preferably no greater than 150 micrometres. This makes it possible for at least some of the polymer particles to break up during a wash cycle. Preferably the water-swellable disintegrant has a charge density less than 10^{-3}, preferably less than 6×10^{-4} or even zero. The term charge density denotes the number of charges on a polymer molecule divided by the molecular weight of the polymer. It is essentially the same as the average number of charges on a repeat unit of the polymer divided by the average molecular weight of a repeat unit.

[0071] Preferably, the swellable disintegrant has a particle size distribution such that at least 90% by weight thereof has a particle size below 0.3 mm and at least 30% by weight thereof has a particle size below about 0.2mm, preferably a particle size distribution such that at least 90 % by weight thereof has a particle size below about 0.25mm and at least 50 % by weight thereof has a particle size below about 0.2mm, more preferably the disintegrant has a particle size distribution such that at least 90 % by weight thereof has a particle size above about 0.05mm, preferably above about 0.075mm.

[0072] When the disintegrant is a swellable disintegrant agent it may suitably be present in the first region in an amount ranging from 1 wt.% to 25 wt.%, preferably from 1.5 wt.% to 10 wt.%. still preferably from 2 wt.% to 10 wt.%, still preferably from 2.5 wt.% to 10 wt.% still preferably from 5 wt.% to 10 wt.%.

[0073] The first region preferably includes from 0 wt.% to 25 wt.% swellable disintegrant agent. Preferably the first region includes at least 1 wt.% swellable disintegrant agent, still preferably at least 3 wt.% swellable disintegrant agent, still more preferably at least 5 wt.% and preferably not more than 20 wt.%, still preferably not more than 15 wt.%, and furthermore preferably not more than 10 wt.% swellable disintegrant agent in the first region. Preferably the swellable disintegrant agent in the first region is selected from modified cellulose, cross-linked polyvinylpyrrolidones or mixtures thereof. Preferably the cellulose-based material is microcrystalline cellulose. Preferably the amount of the microcrystalline cellulose to the cross-linked polyvinylpyrrolidone disintegrant agent in the first region is from 1:1 to 10:1.

[0074] Preferably the unit dose cleaning composition includes from 5 wt.% to 20 wt.% swellable disintegrant agent, still preferably from 10 wt.% to 20 wt.% swellable disintegrant agent by weight of the unit dose cleaning composition.

Effervescent disintegrant agent

[0075] Effervescent disintegrant agent are substances which can create a pressure through the release of gases, non-limiting example include carbonate/citric acid systems, but other organic acids may also be suitable for the present invention.

[0076] Preferably the disintegrant is selected from an effervescent disintegrant agent. The effervescent agent as used herein includes ingredient which release gas in-situ. Preferred effervescent systems, however, consist of at least two components which react with one another to form a gas in-situ. Preferably the effervescent system includes a combination of an acid and a base, still preferably an organic acid and a carbonate base. Preferably the components of the effervescent system include an alkali salt component which reacts with an acidifying agent to release carbon dioxide in-situ. For example, the alkaline salt component include alkali metal carbonate and/or bicarbonate. A preferred example of an acidifying agent which releases carbon dioxide from a reaction with the alkali salts in aqueous solution is citric acid. Preferably the acidifying agent used as a component of the effervescent disintegrant agent include weak acids, for example, polycarboxylic acids, citric acid (preferred), malic acid, maleic acid, malonic acid, itaconic acid, oxalic acid, glutaric acid, glutamic acid, lactic acid, fumaric acid, glycolic acid, tartaric acid and mixtures thereof. Suitable acids include mono, di, or tri basic acids having pKa in the range of 1 to 6.9. Preferably acids include amino sulphonic acids, organo phosphonic acids, HEDP acid, polycarboxylic acids or mixtures thereof.

[0077] The effervescent agent preferably includes an acidifying agent in combination with an alkali. Suitable alkali includes alkali metal silicate, alkali metal carbonate or bicarbonate, alkali metal sesquicarbonate and mixtures thereof. Preferably the alkali is a sodium salt. For the purpose of the present invention, specifically while calculating the ratio ranges between the water hardness removing agent and the disintegrant agent in the first region the alkali salts, particularly those defined previously as builders will be considered as water hardness removing agent. Further examples of acid and carbonate sources and other effervescent systems may be found in Pharmaceutical Dosage Forms: Tablets, Volume 1, 1989, pages 287-291 (Marcel Dekker Inc, ISBN 0-8247-8044-2).

[0078] Preferably when the gas is produced in-situ, the alkali salt component, the acidifying agent or both may be coated. Preferably the acidifying agent of the effervescent agent may be coated. Preferably the coating material at least partially coats the particulate effervescent agent or its components. Preferably the coating material includes vegetable oil, paraffin oil, wax or mixtures thereof.

[0079] Examples of suitable gas include carbon dioxide, nitrogen dioxide, oxygen and/or any other nontoxic, non-flammable gas. Most preferably the effervescent agent is an effervescent system which include an alkali salt component and an acidifying agent as described above, and where the alkali salt component reacts with the acidifying agent to release carbon dioxide in-situ.

[0080] Preferably the disintegrant is a combination of swellable disintegrant and the effervescent disintegrant agent. More preferably the disintegrant is a combination of modified cellulose, cross-linked polyvinylpyrrolidone and citric acid. Preferably the modified cellulose in this combination is microcrystalline cellulose. Preferably the citric acid is coated.

[0081] When the disintegrant is an effervescent agent it may suitably be present in the first region in an amount from 1 wt.% to 25 wt.%, preferably from 1.5 wt.% to 10 wt.%. still preferably from 1 wt.% to 5 wt.%.

[0082] Preferably the unit dose cleaning composition includes from 1 wt.% to 10 wt.% effervescent disintegrant agent, still preferably from 1 wt.% to 5 wt.% effervescent disintegrant agent by weight of the unit dose cleaning composition.

Optional disintegrating agents

[0083] In addition to the swellable disintegrant agent and effervescent disintegrant agent the unit dose cleaning composition according to the present invention may advantageously include several optional disintegrants such as water-soluble material, soaps, fatty acids, waxes and mixtures thereof. These optional disintegrant agents may be advantageously present in the first region, second region or both.

[0084] Water-soluble disintegrant are materials which have a solubility in deionised water at a temperature of 20°C of at least 10 grams per 100 grams of water, more preferably at least 50g/100 grams of water. These optional water-soluble disintegrant materials include sodium citrate dihydrate, potassium carbonate, urea, sodium acetate, sodium acetate trihydrate, magnesium sulphate heptahydrate or mixtures thereof. These materials have the following solubilities when expressed as grams of solid to form a saturated solution in 100 grams of water at 20°C. It is highly preferred that the water-soluble material is a salt form which dissolves in water in an ionised form.

[0085] The composition of the present invention may include the water soluble disintegrant in addition to the above described disintegrants which are selected from a swellable agent, effervescent agent or mixtures thereof. At least one of the swellable disintegrant or effervescent disintegrant must be present in the unit dose composition of the present invention. The water soluble disintegrants are less preferred according to the present invention as these disintegrants requires a longer time duration to disintegrate in the unit dose composition of the present invention. The water soluble disintegrants do not provide a disintegration of the first region in the time duration of 5 second to 5 minutes of addition in the water.

[0086] The composition may include additional water-soluble polymers which are optional. Preferably the polymer is selected from the group consisting of maleic acid/acrylic acid copolymer, a salt of maleic acid/acrylic acid copolymer, ethylene maleic anhydride cross-linked copolymer, polyethylene glycol, polyvinyl pyrrolidone, acrylic acid polymer, a salt of acrylic acid polymer, polyvinyl alcohol, cellulose ether and mixtures thereof. Preferably the optional water-soluble polymer disintegrant is a mixture of polyacrylic acid/maleic acid copolymer and polyethylene glycol. The mixture of the polyacrylic acid/maleic acid copolymer and polyethylene glycol preferably has a weight ratio of polyacrylic acid/maleic acid copolymer to polyethylene glycol of from 1:3 to 3:1, the weight ratio of 1:1 being most preferred. It is also advantageous that the water- soluble polymer disintegrant is a mixture of the polyacrylic acid/maleic acid copolymer and ethylene maleic anhydride crosslinked polymer. The mixture of the polyacrylic acid/maleic acid copolymer and ethylene maleic anhydride crosslinked polymer preferably has a weight ratio of polyacrylic acid/maleic acid copolymer to ethylene maleic anhydride crosslinked polymer from 2:1 to 10:1, the weight ratio of 6:1 being most preferred.

[0087] The optional disintegrant may advantageously include soap as a co-disintegrant. Suitable soap may be selected from calcium salts of long chain, C_{18} and higher fatty acids. The fatty acid that can be used as disintegrant includes C_{18} and higher fatty acids, the waxes which are preferred as disintegrant are preferably high melting point (MP in the range from 40.56°C to 65.56°C (105°F to 150°C) preferably 51.67°C to 61.11°C (125°F to 142°F) waxes, preferably the MP is not higher than 65.56°C (150°F))

[0088] Further optional agents which may advantageously promote the disintegration of the unit dose composition included in the unit dose cleaning composition may be selected from formaldehyde-casein, colloidal silica, veegum clays, sugars and gelatin. Combinations of these materials can also be used.

[0089] In the first region, when the disintegrant is a mixture of swellable disintegrant and an effervescent agent, then the weight ratio of the swellable disintegrant to the effervescent agent is from 5:1 to 1:1.

Seeding agent:

[0090] Preferably the first region includes a seeding agent. The seeding agent is used in combination with the water hardness removing agent. Preferably the seeding agent is a calcium-based compound, more preferably the calcium-based compound is selected from calcium carbonate, calcium magnesium carbonate, calcite, dolomite or mixtures thereof.

[0091] Other preferred seeding agents includes calcium, magnesium and aluminium silicates; calcium and magnesium oxides; calcium and magnesium salts of fatty acids having 12 to 22 carbon atoms; calcium and magnesium hydroxide, and calcium fluoride. The seeding agent may include an amorphous calcium silicate and/or amorphous magnesium silicate.

Preferably the seeding agent is selected from the group consisting of calcium carbonate, dolomite, kaolinite, feldspar, precipitated calcium carbonate or combinations thereof. Most preferably the seeding agent is calcite commercially available as Forcal™ U.

[0092] Preferably the weight ratio of the water hardness removing agent to the seeding agent in the first region is from 1:1 to 1:20, still preferably 1:1 to 1:15, still more preferably from 1:1 to 1:10. Still preferably the weight ratio of builder preferably when the builder is an inorganic builder in the first region to the seeding agent is from 1:1 to 1:20, still preferably 1:1 to 1:15, still more preferably from 1:1 to 1:10.

[0093] Preferably the first region according to the present invention comprises from 1 wt.% to 20 wt.% seeding agent. Preferably the first region comprises at least 3 wt.%, preferably at least 5 wt.%, still preferably at least 7 wt.% and most preferably at least 9 wt.%, but typically not more than 18 wt.%, still preferably not more than 15 wt.% seeding agent by weight of the first region.

[0094] The amount of detersive surfactant present in the first region is preferably not more than 15 wt.% of the first region. Still preferably less than 15 wt.%, still preferably less than 12 wt.%, still more preferably less than 10 wt.% still preferably less than 8 wt.%. The detersive surfactant present in the first region helps in binding the ingredients. Advantageously the detersive surfactant is an anionic surfactant, nonionic surfactant or mixtures thereof. They are preferably anionic detersive surfactant, still preferably alkyl ether sulphate. The alkyl ether sulphate preferably has from 1 to 10 alkoxy group, still preferably 1 to 7 alkoxy group, more preferably 1 to 3 alkoxy group. Most preferably the alkoxy group is ethoxy group. Most preferably the detersive surfactant in the first region is sodium lauryl ether sulphate having 1 to 3 EO (ethoxy) group. Most preferably the surfactant in the first region is SLES 1EO. Preferably the surfactant in the first regions acts as a binder.

Optional ingredients in the first region:

[0095] The first region may advantageously include fillers, fragrance ingredients, cleaning polymers, visual cues, shading dye, colourants, pigments and combinations thereof.

Second region

[0096] The unit dose composition according to the first aspect includes a second region having a detersive surfactant and a disintegrant.

[0097] Preferably the second region has a pH ranging from 4.5 to 10 pH when measured in a 10% solution prepared with distilled water at a temperature of 25°C.

[0098] The second region is released into the wash liquor at a time ranging from 1 minute to 30 minutes of addition in the water, more preferably the second region is released into the wash liquor from 1 minute to 10 minutes, and still more preferably the first region is released into the wash liquor from 1 minute to 5 minutes.

Detersive surfactant:

[0099] According to the first aspect of the invention, the second region include a detersive surfactant.

[0100] Preferably the amount of detersive surfactant present in the second region is at least 15 wt.% of the second region. More preferably the surfactant is present in an amount ranging from 15 wt.% to 80 wt.% by weight of the second region. Preferably the detersive surfactant is present in an amount ranging from 40 wt.% to 80 wt.%, still preferably from 50 wt.% to 70 wt.% in the second region. Preferably the second region comprises at least 20 wt.%, preferably at least 22 wt.%, still preferably at least 25 wt.% and most preferably at least 30 wt.%, but typically not more than 75 w.t%, still preferably not more than 65 wt.%, still further preferably not more than 60 wt.% and most preferably not more than 55 wt.% detersive surfactant by weight of the second region.

[0101] Typically, the surfactant is selected from anionic surfactant, cationic surfactant, nonionic surfactant, amphoteric surfactant, zwitterionic surfactant or mixtures thereof. More preferably the surfactant is anionic surfactant, nonionic surfactant, zwitterionic surfactant or mixtures thereof. Still preferably the surfactant is a combination of anionic surfactant with a nonionic surfactant, zwitterionic surfactant or mixtures thereof.

[0102] Preferably the surfactant is an anionic surfactant or a mixture of anionic surfactants. Anionic surfactants are included in the composition for primary cleaning action by emulsifying the oil attached to the substrate. Any non-soap anionic surfactant known in the art for use in laundry detergents may be used herein. In general, these surfactants are described in well-known textbooks like "Surface Active Agents" Vol. 1, by Schwartz & Perry, Interscience 1949, Vol. 2 by Schwartz, Perry & Berch, Interscience 1958, and/or the current edition of "McCutcheon's Emulsifiers and Detergents" published by Manufacturing Confectioners Company or in "Tenside-Taschenbuch", H. Stache, 2nd Edn., Carl Hauser Verlag, 1981. Preferably the anionic surfactant is a non-soap anionic surfactant.

[0103] A suitable class of anionic surfactants are water-soluble salts, particularly alkali metal (eg. sodium or potassium), ammonium and alkyoylammonium salts of organic sulphuric acid, mono-esters and sulphonic acids having in the molecular structure a branched or straight chain alkyl group and condensations products thereof containing 8 to 22 carbon atoms or an alkylaryl group containing 6 to 20 carbon atoms in the alkyl part.

[0104] A preferred class of non-soap anionic surfactant includes alkylbenzene sulfonates, particularly linear alkylbenzene sulfonates (LAS) with an alkyl chain length of from 10 to 18 carbon atoms. Commercial LAS is a mixture of closely related isomers and homologues alkyl chain homologues, each containing an aromatic ring sulfonated at the *"para"* position and attached to a linear alkyl chain at any position except the terminal carbons. The linear alkyl chain typically has a chain length of from 11 to 15 carbon atoms, with the predominant materials having a chain length of about 12 carbon atoms. Each alkyl chain homologue consists of a mixture of all the possible sulfophenyl isomers except for the 1-phenyl isomer. LAS is normally formulated into compositions in acid (i.e. HLAS) form and then at least partially neutralized in-situ. Mixtures of any of the above described materials may also be used.

[0105] Suitable anionic surfactants which may be used are usually water-soluble alkali metal salts of organic carboxylates, sulphates and sulphonates having alkyl radicals containing from about 8 to about 22 carbon atoms, the term alkyl being used to include the alkyl portion of higher acyl radicals. Non-limiting examples of anionic surfactants useful herein include: C_9 to C_{18} alkyl benzene sulphonates (LAS); C_{10} to C_{20} primary, branched-chain and random alkyl sulphates (AS); C_{10} to C_{18} secondary (2,3) alkyl sulphates; C_{10} to C_{18} alkyl alkoxy sulphates (AE_xS) wherein preferably x is from 1 to 30; C_{10} to C_{18} alkyl alkoxy carboxylates preferably comprising 1 to 5 ethoxy units; mid-chain branched alkyl sulphates as discussed in US 6,020,303 and US 6,060,443; mid-chain branched alkyl alkoxy sulphates as discussed in US 6,008, 181 and US 6,020,303; modified alkylbenzene sulphonate (MLAS) as discussed in WO 99/05243, WO 99/05242, and WO 99/05244; methyl ester sulphonate (MES); and alpha olefin sulfonate (AOS).

[0106] The preferred anionic surfactants are sodium C_{11} to C_{15} alkyl benzene sulphonates, sodium C_8 to C_{18} alcohol ether sulphates and sodium C_{12} to C_{18} alkyl sulphates. Also applicable are surfactants such as those described in EP-A-0 328 177 (Unilever), which show resistance to salting-out, the alkyl polyglycoside surfactants described in EP-A-0 070 074, and alkyl monoglycosides. In a preferred embodiment the anionic surfactant is alkali metal salt of C_{11} to C_{15} alkyl benzene sulphonates, more preferably sodium C_{11} to C_{15} alkyl benzene sulphonates.

[0107] When the composition includes a C_8 to C_{18} alcohol ether sulphate, the degree of ethoxylation of the C_8 to C_{18} alcohol ether sulphate is typically an integer in the range of 1 to 5. In preferred embodiments, the degree of ethoxylation of the C_8-C_{18} alcohol ether sulphate is 1, 2 or 3.

[0108] In preferred embodiments, the composition includes sodium lauryl ether sulphate (also known as sodium dodecyl ether sulphate or SLES) as an anionic surfactant. In some embodiments, the degree of ethoxylation of SLES is 1, 2 or 3. In some embodiments, the degree of ethoxylation of SLES is 3. In other embodiments, the degree of ethoxylation of SLES is 2. In further embodiments, the degree of ethoxylation of SLES is 1.

[0109] The non-soap anionic surfactant is present in the second region in an amount ranging from 15 wt.% to 80 wt.%, preferably not less than 20 wt.%, more preferably not less than 30%, still more preferably not less than 40% but typically not more than 65%, preferably not more than 60% or even not more than 55% by weight of the second region.

[0110] Anionic surfactant of the present invention may be combined with another surfactant generally chosen from nonionic, cationic, amphoteric or zwitterionic surfactants.

[0111] Non-ionic surfactants may provide enhanced performance for removing very hydrophobic oily soil and for cleaning hydrophobic polyester and polyester/cotton blend fabrics. Suitable non-ionic surfactants include water soluble aliphatic ethoxylated nonionic surfactants commercially known, including the primary aliphatic alcohol ethoxylates and secondary aliphatic alcohol ethoxylates. This includes the condensation products of a higher alcohol (e.g., an alkanol containing about 8 to 16 carbon atoms in a straight or branched chain configuration) condensed with about 4 to 20 moles of ethylene oxide, for example, lauryl or myristyl alcohol condensed with about 10 moles of ethylene oxide (EO), tridecanol condensed with about 6 to 15 moles of EO, myristyl alcohol condensed with about 10 moles of EO per mole of myristyl alcohol, the condensation product of EO with a cut of coconut fatty alcohol containing a mixture of fatty alcohols with alkyl chains varying from 10 to about 14 carbon atoms in length and wherein the condensate contains either about 6 moles of EO per mole of total alcohol or about 9 moles of EO per mole of alcohol and tallow alcohol ethoxylates containing 6 EO to 11 EO per mole of alcohol.

[0112] Examples of the foregoing nonionic surfactants include, but are not limited to, the Neodol (trade mark, ex Shell) ethoxylates, which are higher aliphatic, primary alcohol containing about 9 to 15 carbon atoms, such as C_9 to C_{11} alkanol condensed with 4 to 10 moles of ethylene oxide (Neodol 91-8 or Neodol 91-5), C_{12} to C_{13} alkanol condensed with 6.5 moles ethylene oxide (Neodol 23-6.5), C_{12} to C_{15} alkanol condensed with 12 moles ethylene oxide (Neodol 25-12), C_{14} to C_{15} alkanol condensed with 13 moles ethylene oxide (Neodol 45-13), and the like.

[0113] Such ethoxamers have an HLB (hydrophobic lipophilic balance) value of about 8 to 15 and give good O/W emulsification, whereas ethoxamers with HLB values below 7 contain less than 4 ethyleneoxide groups and tend to be poor emulsifiers and poor detergents.

[0114] Suitable amphoteric surfactants include derivatives of aliphatic secondary and tertiary amines containing an alkyl group of 8 to 18 carbon atoms and an aliphatic radical substituted by an anionic water-solubilizing group, such as sodium 3-

dodecylamino-propionate, sodium 3-dodecylaminopropane sulphonate and sodium N-2-hydroxydodecyl-N-methyltaurate.

[0115] Suitable cationic surfactants are quatemary ammonium salts according to the present invention are quaternary ammonium salts characterised in that the ammonium salt has the general formula: $R_1R_2R_3R_4N^+X^-$ wherein R1 is a C12 to C18 alkyl group, each of R_2, R_3 and R_4 independently is a C_1 to C_3 alkyl group and X is an inorganic anion. R_1 is preferably a C_{14} to C_{16} straight chain alkyl group, more preferably C_{16}. R_2, R_3 and R_4 are preferably methyl groups. The inorganic anion (X^-) is preferably chosen from halide, sulphate, bisulphate or hydroxide. For the purposes of this invention, a quaternary ammonium hydroxide is considered to be a quaternary ammonium salt. More preferably the anion is a halide ion or sulphate, most preferably a chloride or sulphate. Cetyltrimethylammonium chloride is a specific example of a suitable compound and commercially abundantly available. Another type of quaternary ammonium cationic surfactant is the class of benzalkonium halides, also known as alkyldimethylbenzylammonium halides. The most common type being benzalkonium chloride, also known as alkyldimethylbenzylammonium chloride (or ADBAC).

[0116] Suitable zwitterionic surfactants include derivatives of aliphatic quaternary ammonium, sulphonium and phosphonium compounds having an aliphatic radical of from 8 to 18 carbon atoms and an aliphatic radical substituted by an anionic water-solubilising group, for instance 3-(N-N-dimethyl-N-hexadecylammonium) propane-1 -sulphonate betaine, 3-(dodecyl methyl sulphonium) propane-1 - sulphonate betaine and 3- (cetyl methyl phosphonium) ethane sulphonate betaine.

[0117] The surfactant may be from a petroleum derived or non-renewable source, a renewable source, a combination of petroleum derived or non-renewable source and renewable source. Preferably the surfactant may be produced from primary sugars, biomass, waste plastic, municipal solid waste, carbon capture, methane capture, marine carbon or combinations thereof.

Disintegrant:

[0118] The second region includes a disintegrant. The disintegrant in the second region may be selected from the group consisting of the swellable disintegrant agent, effervescent disintegrant agent or combinations thereof.

[0119] In the second region, the weight ratio of the detersive surfactant to the disintegrant is from 0.1:1 to 5:1, more preferably from 0.5:1 to 3:1, still more preferably from 1:1 to 3:1. And most preferably from 1.5:1 to 2.5:1.

[0120] The disintegrant is selected from a swellable disintegrant agent, an effervescent disintegrant agent or combinations thereof.

Swellable agent

[0121] The swellable agent present in the second region includes those described in the context of the first region in accordance with the present invention.

[0122] When the disintegrant in the second region is a swellable disintegrant agent it may suitably be present in the second region in an amount ranging from 1 wt.% to 45 wt.%, preferably from 5 wt.% to 35 wt.%. still preferably from 5 wt.% to 30 wt.%, still preferably from 10 wt.% to 30 wt.%.

[0123] The second region preferably includes from 0 wt.% to 35 wt.% swellable disintegrant agent. Preferably the second region includes at least 1 wt.% swellable disintegrant agent, still preferably at least 5 wt.% swellable disintegrant agent, still more preferably at least 10 wt.% and preferably not more than 33 wt.%, still preferably not more than 32 wt.%, and furthermore preferably not more than 30 wt.% swellable disintegrant agent in the second region. Preferably the swellable disintegrant agent in the second region is selected from modified cellulose, cross-linked polyvinylpyrrolidones or mixtures thereof. Preferably the cellulose based material is microcrystalline cellulose. Preferably the amount of the modified cellulose preferably which is a microcrystalline cellulose to the cross-linked polyvinylpyrrolidone disintegrant agent in the second region is from 1:1 to 10:1, still preferably from 1:1 to 8:1.

Effervescent disintegrant agent

[0124] The effervescent disintegrant agent present in the second region includes those already described in the context of the first region in accordance with the present invention.

[0125] In specific embodiments according to the present invention the disintegrant in the second region is composed of only the swellable disintegrant and no effervescent agent.

[0126] In addition to the swellable disintegrant agent and effervescent disintegrant agent the unit dose cleaning composition according to the present invention may advantageously include several optional disintegrants in the second region, preferably the optional disintegrants includes water-soluble material such as, soaps, fatty acids, waxes and mixtures thereof. These optional disintegrant agents may be advantageously present in the second region and are described in greater detail in the previous paragraphs of this specification.

Optional ingredients in the second region:

[0127] In addition to these the second region may advantageously include fillers, fragrance ingredients, cleaning polymers, visual cues, sequestrant, shading dye, fluorescers, enzyme, colourants, pigments and combinations thereof. Preferably the second region includes a sequestrant co-granulated with an alkyl ether sulphate surfactant.

Further discrete region

[0128] Preferably the unit dose cleaning composition according to the present invention includes a further discrete region. The further discrete region, is preferably a third region according to the present invention includes an active ingredient separate from a water hardness removing agent and the detersive surfactant along with a disintegrant. The disintegrant in the third region is preferably selected from the group consisting of a swellable agent, an effervescent agent or combinations thereof. The disintegrant is as described in detail provided in the paragraphs hereinabove.

[0129] The further active ingredient present in the further discrete region, preferably the third region is a cleaning active agent and/or a care active agent. The cleaning active agent is other than the detersive surfactant. The cleaning active agent and/or the care active agent may be preferably selected from the group consisting of sequestrant, enzyme, perfume, rinse aid, shading dye, colourants, cleaning polymer, care polymer, pigments or combinations thereof.

[0130] In a preferred embodiment of the present invention, the further active ingredients may be provided in a separate third region. Preferably the third region according to the present invention includes:

i) an active agent which is preferably a cleaning active agent other than the detersive surfactant and/or a care active agent selected from the group consisting of sequestrant, cleaning polymer, care polymer, catalyst, enzyme, perfume, bleach, bleach activator, rinse aid, shading dye, pigments colourants or mixtures thereof; and,
ii) a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof.

[0131] Preferably the weight ratio between the active agent and the disintegrant in the third region ranges from 0.1:1 to 5:1. Still preferably any further region(s) also have an active agent and a disintegrant in a weight ratio range from 0.1:1 to 5:1.

[0132] The active agent may further preferably include any one or more of the following ingredients selected from bleach catalysts, perfumes, preservatives (e.g. bactericides), pH buffering agents, polyelectrolytes, anti-shrinking agents, anti-wrinkle agents, anti-oxidants, sunscreens, anti-corrosion agents, drape imparting agents, anti-static agents and ironing aids. The compositions may further comprise colorants, pearlisers and/or opacifiers, and shading dye.

[0133] Preferably when the unit dose cleaning composition includes an alkyl ester fatty acid sulphonate surfactant and enzyme, then the alkyl ester fatty acid sulphonate surfactant and enzyme are present in different region.

[0134] In a preferred embodiment of the present invention, the unit dose cleaning composition in preferably the form of a tablet which preferably has a second region at least partially sandwiched between two layers of the first region.

Unit dose cleaning composition

[0135] A unit dose cleaning composition according to the present invention is heterogenous. In the present specification, the term "heterogenous" is used to mean a unit dose cleaning composition, preferably having a plurality of discrete regions. Each region may be in the form of a layer, insert or coating. Preferably each region is formed by compaction of particulate ingredients or particulate blend of ingredient. Each discrete region in the unit dose cleaning composition may have differing composition. Preferably the discrete region is in the form of separate layers within the unit dose cleaning composition. It is also within the scope of the present invention that a discrete region is a core, or an insert and another discrete region is a shell or coating around the core or insert.

[0136] In a unit dose cleaning composition, preferably when in the form of tablet according to the present invention, each discrete region preferably has a weight of at least 0.2 grams. Preferably each region of the unit dose composition is a matrix of compacted particles. The weight of a unit dose cleaning composition will suitably range from 0.5 grams to 160 grams, preferably from 1 grams to 60 grams, depending on the conditions of intended use, and whether it represents a dose for an average load in a fabric washing or dishwashing machine or a fractional part of such a dose.

[0137] The overall density of a unit dose cleaning composition for fabric washing preferably lies in a range of at least at least 400 g/L, preferably at least 600 g/L up to 1400 g/L. The overall density of a unit dose composition for machine dishwashing, may range up to 1700 g/L and will often lie in a range from 1300 to 1550 g/L.

[0138] The unit dose cleaning composition may be of any shape. However, for ease of packaging they are preferably blocks of substantially uniform cross-section, such as cylinders or cuboids. Examples of suitable shape of the unit dose cleaning composition includes cylindrical, hexagonal, square, cylindrical with truncated faces, triangular, etc. Preferably, the unit dose cleaning composition according to the present invention is of a cylindrical disc-like shape. Preferred cylindrical unit dose cleaning composition of this invention have a diameter from about 5 millimeters to about 50 millimeters, preferably at least 10 millimeters, still preferably at least 20 millimeters, still further preferably the diameter ranges from 20 to 34 millimeters and a thickness from about 5 to about 24 millimeters, preferably from about 10 to about 22 millimeters.

[0139] The unit dose cleaning composition may be in the form of tablets, blocks, bricks, or briquettes. The unit dose cleaning composition is preferably a tablet composition. More preferably the tablet composition is a compacted tablet composition or a extruded tablet composition. It is further preferred that the tablet composition has the first region and the second region in the form of different layers. A discrete region in a tablet is preferably a matrix of compacted particles. Preferably the unit dose composition according to the present invention is a compacted particle or an extruded unit dose particle. A particulate composition (which term includes particulate blends or particulate ingredients) from which a unit dose composition according to the present invention is formed has an average particle size in the range from 200 to 2000 micrometers, more preferably from 250 to 1400 micrometers. Fine particles, smaller than 180 micrometers or 200 micrometers may be preferably eliminated by sieving before tableting, if desired. The term "particulate" as used herein means forms such as powders, granules, particles, flakes and other similar particulate forms that are capable of being compacted into a denser non-particulate form. In addition to compacting by means of compression other processes known to a person skilled in the art to form a unit dose composition having discrete regions are also within the scope of the present invention. Non-limiting examples of such process include extrusion.

[0140] While the starting particulate composition may in principle have any bulk density, the present invention may be especially relevant to tablets made by compacting powders of relatively high bulk density, because of their greater tendency to exhibit disintegration and dispersion problems. Such tablets have the advantage that, as compared with a tablet derived from a low bulk density powder, a given dose of composition can be presented as a smaller tablet. Thus, the starting particulate ingredient, blend or composition may suitably have a bulk density of at least 400 g/L, preferably at least 500 g/L, and possibly at least 600 g/L.

[0141] The particulate composition forming the first region and/or second region are formed by any known tower or non-tower route. Non-limiting examples includes spray-drying, dry blending and granulation. Particulate compositions or induvial components in the unit dose composition having high bulk density may be prepared by granulation and densification in a high-speed mixer/granulator, as described and claimed in EP 340013A (Unilever), EP 352135A (Unilever), and EP 425277A (Unilever), or by the continuous granulation/densification processes described and claimed in EP 367339A (Unilever) and EP 390251A (Unilever). Another suitable granulation process is described in WO 00/77147 (Unilever). A liquid binder is contacted with a solid starting material in a high-speed mixer and the resulting mixture is treated in a medium or low speed mixer and finally in a gas fluidisation granulator, where more liquid binder is added.

[0142] The unit dose cleaning composition of the present invention has at least two discrete regions. Preferably the unit dose composition of the present invention may have a plurality of discrete regions. Preferably the discrete region of the unit dose composition in the form of separate layers.

[0143] Altemately the first region and second region of the unit dose composition could be concentric, where one region is at the core or an insert while another region could be a shell or coating around such core or insert. The shell or coating is preferably the first region, the core or insert being the second region.

Laundry unit dose composition:

[0144] Preferably the unit dose composition according to the present invention is a laundry composition. As used herein the term "laundry composition" includes compositions and formulations designed for treating fabric. Such compositions include but are not limited to, laundry cleaning compositions and detergents, fabric softening compositions, fabric enhancing compositions, fabric freshening compositions, laundry prewash, laundry pretreat, laundry additives, dry cleaning agent or composition, laundry rinse additive, wash additive, post-rinse fabric treatment, ironing aid, delayed delivery formulation, detergent contained on or in a porous substrate or nonwoven sheet, and other suitable forms that may be apparent to one skilled in the art in view of the teachings herein.

[0145] When the unit dose cleaning composition is laundry composition it may advantageously have one or more of the below mentioned optional ingredients.

Bleach and bleach activator:

[0146] Unit dose composition may include a bleach. The bleach may be a percarbonate and bleach activator may be TAED. It is advantageous that the bleach is a weight efficient bleach system.

[0147] When present, the bleach is typically incorporated at a level of about 0.0001 to about 10 wt%, preferably about 0.001 to about 5 wt% in the unit dose composition.

Antiredeposition polymer:

[0148] Polymeric polycarboxylates may also be used. Specific examples of such materials include polyacrylates and copolymers of acrylic and maleic acid. The polymers may be in acid, salt or partially neutralised form and may suitably have a molecular weight (Mw) ranging from about 1,000 to 100,000, preferably from about 2,000 to about 85,000, and more preferably from about 2,500 to about 75,000. When present the antiredeposition polymer is present in a range from 0.1 wt.% to 5 wt.% by weight of the unit dose composition.

Perfume:

[0149] Laundry unit dose composition may preferably include a perfume. The inclusion of perfume into cleaning compositions is known *per se.* When the composition is used at very low levels of product dosage, it is advantageous to ensure that perfume is employed efficiently. A particularly preferred way of ensuring that perfume is employed efficiently is to use an encapsulated perfume. It is even more preferable that the perfume is not only encapsulated but also that the encapsulated perfume is provided with a deposition aid to increase the efficiency of perfume deposition and retention on fabrics. The deposition aid is preferably attached to the encapsulate by means of a covalent bond, entanglement or strong adsorption, preferably by a covalent bond or entanglement.

Visual Cues:

[0150] Advantageously the unit dose cleaning composition includes visual cues. The visual cue may be present in any of the regions. The compositions may comprise visual cues of solid material that is not dissolved in the composition. Preferred visual cues are lamellar cues formed from polymer film and possibly comprising functional ingredients. Enzymes and bleach catalysts are examples of such ingredients. Also perfume, particularly microencapsulated perfume.

Enzyme:

[0151] Advantageously the unit dose laundry composition includes an enzyme. Preferably the enzyme is present in the second region, the third region or both. Preferably the amount of enzyme present in the unit dose composition is from 0.1 wt.% to 10 wt.% enzyme, more preferably from 0.1 wt.% to 3 wt.% enzyme. Non-limiting examples of enzymes include lipase, mannanase, cellulase, protease, amylase or combinations thereof. The unit dose cleaning composition according to the present invention preferably includes from 0.1 to 5 wt.%, still preferably from 0.1 to 2 wt.%, still preferably from 0.1 to 0.8 wt.% enzyme.

Whitening agents:

[0152] Advantageously the unit dose laundry composition includes a whitening agent. Preferably the whitening agent is present in the second region, the third region or both.

[0153] Preferably a whitening agent is selected from the group consisting of dyes, shading dyes, pigments, colourants, fluorescers, dye-conjugates and combinations thereof. The dyes include liquitant blue hydrophilic, hydrophobic dyes e.g. AV50.

[0154] The whitening agent present in the second region, third region or both is preferably in an amount ranging from 0.001 wt.% to 10 wt.%, more preferably from 0.001 wt.% to 5 wt.% whitening agents.

Dye

[0155] Dyes are described in Color Chemistry Synthesis, Properties and Applications of Organic Dyes and Pigments, (H Zollinger, Wiley VCH, Zürich, 2003) and, Industrial Dyes Chemistry, Properties Applications. (K Hunger (ed), Wiley-VCH Weinheim 2003).

[0156] Dyes for use in unit dose cleaning composition preferably have an extinction coefficient at the maximum absorption in the visible range (400 to 700nm) of greater than 5000 L mol^{-1} cm^{-1}, preferably greater than 10000 L mol^{-1} cm^{-1}. Preferably the dyes are blue or violet in color. Preferred dye chromophores are azo, azine, anthraquinone, phthalocyanine and triphenylmethane. Azo, anthraquinone, phthalocyanine and triphenylmethane dyes preferably carry a net anionic charged or are uncharged. Azine dyes preferably carry a net anionic or cationic charge.

[0157] Preferred non-shading dyes are selected are selected from blue dyes, most preferably anthraquinone dyes bearing sulphonate groups and triphenylmethane dye bearing sulphonate groups. Preferred compounds are acid blue 80, acid blue 1, acid blue 3; acid blue 5, acid blue 7, acid blue 9, acid blue 11, acid blue 13, acid blue 15, acid blue 17, acid blue 24, acid blue 34, acid blue 38, acid blue 75, acid blue 83, acid blue 91, acid blue 97, acid blue 93, acid blue 93:1, acid blue

97, acid blue 100, acid blue 103, acid blue 104, acid blue 108, acid blue 109, acid blue 110, and acid blue 213.

[0158] Blue or violet Shading dyes are most preferred. Shading dyes deposit to fabric during the wash or rinse step of the washing process providing a visible hue to the fabric. In this regard the dye gives a blue or violet colour to a white cloth with a hue angle of 240 to 345, more preferably 260 to 320, most preferably 270 to 300. The white cloth used in this test is bleached non-mercerised woven cotton sheeting. Shading dyes are discussed in WO2005/003274, WO2006/032327(Unilever), WO2006/032397(Unilever), WO2006/045275(Unilever), WO 2006/027086(Unilever), WO2008/017570(Unilever), WO 2008/141880(Unilever), WO2009/132870(Unilever), WO 2009/141173 (Unilever), WO 2010/099997(Unilever), WO 2010/102861(Unilever), WO 2010/148624(Unilever), WO2008/087497 (P&G), WO2011/011799 (P&G), WO2012/054820 (P&G), WO2013/142495 (P&G) and WO2013/151970 (P&G). A mixture of shading dyes may be used.

[0159] The shading dye chromophore is most preferably selected from mono-azo, bis-azo and azine. Mono-azo dyes preferably contain a heterocyclic ring and are most preferably thiophene dyes. The mono-azo dyes are preferably alkoxylated and are preferably uncharged or anionically charged at pH=7. Alkoxylated thiophene dyes are discussed in WO2013/142495 and WO2008/087497. Bis-azo dyes are preferably sulphonated bis-azo dyes. Preferred examples of sulphonated bis-azo compounds are direct violet 7, direct violet 9, direct violet 11, direct violet 26, direct violet 31, direct violet 35, direct violet 40, direct violet 41, direct violet 51, direct violet 66, direct violet 99 and alkoxylated versions thereof. Alkoxylated bis-azo dyes are discussed in WO2012/054058 and WO/2010/151906. Azine dyes are preferably selected from sulphonated phenazine dyes and cationic phenazine dyes. Preferred examples are acid blue 98, acid violet 50, dye with CAS-No 72749-80-5, acid blue 59, and the phenazine dye.

[0160] The shading dye is present in the unit dose cleaning composition in range from 0.0001 to 0.1 wt %. Depending upon the nature of the shading dye there are preferred ranges depending upon the efficacy of the shading dye which is dependent on class and particular efficacy within any particular class. As stated above the shading dye is a blue or violet shading dye.

Fluorescer:

[0161] Advantageously the whitening agent is a fluorescer. Fluorescer (optical brightener) are well known and many such fluorescer are available commercially. Usually, these fluorescer are supplied and used in the form of their alkali metal salts, for example, the sodium salts. The total amount of the fluorescer used in the composition is generally from 0.005 to 2 wt %, more preferably 0.01 to 1 wt %. Suitable fluorescer may be selected from the group comprising disulphonated distyrylbiphenyls, disulphonated triazinylaminostilbenes, bis(1 ,2,3-triazol-2-yl)stilbenes, bis(benzo[b]furan-2-yl)biphenyls, and 1 ,3-diphenyl-2-pyrazolines. Preferred fluorescers are disodium 4,4'-bis(2-sulfostyryl) biphenyl, sodium 2 (4-styryl-3-sulfophenyl)-2H-napthol[1 ,2-d]triazole, disodium 4,4'-bis{[(4-anilino-6-(N methyl-N-2 hydroxyethyl) amino 1 ,3,5-triazin-2-yl)]amino}stilbene-2-2' disulfonate, disodium 4,4'-bis{[(4-anilino-6-morpholino-1 ,3,5-triazin-2-yl)]amino} stilbene-2-2' disulphonate, Tinopal® DMS is the disodium salt of 4,4'-bis{[(4-anilino-6-morpholino-1 ,3,5-triazin-2-yl)] amino} stilbene-2-2' disulphonate.

[0162] 4,4'-bis-(2-diethanolamino-4-anilino-s-triazin-6-ylamino) stilbene-2,2'-disulphonate; 4,4'-bis-(2,4-dianilino-s-triazin-6-ylamino) stilbene-2.2'-disulphonate; 4,4'-bis-(4-phenyl-2,I,3-triazol-2-yl)stilbene-2,2'-disulphonate; 4,4'-bis-(2-anilino-4(I-methyl-2-hydroxy-ethylamino)-s-triazin-6-ylamino) stilbene-2,2'- disulphonate; 2-(stilbyl-4"-naptho-I.,2':4,5)-I,2,3-trizole-2"-sulphonate. Particularly preferred fluorescers are Tinopal (Trade Mark) CBS-X, Di-amine stilbene di-sulphonic acid compounds, e.g. Tinopal DMS pure Xtra and Blankophor (Trade Mark) HRH, Pyrazoline compounds, e.g. Blankophor SN and Tinopal® CBS, the disodium salt of 4,4'-bis(2-sulfostyryl)biphenyl. Tinopal® DMS and Tinopal® CBS are available from BASF, Basel, Switzerland.

Cleaning or care polymers:

[0163] Advantageously the unit dose cleaning composition according to the present invention includes a cleaning polymer or a care polymer. The cleaning polymer or care polymer is preferably present in the second region, third region or both. The cleaning polymers preferably includes anti-redeposition polymers, soil release polymers, sequestering polymers.

[0164] Non-limiting examples of anti-redeposition polymers includes Sokalan® CP5 (Ex BASF). Non-limiting examples of soil release polymers includes SF2 (Ex Rhodia).

[0165] Non-limiting examples of soil release polymers includes phosphonates, HEDP.

[0166] Still preferably the polymer is a homopolymer of acrylic acid having an average molecular weight of from 4000 to 8000 g/mol. Commercially available as Acusol™ 445 from Dow having a molecular weight of 4500 g/mol.

Fillers:

[0167] Preferred fillers for use in the invention include alkali metal (more preferably sodium and/or potassium) sulfates and chlorides and mixtures thereof, with sodium sulfate and/or sodium chloride being most preferred. Filler, when included, may be present in a total amount ranging from about 0.1 to about 80%, preferably from about 0.1 to about 50% (by weight based on the total weight of the composition).

[0168] A method of laundering fabric using a composition of the invention will usually involve diluting the unit dose laundry detergent composition with water to obtain a wash liquor and washing fabrics with the wash liquor so formed. The dilution step preferably provides a wash liquor which comprises from 3 to 20 g/wash of detersive surfactant. A subsequent aqueous rinse step and drying the laundry is preferred.

Dishwashing unit dose composition:

[0169] Preferably the unit dose composition according to the present invention is a dishwashing composition. As used herein the term "dishwashing composition" includes compositions and formulations designed for treating dishware which encompasses tableware, cookware and any food- holding/handling items used for cooking and/or eating. Dishwashing includes both manual washing and automatic washing.

[0170] By "unit-dose form" is herein meant that the composition is provided in a form sufficient to provide enough detergent for one wash. Suitable unit dose forms include tablets, sachets, capsules, pouches, etc.

[0171] When the unit dose cleaning composition is dishwashing composition it may advantageously have one or more of the below mentioned optional ingredients selected from but not limited to builder, pH buffer, bleach, bleach catalyst, Surfactant, anti-scaling polymer, filler, care agent, sequestrant, tableting aid, enzyme, antifoam, water, perfume, colorant and emotive.

[0172] The composition is preferably phosphate free. By "phosphate-free" is herein understood that the composition comprises less than 1%, preferably less than 0.1% by weight of the composition of phosphate.

Builder:

[0173] Suitable examples of the builder include methyl-glycine-diacetic acid (MGDA) and its salts, glutamic-N,N-diacetic acid (GLDA) and its salts, iminodisuccinic acid (IDS) and its salts, carboxy methyl inulin and its salts and mixtures thereof. Preferably MGDA, trisodium citrate or mixtures thereof. The builder is preferably present in an amount ranging from 5 wt.% to 35 wt.%, more preferably from 10 wt.% to 30 wt.%.

Bleach:

[0174] Inorganic and organic bleaches are suitable for use herein. Inorganic bleaches include perhydrate salts such as percarbonate, perphosphate, persulfate and persilicate salts. The inorganic perhydrate salts are normally the alkali metal salts. Suitable examples of bleach include percarbonate bleach. Preferably sodium percarbonate. The dishwashing composition preferably includes from 5 wt.% 20 wt.%, more preferably from 5 wt.% to 15 wt.% bleach.

[0175] Preferably the bleach is used in combination with a bleach catalyst. Bleach catalysts suitable for use herein include compounds which, under perhydrolysis conditions, give aliphatic peroxoycarboxylic acids having preferably from 1 to 12 carbon atoms, more preferably from 2 to 10 carbon atoms, and/or optionally substituted perbenzoic acid. Suitable substances bear O-acyl and/or N-acyl groups of the number of carbon atoms specified and/or optionally substituted benzoyl groups. Preferably the bleach catalyst is TAED. If present the bleach catalyst is present in an amount ranging from 0.01 wt.% to 5 wt.%, still preferably 0.2 wt.% to 2 wt.% by weight of the unit dose composition.

Surfactant:

[0176] The dishwashing unit dose composition preferably includes one or more surfactant selected from nonionic surfactant, cationic surfactant, zwitterionic surfactant and anionic surfactant. Preferably the dishwashing composition includes nonionic surfactant or a mixture of different non-ionic surfactants. Traditionally, non-ionic surfactants have been used in automatic dishwashing for surface modification purposes in particular for sheeting to avoid filming and spotting and to improve shine. It has been found that non-ionic surfactants can also contribute to prevent redeposition of soils.

[0177] Suitable nonionic surfactants include: i) ethoxylated non-ionic surfactants prepared by the reaction of a monohydroxy alkanol or alkyphenol with 6 to 20 carbon atoms with preferably at least 12 moles particularly preferred at least 16 moles, and still more preferred at least 20 moles of ethylene oxide per mole of alcohol or alkylphenol; ii) alcohol alkoxylated surfactants having from 6 to 20 carbon atoms and at least one ethoxy and propoxy group. Preferably the nonionic surfactant includes unbranched fatty alcohol with ethylene oxide in combination with higher alkene oxides. It is also preferred that the nonionic surfactant is a branched guerbet alcohol alkoxylate with 1 to 10 EO group and having an alkyl chain with 5 to 20 carbon atoms. Commercially available examples of the nonionic surfactant includes Plurafac® LF-301 supplied by BASF and Lutensol A80. The dishwashing composition preferably includes from 0.1 wt.% 5 wt.%, more preferably from 1 wt.% to 5 wt.% surfactant.

[0178] Preferably when the unit dose cleaning composition is a handwashing composition the surfactant preferably comprises alkyl sulfates and/or alkyl ethoxy sulfates anionic surfactants; more preferably a combination of alkyl sulfates and/or alkyl ethoxy sulfates with a combined average ethoxylation degree of less than 5, preferably less than 3, more preferably less than 2 and most preferably between 0.5 and 1. Preferably the anionic surfactant is a branched anionic surfactant having an average level of branching of from 5% to 40%, preferably from 10% to 35% and more preferably from 20% to 30%. Preferably, the composition of the present invention further comprise amphoteric and/or zwitterionic surfactant, more preferably an amine oxide or betaine surfactant, most preferably an amine oxide. The anionic and amphoteric or zwitterionic surfactants are present in a weight ratio anionic to amphoteric or anionic to zwitterionic of from 1:1 to 8.5:1, more preferably in a weight ratio of less than 5:1, and even more preferably in a weight ratio of less than 4.5:1 and greater than 1.5, more preferably greater than 2. The most preferred surfactant system for the hand dishwashing composition will therefore comprise: (1) 1% to 40%, preferably 6% to 32%, more preferably 8% to 25% by weight of the total composition of an anionic surfactant, more preferably an alkyl sulphate or an alkyl ethoxy sulphate anionic surfactant or a mixture thereof, combined with (2) 0.01% to 20%, preferably from 0.2% to 15%, more preferably from 0.5% to 10% by weight of the composition of amphoteric and/or zwitterionic surfactant, more preferably an amphoteric surfactant, even more preferrably an amine oxide surfactant and most preferably an alkyldimethyl amine oxide surfactant.

Anti-scaling polymer:

[0179] Suitable examples of the antiscaling polymer includes polycarboxylate. Preferred carboxylic acid monomers include one or more of the following: acrylic acid, maleic acid, maleic anhydride, itaconic acid, citraconic acid, 2-phenylacrylic acid, cinnamic acid, crotonic acid, fumaric acid, methacrylic acid, 2-ethylacrylic acid, methylenemalonic acid, or sorbic acid. Acrylic and methacrylic acids being more preferred. Preferred commercial available polymers include: Alcosperse 240, Aquatreat AR 540 and Aquatreat MPS supplied by Alco Chemical; Acumer 3100, Acumer 2000, Acusol 587G and Acusol 588G supplied by Rohm & Haas; Goodrich K-798, K-775 and K-797 supplied by BF Goodrich; and ACP 1042 supplied by ISP technologies Inc. Particularly preferred polymers are Acusol 587G and Acusol 588G supplied by Rohm & Haas and Sokalan PA 25 CL supplied by BASF.

[0180] The dishwashing composition preferably includes from 0.1 wt.% 5 wt.%, more preferably from 1 wt.% to 5 wt.% anti-scaling polymer.

Filler:

[0181] Suitable examples of the filler include sodium sulphate. The dishwashing composition preferably includes from 5 wt.% 30 wt.%, more preferably from 5 wt.% to 15 wt.% filler.

Care agent:

[0182] Suitable examples of the care agent include disilicate, benzotriazole (BTA). BTA is used as a metal care agent and prevents or reduce the tarnishing, corrosion or oxidation of metals, including aluminium, stainless steel and non-ferrous metals, such as silver and copper. The dishwashing composition preferably includes from 0.1 wt.% 10 wt.%, more preferably from 1 wt.% to 5 wt.% care agent.

Sequestrant:

[0183] Suitable examples of the sequestrant include phosphonates. The dishwashing composition preferably includes from 0.1 wt.% 10 wt.%, more preferably from 0.8 wt.% to 5 wt.% sequestrant.

Enzyme:

[0184] Non-limiting examples of the enzyme includes protease, lipase, cellulase, amylase or combinations thereof. The dishwashing composition preferably includes from 0.001 wt.% 1 wt.%, more preferably from 0.005 wt.% to 0.5 wt.% enzyme.

[0185] Suitable commercially available protease enzymes include those sold under the trade names Savinase®, Polarzyme®, Kannase®, Ovozyme®, Everlase® and Esperase® by Novozymes A/S (Denmark), those sold under the tradename Properase®, Purafect®, Purafect Prime®, Purafect Ox®, FN3®, FN4®, Excellase®, Ultimase® and Purafect OXP® by Genencor International, those sold under the tradename Opticlean® and Optimase® by Solvay Enzymes, those available from Henkel/ Kemira, namely BLAP. Preferred levels of protease in the product of the invention include from 0.1 to 10, more preferably from 0.5 to 7 and especially from 1 to 6 mg of active protease.

[0186] Suitable commercially available alpha-amylases include DURAMYL®, LIQUEZYME®, TERMAMYL®, TERMAMYL ULTRA®, NATALASE®, SUPRAMYL®, STAINZYME®, STAINZYME PLUS®, POWERASE®, FUNGAMYL® and BAN® (Novozymes A/S, Bagsvaerd, Denmark), KEMZYM® AT 9000 Biozym Biotech Trading GmbH Wehlistrasse 27b A-1200 Wien Austria, RAPIDASE® , PURASTAR®, ENZYSIZE®, OPTISIZE HT PLUS® and PURASTAR OXAM® (Genencor Intemational Inc., Palo Alto, California) and KAM® (Kao, 14-10 Nihonbashi Kayabacho, 1-chome, Chuo-ku Tokyo 103-8210, Japan). Amylases especially preferred for use herein include NATALASE®, STAINZYME®, STAINZYME PLUS®, POWERASE® and mixtures thereof. Preferably, the unit dose dishwashing composition comprises at least 0.01 mg, preferably from 0.05 to 10, more preferably from 0.1 to 6, especially from 0.2 to 5 mg of active amylase.

Antifoam:

[0187] Non-limiting examples of the antifoaming agent includes silicone. The dishwashing composition preferably includes from 0.01 wt.% 1 wt.%, more preferably from 0.05 wt.% to 1 wt.% antifoam.

Packaging and dosing

[0188] The unit dose composition of the invention may be packaged as unit doses in polymeric film soluble in the wash water. Alternatively, a unit dose cleaning composition of the invention may be supplied in multi-dose plastics packs with a top or bottom closure. The packaging may preferably include paper and carton-based packaging well known to a person skilled in the art for packaging unit dose composition.

[0189] According to a second aspect of the present specification, disclosed is a method of manufacturing a unit dose cleaning composition according to the first aspect, comprising the steps of:

i) blending a water hardness removing agent and a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof to form a first unit dose component mix;
ii) blending a detersive surfactant and a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof to form a second unit dose component mix;
iii) adding the first unit dose component mix to a mould and the second unit dose component mix to the mould to form discrete unit dose component; and,
iv) applying pressure to form a unit dose cleaning composition.

wherein the weight ratio of the water hardness removing agent to the disintegrant in the first region is from 5:1 to 20:1 and wherein the weight ratio of the detersive surfactant to the disintegrant in the second region is from 0.1:1 to 5:1.

[0190] Preferably the pressure applied for tableting is in the range from 2.5 to 100 Kgf/cm^2, more preferably the pressure is in the range of 5 to 30 Kgf/cm^2.

[0191] According to one embodiment, the unit dose cleaning composition is a tablet. Tableting entails compaction of a particulate composition. A variety of tableting machinery is known and can be used. Generally, the process includes the step of stamping a quantity of the particulate composition which is confined in a die or a mould.

[0192] Manufacture of a tablet according to the present invention having two region (first region and second region) preferably where each region is in the form of layers of differing composition may be carried out by placing a predetermined quantity of a first composition forming the first region in a mould, then adding a second composition forming the second region on top, and next driving a die into the mould to cause compaction. Further regions may be prepared by following similar process.

[0193] Alternatively, a predetermined quantity of a first composition may be placed in a mould and compacted by driving a die into the mould, followed by removing the die, adding a second composition and compacting again. Further regions may be prepared by following similar process.

[0194] Tablets with even more layer can be made by these routes, but with extra stages of loading particulate material into the die, and possibly compacting after each stage.

[0195] Tableting machinery able to carry out such operations is known, for example suitable tablet presses are available from Fette and from Korch.

[0196] In one preferred embodiment of the present invention, the unit dose cleaning composition includes two first regions and one second region, where second region is provided between the two first region.

[0197] The mould in which the tablet is formed may be provided by an aperture within a rigid structure (that is a rigid structure surrounding a cavity) and a pair of dies (punches) which are moveable towards each other within the cavity, thereby compacting the contents of the aperture. A tableting machine may have a rotary table defining a number of apertures each with a pair or associated dies which can be driven into an apertures. Each die may be provided with an elastomeric layer on its surface which contacts the tablet material, as taught in WO 98/46719 or WO 98/46720.

[0198] Tableting may be carried out at ambient temperature or at a temperature above ambient which may allow adequate strength to be achieved with less applied pressure during compaction. In order to carry out the tableting at a temperature which is above ambient, the particulate composition is preferably supplied to the tableting machinery at an elevated temperature. This will of course supply heat to the tableting machinery, but the machinery may be heated by other means.

[0199] If any heat is supplied, it is envisaged that it will be supplied conventionally, such as by passing the particulate composition through an oven, rather than by any application of microwave energy.

[0200] Further examples within the scope of the present invention will be apparent to the person skilled in the art.

Examples

Example 1a: Preparing a unit dose dishwashing cleaning composition according to the present invention.

[0201] A unit dose dishwashing composition was prepared by first measuring the amount of various ingredients required for the first region and mixing them to form a homogeneous mixture. Thereafter the first region premix was added into a tableting machine to form the first region. Similarly, the second region premix was prepared including the ingredients as shown in table 1a. Thereafter the second region was also moulded to provide the unit dose dishwashing composition.

Table 1a

Dishwashing unit dose tablet composition			
Ingredients	**First region (wt.%)**	**Ingredients**	**Second region (wt.%)**
MGDA[1]	44.4	Bleach catalyst	7.7
Sodium carbonate[1]	24.8	Nonionic surfactant[2]	16.5
Polycarboxylate	4.6	Disilicate	18.1
Sodium percarbonate	16.1	Bismuth citrate	1.0
Phosphonate/Carbonate	1.2	Enzyme	13.3
Antifoam	0.7	Colourant	0.4
perfume	0.3	Disintegrant	43.0
Coloured particle	2.2		
Disintegrant	5.2		
Water	0.5		
[1]Water hardness removing agent Disintegrant is a mixture of modified cellulose, cross-linked polyvinylpyrrolidone and coated citric acid		[2]detersive surfactant Disintegrant is modified cellulose and cross-linked polyvinylpyrrolidone	

Example 1b: Preparing a unit dose laundry cleaning composition according to the present invention.

[0202] The ingredients provided in table 1b for the first region were taken in a mixer and homogeneously mixed to form the pre-mix for the first region. Similarly, the second region premix was formed as shown in table 1b. The disintegrant were added in the last step.

[0203] A 7 grams unit dose laundry cleaning composition was prepared. For this, 4.5 grams of the prepared composition for the first region was placed in a mould having a circular diameter of 25 mm and compacted manually under a compression pressure of 10 Kgf/cm^2. Next 2.5 grams of the composition for the second region was added into the mould and again compacted under similar conditions. The two-layered tablet composition included a first region and a second region. Table 1b below shows 2 different examples of unit dose laundry cleaning composition according to the present invention.

Table 1b

Ingredients	**Ex 1 (wt.%)**	**Ex 2 (wt.%)**
First region		
SLES 1EO	8.8	8

(continued)

Ingredients	Ex 1 (wt.%)	Ex 2 (wt.%)
First region		
Sodium silicate	7.8	0
Sodium carbonate	55	70.5
Forcal U	12	8
Enzyme	0	0
Disintegrant&	7.5	6
Perfume	0.6	0.6
Moisture	7	6
Visual cues	0.04	0.04
Miscellaneous	1.3	0.9
water hardness removing agent : disintegrant	8.4	11.8
Total	100	100
& disintegrant includes micoaystalline cellulose, cross-linked polyvinylpyrrolidone and citric acid. water hardness removing agent includes sodium carbonate and sodium silicate		
Second region		
Ingredients	**Ex 1 (wt.%)**	**Ex 2 (wt.%)**
LAS	0	11.5
PAS	54	43
Enzyme	1.6	1.6
Disintegrant*	28.6	30.5
HEDP/Carbonate	5	5.2
Fluorescer	0.8	0.8
Moisture	4	7
Filler	6	0.4
Detersive surfactant : disintegrant	1.9	1.8
Total	100	100
* disintegrant includes microcrystalline cellulose and cross-linked polyvinylpyrrolidone. Detersive surfactant includes LAS and PAS		

Table 2

Ingredients	Ex 1 (wt.%)	Ex 2 (wt.%)	EX A (wt.%)
LAS	0	4	17.5
Primary alkyl sulphate	19	15	1.9
SLES 1EO	5.6	5	0
Sodium silicate	5	0	10
Sodium carbonate	35	46	35
Forcal U*	7.5	5	5
Disintegrant&	16.5	14.5	0
Enzyme	0.6	0.6	0.45
HEDP/Carbonate	1.8	1.8	1.2

(continued)

Ingredients	Ex 1 (wt.%)	Ex 2 (wt.%)	EX A (wt.%)
Perfume	0.4	0.4	0.4
Fluorescer	0.3	0.3	0.3
Filler	1.2	0.2	20.9
Visual cue	0.03	0.03	0.03
Moisture	6	6	6
Miscellaneous	1.07	1.17	1.32
Total	100	100	100
*(precipitated calcium carbonate) &(microcrystalline cellulose, cross-linked polyvinylpyrrolidone and citric acid)			

[0204] The unit dose cleaning tablets according to the present invention (Ex 1 and Ex 2) were formed properly and were structurally stable.

Example 2: Evaluation of the water softening performance of the tablet composition according to the present invention

[0205] The water softening performance of the tablet composition according to the present invention (Ex 2 of Table 2) was evaluated against a comparative typical spray-dried laundry detergent composition (Ex A) as shown in table 2.

Procedure for evaluation of water softening:

[0206] Sample preparation: 10.6 L of 48 FH (2:1 Ca: Mg) water was taken in two separate buckets. 30mL of this water is collected in a sampling container for initial water hardness measurement. The amount of the comparative spray dried powder added to the water provided 0.46 g/L of surfactant, 0.92 glL of the water hardness removing agent. After the addition of the comparative powder in the first bucket the timer was started. Similarly, 3 tablets of the inventive unit dose composition of Ex 2 having a total weight of 21 grams was added to a second bucket and the timer was started.

[0207] After addition, the water in both the buckets was slowly stirred for 30 seconds. After an interval of 1 minute approximately 30mL of the aqueous liquor is collected from each bucket and filtered through a 0.2 µm filter medium (standard PES membrane) Immediately after collecting and filtering the sample the residual hardness of the aqueous liquor was measured by complexometric titration against standardized EDTA solution.

[0208] Complexometric titration measurement procedure: EDTA (secondary standard) solution was standardized against standard Zinc Acetate (primary standard) solution. 10 mL of test solution was taken in a conical flask and diluted to 100mL with de-ionized water. Then 2 mL of ammonia/ammonium chloride buffer solution was added to make the final solution ammoniacal. Then a pinch of Eriochrome Black T (EBT) indicator was added to the solution which turns the solution into a wine red in colour. Next using a burette, drop by drop secondary standard EDTA solution was added to the test solution with vigorous mixing until the solution becomes blue, which indicates the end of the titration.

[0209] Equation of complexometric titration-

$$C_{EDTA} \times V_{EDTA} = C_{Solution} \times V_{Solution}$$

C_{EDTA} = Concentration of Standard EDTA solution (M)
V_{EDTA} = Volume of Standard EDTA solution required (mL)
$C_{Solution}$ = Concentration of test solution (M)
$V_{Solution}$ = Volume of test solution taken (mL)

[0210] The titration value obtained was obtained and is provided in table 4 below.

Table 3: Water softening measurement data

Time (minute)	Residual hardness (FH)		
	Ex A	Ex 1	Ex 2
0	44	44	44

(continued)

Time (minute)	Residual hardness (FH)		
	Ex A	Ex 1	Ex 2
1	44	30	33
2	38	22	27
3	38	20	21

[0211] The water softening data showed on Table 3 indicates that for similar levels of the builder present in both comparative A and example 1, 2 according to the present invention, the water softening performance of the tablet composition of the present invention (Ex 1, Ex 2) outperformed the comparative composition (Ex A). This clearly indicates that the unit dose composition of the present invention having a first region released before the second region, provides an improvement in the water softening performance.

Example 3: Evaluation of the surfactant content of the tablet composition

[0212] To evaluate the surfactant content available in a tablet composition according to the present invention having a first region and a second region as shown in table 2 (Ex 2), the compositions were evaluated along with a comparative tablet composition (Comp B). The composition of the comparative tablet (Comp B) was the same as that of the inventive tablet Ex 2, except that in tablet Comp B the two regions were not formed, and the entire tablet had the same composition throughout.

[0213] To evaluate the surfactant loss, 3 tablet according to the present invention (Ex 2, weighing around 21 grams) was added to a bucket containing 10.6 L water (with a water hardness of 0 FH) and stirred for 30 seconds. After stirring for 30 seconds, the bucket was allowed to remain undisturbed. After 3 minutes the water was mixed again to homogenise. Then 10 mL of the aqueous liquor was collected in a sample container and filtered through a 0.2 μm filter medium (standard PES membrane). Anionic surfactant content in the collected aqueous liquor was analysed by titrating against a standard Hyamine solution. The same process was carried out in another bucket having a water with a water hardness of 48 FH when measured at room temperature.

[0214] The above experimental setup was similarly conducted for the comparative tablet composition (Comp B) and the anionic surfactant content was measured as described herein below.

[0215] Determining the anionic surfactant content:

- Hyamine solution: 0.0004 mol/L of Hyamine solution was prepared from 0.004 mol/L Hyamine 1622 solution.
- Titration of the aqueous liquor: 2 mL of each of the 4 different collected, filtered aqueous liquor were taken in 4 different stoppered bottle. Then 5 mL of chloroform and a few drops of mixed indicator was added to each of the 4 stoppered bottle and then shook vigorously. Next the prepared Hyamine solution was added drop by drop using a pipette and after every addition the stoppered bottle was closed and shaken vigorously until the chloroform layer turned bluish green from bright pink. This indicates the neutralisation point.

[0216] Equation of colorimetric two-phase titration-

$$C_{Hyamine} \times V_{Hyamine} = C_{Solution} \times V_{Solution}$$

$C_{Hyamine}$ = Concentration of Standard Hyamine solution (M)
$V_{Hyamine}$ = Volume of Standard Hyamine solution required (mL)
$C_{Solution}$ = Concentration of test solution (M)
$V_{Solution}$ = Volume of test solution taken (mL)

[0217] The amount of the hyamine solution required for neutralizing was recorded and the amount of the anionic surfactant content available in each aqueous liquor was calculated based on the standard curve. The amount of anionic surfactant concentration available is provided in Table 4.

Table 4: Available anionic surfactant

Tablet composition	Time (in minutes)	Surfactant concentration		Surfactant Loss (wt.%)
		at 0 FH (g/L)	at 48 FH (g/L)	
Comp B	15	0.43	0.10	76.7
Ex 2	15	0.42	0.24	42.9

[0218] The data in table 4 indicates that the comparative tablet (Comp B) shows higher percentage of surfactant loss when compared to the composition according to the present invention (Ex 2). This shows that the surfactant content in the composition according to the present invention is better available even when the amount of builder present in the tablet composition remains unchanged. Thus, the tablet composition according to the present invention provides improved cleaning performance as compared to the comparative tablet composition.

Example 4: Evaluation of tablet unit dose compositions having different ratios between the disintegrant and the active ingredient.

[0219] A comparative tablet unit dose composition was prepared with the first region and the second region which were same as that provided for Ex 2 (Table 2) but the tablet had different ratios between the builder and the disintegrant in the first region and a different ratio between the detersive surfactant and the disintegrant in the second region. The comparative tablet composition was evaluated, and the details are provided in table 5 below.

Table 5

Ingredients	Comp Ex C (wt.%)	Ex 2 (wt.%)
First region		
Water hardness removing agent (sodium carbonate)	68.4	70.5
Disintegrant	2	5.97
Ratio of water hardness removing agent : disintegrant	34.2	11.8
Second region		
Detersive surfactant (LAS + PAS)	74	54.5
Disintegrant	8.6	30.5
Ratio of detersive surfactant : disintegrant	8.6	1.8

[0220] It was found that in the comparative unit dose composition (Comp Ex C) where the weight ratio between water hardness removing agent to disintegrant in the first region is outside the claimed ranges (34.2) the tablet did not disintegrate even after 5 minutes. It was further found that the second region the comparative tablet (Ex C) having a weight ratio between the detersive surfactant and the disintegrant of 8.6 (outside the claimed range) also failed to disintegrate even after 10 minutes. On the other hand, the composition according to the present invention, the first region disintegrated within 5 minutes and the second region disintegrated within 10 minutes.

Claims

1. A unit dose cleaning composition comprising:

i) a first region comprising:

i a water hardness removing agent;
ii a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof;

ii) a second region comprising:

i a detersive surfactant;
ii a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof;

wherein the weight ratio of the total amount of water hardness removing agent to the total amount of disintegrant in the first region is from 5:1 to 20:1 and wherein the weight ratio of the total amount of detersive surfactant to the total amount of disintegrant in the second region is from 0.1:1 to 5:1.

2. A composition according to claim 1 wherein the water hardness removing agent is a builder selected from the group consisting of inorganic builder, organic builder or mixtures thereof.

3. A composition according to claim 1 or 2 wherein the first region comprises a seeding agent, preferably selected from calcium carbonate, dolomite, kaolinite, feldspar, precipitated calcium carbonate or combinations thereof.

4. A composition according to any one of the preceding claims 1 to 3 wherein the weight ratio of the builder to seeding agent in the first region is from 1:1 to 1:20.

5. A composition according to any one of the preceding claims wherein when the water hardness removing agent comprises a sequestrant, the sequestrant is present in an amount of at least 20 wt.% of the first region.

6. A composition according to any one of the preceding claims wherein the second region comprises a sequestrant co-granulated with an alkyl ether sulphate surfactant.

7. A composition according to any one of the preceding claims wherein the water hardness removing agent is an inorganic builder selected from the group consisting of alkali metal carbonate, alkali metal bicarbonate, alkali metal sesquicarbonate, alkali metal silicate, or combinations thereof.

8. A composition according to any one of the preceding claims wherein the swellable agent is a polymeric material, preferably selected from the group consisting of inorganic or organic material, still preferably polymeric organic material selected from cellulose, starch, modified starch, microcrystalline cellulose, crosslinked polyvinylpyrrolidone, or combinations thereof.

9. A composition according to any one of the preceding claims wherein when the disintegrant is an effervescent agent it comprises a combination of acid and base, preferably an organic acid and a carbonate base.

10. A composition according to any one of the preceding claims wherein the amount of detersive surfactant present in the first region is not more than 15 wt.% of the first region.

11. A composition according to any one of the preceding claims wherein the amount of detersive surfactant present in the second region is at least 15 wt.% of the second region.

12. A composition according to any one of the preceding claims wherein the composition comprises a third region comprising:

i) a cleaning active agent other than the detersive surfactant and/or a care active agent selected from the group consisting of enzyme, perfume, sequestrant, bleach, bleach activators, rinse aid, shading dye, colourants, pigments;
ii) a disintegrant selected from a group consisting of swellable agent, effervescent agent or combinations thereof.

wherein the weight ratio of the cleaning active agent and/or the care active agent to the disintegrant in the third region is from 5:1 to 20:1.

13. A composition according to any one of the preceding claims wherein when the composition includes an alkyl ester fatty acid sulphonate surfactant and enzyme, then the alkyl ester fatty acid sulphonate surfactant and enzyme are present in different region.

14. A composition according to any one of the preceding claims wherein the unit dose cleaning composition is a tablet composition.

15. A composition according to any one of the preceding claims wherein the unit dose cleaning composition is a dish wash composition or a laundry composition.

Patentansprüche

1. Reinigungsmittelzusammensetzung in Einzeldosisform, umfassend:

i) einen ersten Bereich, der umfasst:

- i ein Mittel zur Beseitigung der Wasserhärte;
- ii ein Sprengmittel, ausgewählt aus einer Gruppe, bestehend aus Quellmitteln, Brausemitteln oder Kombinationen davon;

ii) einen zweiten Bereich, der umfasst:

- i ein Reinigungstensid;
- ii ein Sprengmittel, ausgewählt aus einer Gruppe, bestehend aus Quellmitteln, Brausemitteln oder Kombinationen davon;

wobei das Gewichtsverhältnis der Gesamtmenge des Mittels zur Beseitigung der Wasserhärte zu der Gesamtmenge des Sprengmittels in dem ersten Bereich 5:1 bis 20:1 beträgt und wobei das Gewichtsverhältnis der Gesamtmenge des Reinigungstensids zu der Gesamtmenge des Sprengmittels in dem zweiten Bereich 0,1:1 bis 5:1 beträgt.

2. Zusammensetzung nach Anspruch 1, wobei das Mittel zur Beseitigung der Wasserhärte ein Builder ist, ausgewählt aus der Gruppe, bestehend aus anorganischem Builder, organischem Builder oder Mischungen davon.

3. Zusammensetzung nach Anspruch 1 oder 2, wobei der erste Bereich ein Keimmittel umfasst, vorzugsweise ausgewählt aus Calciumcarbonat, Dolomit, Kaolinit, Feldspat, gefälltem Calciumcarbonat oder Kombinationen davon.

4. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche 1 bis 3, wobei das Gewichtsverhältnis des Builders zum Keimmittel in dem ersten Bereich 1:1 bis 1:20 beträgt.

5. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei dann, wenn das Mittel zur Beseitigung der Wasserhärte einen Komplexbildner umfasst, der Komplexbildner in einer Menge von mindestens 20 Gew.-% des ersten Bereichs vorliegt.

6. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei der zweite Bereich einen Komplexbildner umfasst, der mit einem Alkylethersulfat-Tensid co-granuliert ist.

7. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei das Mittel zur Beseitigung der Wasserhärte ein anorganischer Builder ist, ausgewählt aus der Gruppe, bestehend aus Alkalimetallcarbonat, Alkalimetallbicarbonat, Alkalimetallsesquicarbonat, Alkalimetallsilikat oder Kombinationen davon.

8. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei das Quellmittel ein polymeres Material ist, bevorzugt ausgewählt aus der Gruppe, bestehend aus anorganischem oder organischem Material, wobei das polymere organische Material weiter bevorzugt unter Cellulose, Stärke, modifizierter Stärke, mikrokristalliner Cellulose, vernetztem Polyvinylpyrrolidon oder Kombinationen davon ausgewählt ist.

9. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei dann, wenn das Sprengmittel ein Brausemittel ist, dieses eine Kombination von Säure und Base umfasst, bevorzugt eine organische Säure und eine Carbonatbase.

10. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei die Menge des in dem ersten Bereich vorliegenden Reinigungstensids nicht mehr als 15 Gew.-% des ersten Bereichs beträgt.

11. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei die Menge des in dem zweiten Bereich vorliegenden Reinigungstensids mindestens 15 Gew.-% des zweiten Bereichs beträgt.

12. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei die Zusammensetzung einen dritten Bereich aufweist, umfassend:

i) einen Reinigungswirkstoff, ausgenommen das Reinigungstensid, und/oder einen Pflegewirkstoff, ausgewählt aus der Gruppe, bestehend aus Enzymen, Parfüm, Komplexbildnern, Bleichmitteln, Bleichaktivatoren, Spülmitteln, Schattierungsfarbstoffen, Farbmitteln, Pigmenten;
ii) ein Sprengmittel, ausgewählt aus der Gruppe, bestehend aus Quellmitteln, Brausemitteln oder Kombinationen davon,

wobei das Gewichtsverhältnis des Reinigungswirkstoffs und/oder des Pflegewirkstoffs zu dem Sprengmittel in dem dritten Bereich 5:1 bis 20:1 beträgt.

13. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei dann, wenn die Zusammensetzung ein Alkylesterfettsäuresulfonat-Tensid und Enzym enthält, das Alkylesterfettsäuresulfonat-Tensid und das Enzym in unterschiedlichen Bereichen vorliegen.

14. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei die Reinigungsmittelzusammensetzung in Einzeldosisform als Tablettenzusammensetzung vorliegt.

15. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei die Reinigungsmittelzusammensetzung in Einzeldosisform eine Geschirrspülzusammensetzung oder eine Waschzusammensetzung ist.

Revendications

1. Composition nettoyante en dose unitaire comprenant :

i) une première région comprenant :

i un agent de suppression de la dureté de l’eau ;
ii un désintégrant choisi dans un groupe constitué d’un agent gonflant, d’un agent effervescent ou de combinaisons de ceux-ci ;

ii) une deuxième région comprenant :

i un tensioactif détersif ;
ii un désintégrant choisi dans un groupe constitué d’un agent gonflant, d’un agent effervescent ou de combinaisons de ceux-ci ;

dans laquelle le rapport en poids de la quantité totale d’agent de suppression de la dureté de l’eau à la quantité totale de désintégrant dans la première région est de 5:1 à 20:1 et dans laquelle le rapport en poids de la quantité totale de tensioactif détersif à la quantité totale de désintégrant dans la deuxième région est de 0,1:1 à 5:1.

2. Composition selon la revendication 1, dans laquelle l’agent de suppression de la dureté de l’eau est un adjuvant choisi dans le groupe constitué d’un adjuvant inorganique, d’un adjuvant organique ou de mélanges de ceux-ci.

3. Composition selon la revendication 1 ou 2, dans laquelle la première région comprend un agent d’ensemencement, de préférence choisi parmi le carbonate de calcium, la dolomite, la kaolinite, le feldspath, le carbonate de calcium précipité ou des combinaisons de ceux-ci.

4. Composition selon l’une quelconque des revendications 1 à 3 précédentes, dans laquelle le rapport en poids de l’adjuvant à l’agent d’ensemencement dans la première région est de 1:1 à 1:20.

5. Composition selon l’une quelconque des revendications précédentes, dans laquelle, lorsque l’agent de suppression de la dureté de l’eau comprend un séquestrant, le séquestrant est présent en une quantité d’au moins 20 % en poids de la première région.

6. Composition selon l'une quelconque des revendications précédentes, dans laquelle la deuxième région comprend un séquestrant cogranulé avec un tensioactif à base d'alkyléthersulfate.

7. Composition selon l'une quelconque des revendications précédentes, dans laquelle l'agent de suppression de la dureté de l'eau est un adjuvant inorganique choisi dans le groupe constitué par un carbonate de métal alcalin, un bicarbonate de métal alcalin, un sesquicarbonate de métal alcalin, un silicate de métal alcalin ou des combinaisons de ceux-ci.

8. Composition selon l'une quelconque des revendications précédentes, dans laquelle l'agent gonflant est un matériau polymère, de préférence choisi dans le groupe constitué par un matériau inorganique ou organique, plus préférablement un matériau organique polymère choisi parmi la cellulose, l'amidon, l'amidon modifié, la cellulose microcristalline, la polyvinylpyrrolidone réticulée, ou des combinaisons de ceux-ci.

9. Composition selon l'une quelconque des revendications précédentes dans laquelle, lorsque le désintégrant est un agent effervescent, celui-ci comprend une combinaison d'acide et de base, de préférence un acide organique et une base carbonatée.

10. Composition selon l'une quelconque des revendications précédentes, dans laquelle la quantité de tensioactif détersif présente dans la première région est inférieure ou égale à 15 % en poids de la première région.

11. Composition selon l'une quelconque des revendications précédentes, dans laquelle la quantité de tensioactif détersif présente dans la deuxième région est d'au moins 15 % en poids de la deuxième région.

12. Composition selon l'une quelconque des revendications précédentes, la composition comprenant une troisième région comprenant :

i) un agent actif nettoyant autre que le tensioactif détersif et/ou un agent actif d'entretien choisi dans le groupe constitué par une enzyme, un parfum, un séquestrant, un agent de blanchiment, des activateurs de blanchiment, un auxiliaire de rinçage, un colorant d'ombrage, des colorants, des pigments ;
ii) un désintégrant choisi dans un groupe constitué d'un agent gonflant, d'un agent effervescent ou de combinaisons de ceux-ci ;

dans laquelle le rapport en poids de l'agent actif nettoyant et/ou de l'agent actif d'entretien au désintégrant dans la troisième région est de 5:1 à 20:1.

13. Composition selon l'une quelconque des revendications précédentes dans laquelle, lorsque la composition comprend un tensioactif à base de sulfonate d'acide gras d'ester d'alkyle et une enzyme, alors le tensioactif à base de sulfonate d'acide gras d'ester d'alkyle et l'enzyme sont présents dans des régions différentes.

14. Composition selon l'une quelconque des revendications précédentes, la composition de nettoyage en dose unitaire étant une composition en comprimé.

15. Composition selon l'une quelconque des revendications précédentes, la composition de nettoyage en dose unitaire étant une composition pour le lavage de la vaisselle ou une composition de lessive.

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