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(54) Detergent tablets

(57) A cleaning tablet comprising a smooth phase, wherein the smooth phase comprises at least 5 wt% of a diluent material having a dielectric constant of less than 20 and a molecular weight of less than 300 Dalton.

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Description

Field of the invention

[0001] The present invention relates to cleaning compositions in the form of tablets for use in fabric washing or machine dishwashing.

Background of the invention

[0002] Detergent compositions in tablet form have advantages over powdered products in that they do not require measuring and are thus easier to handle and dispense into the wash load.

[0003] Tablets of a cleaning composition are generally made by compressing or compacting a quantity of the composition in particulate form.

[0004] Tablets comprising two or more separate regions have also been described. For example WO 01/42416 describes the production of multi-phase moulded bodies comprising a combination of core moulded bodies and a particulate premix. WO 00/61717 describes a detergent tablet which is characterised in that at least part of its outer surface is semi-solid. WO 00/04129 describes a multi-phase detergent tablet comprising a first phase in the form of a shaped body having at least one mould therein and a second phase in the form of a particulate solid compressed within said mould. WO 99/24549 describes a detergent tablet comprising a compressed solid body and a non-compressed gelatinous portion mounted in a mold of said body. WO99/27069 relates to a tablet comprising a compressed and a non-compressed phase, wherein the non-compressed phase improves stability of perfume components.

[0005] There also have been prior publications on form stable, solid, and/or transparent smooth or gel-like detergent compositions. In GB 1578289 such a composition comprising soap, detergent and solvent has been proposed, for detergent sticks for use in wash or dry-cleaning pre-treatment. Recently it has been suggested, for example in EP 1,371,729, EP 1,405,900, EP 1,382,368, EP 1,375,636, EP 1,405,901, EP 1,405,902, EP 1,418,224 and WO 03/104380 to prepare tablets comprising a smooth or semi-solid phase.

[0006] A problem with cleaning tablets comprising a smooth phase such as for example a melt-casted, semi-solid, non-compressed or gel-like phase is often that these phases show a slow dissolution behaviour e.g. when used in a laundry washing machine. The combination of dissolution rate, hardness and stickiness for the application of smooth detergent phases is cleaning tablets leaves therefore to be desired.

[0007] It is an object of the present invention is to provide a cleaning tablet, preferably multi-phase cleaning tablet, comprising at least a smooth phase or layer with a favourable dissolution rate, hardness and stickiness.

Definition of the invention

[0008] In a first aspect the invention provides a cleaning tablet comprising a smooth phase, wherein the smooth phase comprises at least 5 wt% of a diluent material having a dielectric constant of less than 20 and a molecular weight of less than 300 Dalton.

[0009] Preferably the cleaning tablet comprising a smooth phase, wherein the smooth phase comprises

(a) at least 5 wt% of a diluent material having a dielectric constant of less than 20 and a molecular weight of less than 300 Dalton and
(b) at least 20 wt% of non-soap surfactant material.

[0010] In another aspect the invention relates to a cleaning tablet comprising a smooth phase wherein the smooth phase comprises at least 5 wt% of a diluent material selected from Tri-ethyleneglycol di-methyl ether (CH_3-$(OCH_2CH_2)_3$-OCH_3) or Di-(ethylene glycol)mono-ethyl ether ($CH_3CH_2(OCH_2CH_2)_2$-OH)) or mixtures thereof. Also these diluent materials may be mixed with diluents with a dielectric constant of 20 or more, such as for instance dipropyleneglycol, as long as the dielectric constant of the mixture of diluent materials remains less than 20.

Detailed description

[0011] Tablets of the invention comprise a smooth region. For the purpose of this invention the term smooth phase refers to compositions which are on the one hand solid enough to retain their shape at ambient temperature and on the other hand smooth in appearance. Smooth textures can for example be semi-solid, non-compressed, gel-like or melt-casted as described above. Smooth textures are generally of low or no porosity and have - at normal viewing distance- the appearance of a continuous phase for example as opposed to porous and particulate appearance of a compacted particulate material.

[0012] Tablets of the invention may be single phase tablets solely or predominantly constituted by the smooth phase, however in a preferred embodiment the tablets of the invention are multi-phase tablets wherein at least one of the phases is a smooth phase.

[0013] Preferably the tablet or the first region of the multi-phase tablet is both a smooth region and a semi-solid region. For the purpose of this invention the term semi-solid refers to compositions which are one the one hand solid enough to retain their shape at ambient temperature but which are neither completely solid.

[0014] A suitable test to check if a composition can be considered as semi-solid can be described as follows:

A cylindrical tablet with a diameter of 45 mm and a height of 20 mm is compressed radially between the plates of a material testing machine until the tablet fractures. At the starting position the plates contact the tablet but do not apply force to it. Force is applied, to compress the tablet, the vertical speed of the upper plate is 25 mm/minute. The testing machine measures the applied force (F), and also the displacement (x) of the plates towards each other as the tablet is compressed. The distance (y) between the plates before force is applied, which is the diameter of the tablet, is also known. At failure, the tablet cracks and the applied force needed to maintain the displacement drops. Measurement is discontinued when the applied force needed to maintain the displacement has dropped by 25% from its maximum value. The displacement at failure (x_f) is also measured.

A graph of force (F) against displacement (x) can be made. The maximum force is the force at failure (F_f). The break energy is the area under the graph of force against displacement, up to the point of break and is given by the equation:

$$E_b = \int_{0-x_f} F(x)\ dx$$

wherein E_b is the break energy in mJoules, x is the displacement in metres and F is the applied force in Newtons at displacement x and x_f is the displacement at failure.

[0015] Semi-solid compositions are characterised by a ratio of F_f to E_b of less than 1.0, more preferred from 0.1 to 0.9, most preferred from 0.2 to 0.6, while traditional tablets of compacted particulate materials are generally characterised by a ratio of F_f to E_b of more than 1, more generally more than 1.25 or even more than 1.5 up to say 6.

[0016] Tablets of the invention preferably are multi-phase tablets, wherein at least one of the phases is a smooth region as described above. The regions of the cleaning tablet are possibly separate layers within a tablet. Preferably the smooth region covers a substantial part of the upper surface of the other region, e.g. preferably at least 65%, more preferred at least 75%, most preferred more than 90% or even substantially all of the upper surface of the other region is covered by the first smooth region. For the purpose of the invention the term upper surface refers to one of the main sides of the cleaning tablet which by placing the tablet on a flat surface could be classified as the upper surface. Especially preferably the other second region suitably is a layer of compacted particulate material, preferably having a substantially flat upper surface.

[0017] Preferably the first smooth region is a layer having an average thickness of from 0.5 to 20 mm, more preferred 1 to 5 mm, for example 1.5 to 3 mm. Preferably the total weight the smooth region is from 1 to 40 grammes, more preferred from 3 to 30 grammes, most preferred from 4 to 20 grammes, preferably the level ofof non-soap surfactants in the smooth region is from 0.5 to 10 grams, more preferred from 1 to 5 grams.

[0018] In an advantageous embodiment of the invention the smooth or semi-solid first region comprises from 40-100 wt% of non-soap surfactants (based on the total weight of the smooth region), more preferred from 50-95 wt%, most preferred the first region is predominantly constituted by non-soap surfactants e.g. more than 60 wt% for example 70 to 90 wt%. It has been found that the combination of a separate smooth or semi-solid first region and these high surfactant levels provide very good dispersing and cleaning properties to the tablet.

[0019] In a preferred embodiment the surfactants in the first region comprise a combination of anionic surfactants and non-soap non-ionic surfactants in a weight ratio of from 5 : 1 to 1 : 5, more preferred 3 : 1 to 1 : 3, more preferred 2 : 1 to 1: 2. In another preferred embodiement the the first region comprises relatively high levels of non-ionic surfactants, preferably the non-soap surfactants are predominantly nonionic surfactants, most preferred all the non-soap surfactants are nonionic surfactants. Further surfactants, for example cationic surfactants may equally be present for example at a level of 0.1 to 10 wt% based on the weight of the smooth or semi-solid part.

[0020] Also advantageously the smooth or semi-solid region may comprise soap for example at a level of 0.1 to 10 wt% based on the weight of the smooth or semi-solid part. Especially preferably the soap is present in a level of at least 1 wt% of the smooth phase. In a very preferred embodiment of the invention the level of C16 soaps is relatively high,

particularly it is preferred that at least 50 wt% of the soap is a C16 soap, even more preferred from 60 to 100 wt% of the soap is a C16 soap.

[0021] Also advantageously the first smooth region of the tablet comprises at least 5 wt% of diluent materials having a di-electric constant and a molecular weight as described above.

[0022] Preferably the di-electric constant of the diluents is less than 17 e.g. from 5 to 16. Also preferably the molecular weight of the diluents is from 50 to 250, e.g. from 100 to 200. Preferred examples of diluents having a low molecular weight are for example, Tri-ethyleneglycol di-methyl ether or Di-(Ethylene Glycol)Ethyl ether or mixtures thereof. Preferably the level of the diluents is from 5 to 40 wt%, more preferred 2 to 30, most preferred 10-25 wt% based on the weight of the smooth region.Also preferably the diluents used in the smooth phase preferably have a flashpoint of at least 75°C, most preferred above 80°C or even above 90 °C.

[0023] The smooth or semi-solid phase preferably comprises no or only low levels of water. Preferably the level of water is less than 20 wt % based on the weight of the semi-solid phase, more preferred less than 15 wt%, most preferred from 5 to 12 wt%. Most preferably the smooth or semi-solid phases are substantially free from water, which means that apart from low levels of moisture (e.g. for neutralisation or as crystal water) no additional added water is present.

[0024] Preferably cleaning tablets in accordance to the invention also comprise a second region or phase which is a solid region preferably a region of compacted material.The weight of the solid region may suitably range from 1 to 60 grammes, more preferred from 10 to 50 grammes, most suitably from 20 to 40 grammes.

[0025] In a preferred embodiment of the invention the second region comprises no or only low levels of surfactants. Preferably the level of surfactants in the second region is less than 10 wt% (based on the total weight of the second region), more preferred from 0 to 9 wt%, most preferred from 1 to 8 wt%.

[0026] The second region of the tablet is preferably a solid region, for example this can be prepared by compression or melting. Preferably the second region is a compacted particulate composition.The second region preferably comprises ingredients of the tablet other than surfactants. Examples of these ingredients are builders, bleach system, enzymes etc. Preferably the builders in the tablet are predominantly present in the second region. Preferably the bleach system is predominantly present in the second region. Preferably the enzymes are predominantly present in the second region. For the purpose of this invention the term "predominantly present" refers to a situation wherein at least 90 wt% of an ingredient is present in the second region, more preferred more than 98 wt%, most preferred substantially 100 wt%.

[0027] Materials which may be used in tablets of this invention will now be discussed in more detail.

Surfactant Compounds

[0028] Compositions which are used in tablets of the invention will contain one or more detergent surfactants. In a fabric washing composition, these preferably provide from 5 to 50% by weight of the overall tablet composition, more preferably from 8 or 9% by weight of the overall composition up to 40% or 50% by weight. Surfactant may be anionic (soap or non-soap), cationic, zwitterionic, amphoteric, nonionic or a combination of these.

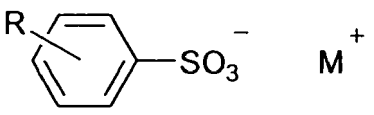
[0029] Anionic surfactant may be present in an amount from 0.5 to 50% by weight, preferably from 2% or 4% up to 30% or 40% by weight of the tablet composition.

[0030] Synthetic (i.e. non-soap) anionic surfactants are well known to those skilled in the art. Examples include alkylbenzene sulphonates, particularly sodium linear alkylbenzene sulphonates having an alkyl chain length of C_8-C_{15}; olefin sulphonates; alkane sulphonates; dialkyl sulphosuccinates; and fatty acid ester sulphonates.

[0031] Primary alkyl sulphate having the formula

$$ROSO_3^- M^+$$

in which R is an alkyl or alkenyl chain of 8 to 18 carbon atoms especially 10 to 14 carbon atoms and M^+ is a solubilising cation, is commercially significant as an anionic surfactant. Linear alkyl benzene sulphonate of the formula



where R is linear alkyl of 8 to 15 carbon atoms and M^+ is a solubilising cation, especially sodium, is also a commercially significant anionic surfactant.

[0032] Frequently, such linear alkyl benzene sulphonate or primary alkyl sulphate of the formula above, or a mixture thereof will be the desired anionic surfactant and may provide 75 to 100 wt% of any anionic non-soap surfactant in the

composition.

[0033] In some forms of this invention the amount of non-soap anionic surfactant lies in a range from 5 to 20 wt% of the tablet composition.

[0034] Soaps for use in accordance to the invention are preferably sodium soaps derived from naturally occurring fatty acids, for example, the fatty acids from beef tallow.

[0035] Suitable nonionic surfactant compounds which may be used include in particular the reaction products of compounds having a hydrophobic group and a reactive hydrogen atom, for example, aliphatic alcohols, acids, amides or alkyl phenols with alkylene oxides, especially ethylene oxide.

[0036] Specific nonionic surfactant compounds are alkyl (C_{8-22}) phenol-ethylene oxide condensates, the condensation products of linear or branched aliphatic C_{8-20} primary or secondary alcohols with ethylene oxide, and products made by condensation of ethylene oxide with the reaction products of propylene oxide and ethylene-diamine.

[0037] Especially preferred are the primary and secondary alcohol ethoxylates, especially the C_{9-11} and C_{12-15} primary and secondary alcohols ethoxylated with an average of from 5 to 20 moles of ethylene oxide per mole of alcohol.

[0038] In some fabric washing tablets of this invention, the amount of nonionic surfactant lies in a range from 4 to 40%, better 4 or 5 to 30% by weight of the whole tablet.

[0039] Many nonionic surfactants are liquids. These may be absorbed onto particles of the composition.

[0040] In a machine dishwashing tablet the surfactant may be wholly nonionic, in an amount below 5 wt% of the whole tablet although it is known to include some anionic surfactant and to use up to 10 wt% surfactant in total.

Detergency Builder

[0041] A composition which is used in tablets of the invention will usually contain from 5 to 80%, more usually 15 to 60% by weight of detergency builder. This may be provided wholly by water soluble materials, or may be provided in large part or even entirely by water-insoluble material with water-softening properties. Water-insoluble detergency builder may be present as 5 to 80 wt%, better 5 to 60 wt% of the composition.

[0042] Alkali metal aluminosilicates are strongly favoured as environmentally acceptable water-insoluble builders for fabric washing. Alkali metal (preferably sodium) aluminosilicates may be either crystalline or amorphous or mixtures thereof, having the general formula:

$$0.8 - 1.5\ Na_2O.Al_2O_3.\ 0.8 - 6\ SiO_2.\ xH_2O$$

[0043] These materials contain some bound water (indicated as "xH2O") and are required to have a calcium ion exchange capacity of at least 50 mg CaO/g. The preferred sodium aluminosilicates contain 1.5-3.5 SiO_2 units (in the formula above). Both the amorphous and the crystalline materials can be prepared readily by reaction between sodium silicate and sodium aluminate, as amply described in the literature.

[0044] Suitable crystalline sodium aluminosilicate ion-exchange detergency builders are described, for example, in GB 1429143 (Procter & Gamble). The preferred sodium aluminosilicates of this type are the well known commercially available zeolites A and X, the novel zeolite P described and claimed in EP 384070 (Unilever) and mixtures thereof.

[0045] Conceivably a water-insoluble detergency builder could be a layered sodium silicate as described in US 4664839.

NaSKS-6 is the trademark for a crystalline layered silicate marketed by Hoechst (commonly abbreviated as "SKS-6"). NaSKS-6 has the delta-Na_2SiO_5 morphology form of layered silicate. It can be prepared by methods such as described in DE-A-3,417,649 and DE-A-3,742,043. Other such layered silicates, such as those having the general formula $NaMSi_xO_{2x+1}.yH_2O$ wherein M is sodium or hydrogen, x is a number from 1.9 to 4, preferably 2, and y is a number from 0 to 20, preferably 0 can be used.

[0046] Water-soluble phosphorous-containing inorganic detergency builders, include the alkali-metal orthophosphates, metaphosphates, pyrophosphates and polyphosphates. Specific examples of inorganic phosphate builders include sodium and potassium tripolyphosphates, orthophosphates and hexametaphosphates.

[0047] Non-phosphorous water-soluble builders may be organic or inorganic. Inorganic builders that may be present include alkali metal (generally sodium) carbonate; while organic builders include polycarboxylate polymers, such as polyacrylates, acrylic/maleic copolymers, and acrylic phosphonates, monomeric polycarboxylates such as citrates, gluconates, oxydisuccinates, glycerol mono- di- and trisuccinates, carboxymethyloxysuccinates, carboxymethyloxymalonates, dipicolinates and hydroxyethyliminodiacetates.

[0048] At least one region (preferably the second region) of a fabric washing tablet preferably include polycarboxylate polymers, more especially polyacrylates and acrylic/maleic copolymers which can function as builders and also inhibit unwanted deposition onto fabric from the wash liquor.

Bleach System

[0049] Tablets according to the invention may contain a bleach system in at least one region of a tablet, preferably in the second region. This preferably comprises one or more peroxy bleach compounds, for example, inorganic persalts or organic peroxyacids, which may be employed in conjunction with activators to improve bleaching action at low wash temperatures. If any peroxygen compound is present, the amount is likely to lie in a range from 10 to 25% by weight of the composition.

[0050] Preferred inorganic persalts are sodium perborate monohydrate and tetrahydrate, and sodium percarbonate, advantageously employed together with an activator. Bleach activators, also referred to as bleach precursors, have been widely disclosed in the art. Preferred examples include peracetic acid precursors, for example, tetraacetylethylene diamine (TAED), now in widespread commercial use in conjunction with sodium perborate; and perbenzoic acid precursors. The quaternary ammonium and phosphonium bleach activators disclosed in US 4751015 and US 4818426 (Lever Brothers Company) are also of interest. Another type of bleach activator which may be used, but which is not a bleach precursor, is a transition metal catalyst as disclosed in EP-A-458397, EP-A-458398 and EP-A-549272. A bleach system may also include a bleach stabiliser (heavy metal sequestrant) such as ethylenediamine tetramethylene phosphonate and diethylenetriamine pentamethylene phosphonate.

[0051] As indicated above, if a bleach is present and is a water-soluble inorganic peroxygen bleach, the amount may well be from 10% to 25% by weight of the composition.

Other Detergent Ingredients

[0052] The detergent tablets of the invention may also contain (preferably in the second region) one of the detergency enzymes well known in the art for their ability to degrade and aid in the removal of various soils and stains. Suitable enzymes include the various proteases, cellulases, lipases, amylases, and mixtures thereof, which are designed to remove a variety of soils and stains from fabrics. Examples of suitable proteases are Maxatase (Trade Mark), as supplied by Gist-Brocades N.V., Delft, Holland, and Alcalase (Trade Mark), and Savinase (Trade Mark), as supplied by Novo Industri A/S, Copenhagen, Denmark.

[0053] Detergency enzymes are commonly employed in the form of granules or marumes, optionally with a protective coating, in amount of from about 0.1% to about 3.0% by weight of the composition; and these granules or marumes present no problems with respect to compaction to form a tablet.

[0054] The detergent tablets of the invention may also contain (preferably in the second region) a fluorescer (optical brightener), for example, Tinopal (Trade Mark) DMS or Tinopal CBS available from Ciba-Geigy AG, Basel, Switzerland. Tinopal DMS is disodium 4,4'bis-(2-morpholino-4-anilino-s-triazin-6-ylamino) stilbene disulphonate; and Tinopal CBS is disodium 2,2'-bis-(phenyl-styryl) disulphonate.

[0055] An antifoam material is advantageously included (preferably in the second region), especially if a detergent tablet is primarily intended for use in front-loading drum-type automatic washing machines. Suitable antifoam materials are usually in granular form, such as those described in EP 266863A (Unilever). Such antifoam granules typically comprise a mixture of silicone oil, petroleum jelly, hydrophobic silica and alkyl phosphate as antifoam active material, absorbed onto a porous absorbed water-soluble carbonate-based inorganic carrier material. Antifoam granules may be present in an amount up to 5% by weight of the composition.

[0056] It may also be desirable that a detergent tablet of the invention includes an amount of an alkali metal silicate, particularly sodium ortho-, meta- or disilicate. The presence of such alkali metal silicates at levels, for example, of 0.1 to 10 wt%, may be advantageous in providing protection against the corrosion of metal parts in washing machines, besides providing some measure of building and giving processing benefits in manufacture of the particulate material which is compacted into tablets.

[0057] A tablet for fabric washing will generally not contain more than 15 wt% silicate. A tablet for machine dishwashing will often contain more than 20 wt% silicate. Preferably the silicate is present in the second region of the tablet.

[0058] Further ingredients which can optionally be employed in a region of a fabric washing detergent of the invention tablet (preferably the second region) include anti-redeposition agents such as sodium carboxymethylcellulose, straight-chain polyvinyl pyrrolidone and the cellulose ethers such as methyl cellulose and ethyl hydroxyethyl cellulose, fabric-softening agents; heavy metal sequestrants such as EDTA; perfumes; and colorants or coloured speckles.

[0059] Further ingredients which can optionally be used in tablets of the invention, preferably in the second region are dispersing aids. Examples of suitable dispersing aids are water-swellable polymers (e.g. SCMC) highly soluble materials (e.g. sodium citrate, potassium carbonate or sodium acetate) or sodium tripolyphospate with preferably at least 40% of the anhydrous phase I form.

[0060] The above description of the tablet has been given with reference to a tablet constituted by one or two regions. It will however be understood that each of the regions may be composed of a limited number of discrete regions.

[0061] Cleaning tablets of the invention may be manufactured by any suitable method e.g. the pre-preparation of the

smooth phase e.g. by extrusion or melt-casting followed by assembly of the smooth phase and the other phases of the tablet. Also the second phase of compressed particulate material may be pre-prepared followed by in-situ preparation of the smooth phase e.g. by casting, coating or spraying, or assembly of said compressed phase with a separately prepared smooth phase. Typical processing conditions for preparing the smooth phase or the compressed phase are for example disclosed in the documents as described above.

[0062] Tablets of the invention may be used e.g. for mechanical diswashing or laundry washing. For this purpose generally 1-5 tablets will be used per wash where approriate a dispenser e.g. a shuttle or a net may be used.

[0063] The invention will be further illustrated by means of the following examples.

Example 1

[0064] A detergent powder was made of the following composition by pregranulating the granule ingredients, followed by post-dosing the rest of the ingredients

Ingredient	Parts by weight
granules	
Na-las	1.1
Nonionic 7EO	0.5
Soap (C16-C18)	0.1
Zeolite A24	2.4
NaAc3aq	0.3
Light soda ash	0.4
SCMC (68%)	0.1
Moisture/minors	0.4
Post-dose	
EAG (17% silicone)	3.0
Fluorescer (15%)	2.2
STP HPA	28.3
STP LV	34.0
Na-disilicate (80%)	3.8
TAED (83%)	4.3
Percarbonate	16.9
Dequest 2047	1.9
Minors/ enzymes/colour	to 100

[0065] Smooth or semi-solid parts were prepared of the following composition:

Ingredient	*Composition A Parts by wt*	*Composition B Parts by wt*	*Composition C Parts by wt*
Na-las	57.5	57.5	57.5
Nonionic(Lutensil AO5)	46.1	46.1	46.1
Soap (Pristerene4916)*	5	5	5
Soap(Prifac 2962)**		4,3	4,3
Dipropyleneglycol			30
Solvent	30	46	16
Water	10.7	10.7	10.7
Notes: * is a C16-C18 soap; ** is a C16 soap.			

Each formulation A-C was prepared with the following solvents:
Tri-ethyleneglycol di-methyl ether having a di-electric constant of 7.6 and a molecular weight of 178 ex Clariant (A1, B1 and C1)or Di(Ethylene Glycol)mono-ethyl ether having an di-electric constant of 15.5 and a molecular weight of 134 ex

Sigma (A2, B2 and C2). As a comparison each formulation was made with dipropylene glycol having a di-electric constant of about 25 as solvent (A3, B3 and C3).

[0066] The mixtures were heated to 80°C and cast into moulds and cooled to 20°C to form firm, 5 grammes smooth and semi-solid parts of 32mm diameter and 6mm high.

[0067] Multi-layer tablets are made by pre-compressing 25 grammes of the powdered composition in a die of 45 mm diameter at 4 kN /cm^2, way followed by adherence of a smooth and semi-solid part on top of the compressed layer followed by a final compression step at 0.8 kN/cm^2. During the final compression step, the smooth and semi-solid part flows by the compaction forces to form a 3.4 mm smooth semi-solid layer adhered on top of the compressed particulate layer. The height of the powdered part after compression is 11 mm.

Example 2 dissolution properties

[0068] Smooth parts of 5 gram each were prepared having a composition as described in example 1 and having a cylidrical shape of 19 mm diameter and 22 mm height. Pieces were immersed in water of 20 °C which is stirred at 200 rpm. T80 was determined by measuring the time at which 80% of the smooth part was dissolved.

[0069] The following results were obtained:

Formulation	T80 (minutes)
A1	30
A2	25
A3	41
B1	18
B2	18
B3	28
C1	19
C2	18
C3	25

[0070] These results clearly show that the use of solvents having a low di-electric constant (examples A1, A2, B1, B2, C1 and C2)lead to a marked decrease in dissolution time compared to using diluents with a higher di-electric constant such as DPG (A3,B3 and C3).

Furthermore these examples show that the use of increased amounts of C16 soap lead to a decrease in dissolution time (Ax compared to Bx and Cx) Lowest dissolution times are obtained by using a combination of high C16 level soaps and solvents having a low di-electric constant (B1, B2, C1 and C2).

Claims

1. A cleaning tablet comprising a smooth phase, wherein the smooth phase comprises at least 5 wt% of a diluent material having a dielectric constant of less than 20 and a molecular weight of less than 300 Dalton.

2. A cleaning tablet according to claim 1 wherein the smooth phase comprises at least 5 wt% of a diluent material selected from Tri-ethyleneglycol di-methylether,Di-(ethylene glycol)mono-ethyl ether, benzylalcohol or mixtures thereof.

3. A cleaning tablet according to claim 1, wherein the diluent is selected from Tri-ethyleneglycol di-methyl ether or Di-(ethylene glycol)mono-ethyl ether or mixtures thereof.

4. A cleaning tablet according to one or more of the preceding claims wherein the smooth phase comprises at least 1 wt% of soap, wherein at least 50% of the soap material is a C16 soap.

5. A cleaning tablet according to any preceding claim, wherein the smooth phase comprises 5 to 50 wt% of the diluent material, preferably 10 to 40 wt%.

6. A cleaning tablet according to any preceding claim, wherein the smooth phase comprises 10 to 90wt% of the non-

soap surfactant material, preferably 30 to 80 wt%.

7. A cleaning tablet according to one or more of the preceding claims wherein the smooth phase comprises less than 20 wt% of water, preferably 5 to 12 wt%

8. A cleaning tablet according to any preceding claim, wherein the tablet also comprises a solid region of compacted material.

9. A cleaning tablet according to any preceding claim, wherein the dileunt material has a flash point above 75°C

10. Use of a cleaning tablet according to one or more of the preceding claims for dish-washing of for laundry washing.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 07 7912

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,X	EP 1 405 901 A (UNILEVER N.V; UNILEVER PLC) 7 April 2004 (2004-04-07) * paragraphs [0029], [0043], [0045] - [0047], [0055]; claims 1,9,10; examples *	1,2,4-10	INV. C11D17/00 C11D3/20 C11D7/26
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 April 2006	Péntek, E

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