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(54) Hard surface cleaning composition

(57) A cleaning composition comprising at most two surfactants, wherein at least one surfactant is a quaternary ammonium compound of the formula R1R2R3R4N+ wherein R1 is an C10-C16 alkyl, R2, R3, R4 are each H or C1-C3 alkyl or substituted C1-C3 alkyl, and wherein the quaternary ammonium compound is present in an amount of 0.1-10 wt% of the composition and if the composition comprises a non-ionic surfactant, the non-ionic surfactant is present in an amount of less than 3 wt%.

A method for cleaning a hard surface comprising treating the hard surface with an effective amount of such a cleaning composition. The use of such a cleaning composition against toughened greasy soil and as a surface pre-treatment composition.

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Description

Field of the invention

[0001] The present invention relates to a cleaning composition for hard surfaces that is useful against tough soil especially greasy soil. The cleaning composition comprises specific alkyl quaternary ammonium cationic surfactants that are very effective against toughened soil on hard surfaces.

Background

[0002] Surfaces in the household, such as in the kitchen and bathroom are cleaned regularly and various cleaning compositions for this are known. Many of these compositions are specifically suited for particular surfaces, e.g. for bathroom, and/or for specific stains and soils on these hard surfaces, e.g. calcium deposits or greasy soil.

[0003] A particular type of stain which is very hard to remove from a hard surface is an aged, dried or baked stain which is frequently the residues of cooking oils and greases. Oil stains and other greases are usually easy to remove when they are not hardened and/or dry, however when they are dried and hardened, e.g. by aging or baking, the stains are particularly difficult to remove.

[0004] WO97/44427 discloses an alkaline aqueous hard surface cleaning composition which exhibits good cleaning efficacy against hardened, dried or baked greasy soil deposits. The composition comprises non-ionic surfactants based on amine oxides, chelating agents, caustic and a glycol ether solvent system comprising one glycol ether or glycol ether acetate solvent having a solubility in water of not more than 20 wt%, and a second glycol ether or glycol ether acetate having a solubility of approximately 100 wt%, wherein the ratio of the former and latter is from 0.5:1 to 1.5:1 and other optional ingredients. The compositions comprise no anionic or cationic surfactants.

[0005] The drawback of these compositions is that they require many ingredients among which are at least two different glycol ether compounds. Furthermore it was found that the addition of anionic or cationic surfactants to these compositions decrease the cleaning properties.

[0006] It is therefore an object of the present invention to provide a cleaning composition that is effective against toughened greasy soil. Another object of the invention is a cleaning composition that requires less effort in the cleaning task. Another object of the invention is the provision of a cleaning composition that has a simple formulation, does not require many ingredients and is easy to formulate. A further object of the invention is the provision of a cleaning composition that does not require a glycol ether system. Yet another object of the invention is the provision of a cleaning composition that requires only small amounts of non-ionic surfactants or even no non-ionic surfactants.

[0007] One or more of the above mentioned objects are attained by a cleaning composition comprising 0.1-10 wt% of a quaternary ammonium compound of the formula R1R2R3R4N+ wherein R1 is an C10-C16 alkyl, R2, R3, R4 are each H or C1-C3 alkyl or substituted C1-C3 alkyl, and wherein the composition comprises a non-ionic surfactant in an amount of less than 3 wt%.

[0008] Cationic quaternary amino compounds are known in the art. For example US 4,264,479 and US 4,065,409 disclose surfactant systems comprising mixtures of a non-ionic detergent, a tertiary amine oxide or amphoteric detergent, and a quaternary ammonium halide. The detergent system has at least 3 surfactants present.

[0009] WO03/031549 is directed towards a cleaning composition that is efficient in removing both food and industrial grease from hard surfaces. The improved cleaning compositions contain certain non-ionic surfactant and quaternary amine salts combined with a slightly water-soluble polar organic compound. The quaternary amine salts have a general formula wherein one alkyl has 10-20 carbon atoms and one alkyl has 1 to 5 carbon atoms. There is however no disclosure of a quaternary amine salt that has the general formula as depicted in claim 1, i.e. a amine salt with 3 short chain, alkyl (1-3 carbon atoms) or H, and 1 medium chain alkyl (10-16 carbon atoms).

[0010] US 5,061,395 is directed to alkaline cleaning compositions comprising a combination of a cationic and a non-ionic surfactant with at least one chelating agent and an alkaline sodium component. The cationic surfactant may be an ammonium halide surfactant, however these ammonium surfactants comprise two lower alkyl (C1-C7 alkyl) and two substituents being either a phenyl group or a C8-C20 alkyl. There is however no disclosure of a quaternary amine salt that has the general formula as depicted in claim 1, i.e. a amine salt with 3 short chain, alkyl (1-3 carbon atoms) or H, and 1 medium chain alkyl (10-16 carbon atoms).

[0011] EP 0 621 335 is directed to an aqueous solution of a quaternary ammonium compound, a non-ionic surfactant and a glycol ether solvent. The quaternary ammonium surfactant comprises two lower alkyl (C1-C7 alkyl) and two substituents being either a phenyl group or a C8-C20 alkyl. There is however no disclosure of a quaternary amine salt that has the general formula as depicted in claim 1, i.e. a amine salt with 3 short chain, alkyl (1-3 carbon atoms) or H, and 1 medium chain alkyl (10-16 carbon atoms).

[0012] US 4,443,363 discloses a detergent composition comprising a specific non-ionic surfactant and a selected quaternary ammonium surfactant wherein the quaternary ammonium is substituted with three C1-C8 alkyl and one C1-

C4 alkyl.

Detailed description

[0013] It was surprisingly found that certain cationic surfactants give good results in the cleaning of toughened greasy soil. This was surprising as prior art suggests that cationics are poor detergents when used as a sole or major surfactant (Rubingh DN, 'Surface active cationic compounds in Detergency' in Surfactant Science Series vol. 37. Cationic surfactants. Physical Chemistry, edited by DN Rubingh, PM Holland, Marcel Dekker New York 1991).

[0014] The present invention is directed to a cleaning composition comprising a quaternary ammonium compound. Quaternary ammonium compounds have the formula R1R2R3R4N+. It was found that mono-alkyl quaternary ammonium compounds were superior in cleaning performance. With mono-alkyl quaternary ammonium compounds is meant a quaternary ammonium compound wherein R1 being a medium alkyl substituent with a length between 10 and 16 C-atoms and R2, R3, and R4 each being a shorter alkyl substituent, i.e. C1-C3 alkyl, or being H. The C1-C3 alkyl may be substituted. C10-16 alkyl is an alkyl with a length between 10 and 16 C-atoms, e.g. decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentadecyl, hexadecyl. In addition, C10-C16 alkyl may comprise a mixture of alkyl chain lengths from C10 to C16, wherein the mean alkyl chain length of the mixture is in the range C10-C16. Preferred R1 are C10-C14 alkyl, e.g. decyl, undecyl, dodecyl, tridecyl, tetradecyl or even more preferred C12-C14 alkyl, dodecyl, tridecyl, tetradecyl. Preferably R1 is a linear alkyl.

[0015] The shorter substituents R2, R3, R4 may be H or a short alkyl with 1 to 3 C-atoms, e.g. methyl, ethyl or propyl. The short alkyl may be substituted with halogen, hydroxyl or amine. A hydroxyl substitution is most common, e.g. hydroxymethyl, hydroxyethyl or a hydroxypropyl. Suitable quaternary ammonium compounds according to the invention are compounds wherein at least two of R2, R3, and R4 are CH3.

[0016] It was found that aromatic quaternary ammonium compounds, such as benzylalkonium chloride, and di-alkyl quaternary ammonium compounds, such as di-decyl di-methyl quaternary ammonium chloride are not effective in cleaning performance.

[0017] In a preferred embodiment the quaternary ammonium compound is selected from the group consisting of mono-coco tri-methyl quaternary ammonium cationic, C12-C14 mono-alkyl dimethyl hydroxyethyl quaternary ammonium cationic, or mono-C12 alkyl tri-methyl quaternary ammonium cationic.

[0018] Suitable commercial available cationic surfactants are selected from the group consisting of Arquad 12-30, Arquad C-35 ex Akzo Nobel, Praepagen HY ex Clariant.

[0019] In a preferred embodiment the pH of the cleaning composition according to the invention is at least 9, more preferably at least 10.5

[0020] Preferred cleaning compositions according to the invention comprise in addition to the quaternary ammonium surfactant a non-ionic surfactant. In a preferred embodiment the non-ionic surfactant is selected from the group comprising alkoxylated alkanol, alkyl polyglycoside or amine oxide.

[0021] Suitable cleaning compositions according to the invention comprise two surfactants. Suitable surfactant combinations according to the invention comprise quaternary ammonium and an alkoxylated alkanol, quaternary ammonium and alkyl polyglycoside, and quaternary ammonium and amine oxide.

[0022] Preferred alkoxylated alkanols are selected from the group comprising the condensation products of aliphatic alcohols having from 8 to 22 carbon atoms in either straight or branched chain configuration with ethylene oxide, such as a coconut alcohol/ethylene oxide condensate having from 2 to 15 moles of ethylene oxide per mole of coconut alcohol, condensates of alkylphenols having C6-C15 alkyl groups with 5 to 25 moles of ethylene oxide per mole of alkylphenol, condensates of long chain aliphatic amines of C8-18 alkyl groups with 2 to 16 moles of ethylene oxide and/or propylene oxide, condensates of the reaction product of ethylene-diamine and propylene oxide with ethylene oxide, the condensates containing from 40 to 80% of ethyleneoxy groups by weight and having a molecular weight of from 5,000 to 11,000.

[0023] Preferred alkyl polyglycosides may be selected from the group consisting of condensation products of long chain aliphatic alcohols of C6-18 alkyl groups and saccharides.

[0024] Preferred tertiary amine oxides may be selected from the group consisting of tertiary amine oxides of the structure RIR2R3NO, where R1 is an alkyl group of 8 to 20 carbon atoms and R2 and R3 are each alkyl or hydroxyalkyl groups of 1 to 3 carbon atoms, e.g. dimethyl-dodecylamine oxide.

[0025] In a preferred embodiment the composition according to the invention comprises a quaternary ammonium surfactant and a non-ionic surfactant in a ratio 50:1 to 3:1, more preferably a ratio of 25:1 to 10:1.

[0026] In another preferred embodiment the composition according to the present invention is in the form of a concentrate wherein the quaternary ammonium compound is present in an amount of up to 30 wt% of the composition and if the composition comprises a non-ionic surfactant, the non-ionic surfactant is present in an amount of less than 10 wt%.

[0027] Preferably the cleaning composition according to the invention does not comprise anionic surfactant. Preferably the cleaning composition according to the invention does not comprise zwitterionic surfactant.

[0028] The cleaning composition according to the invention may contain solvent. The solvent may be present in an

amount of 0-10%. Suitable solvents are selected from the group consisting of C2-C6 alcohols, C2-C6 digols, C2-C10 ethers of ethylamine or propylamine and C1-C6 mono-ethers of diols.

[0029] Compositions of the present invention may also optionally include small amounts of adjuvants and auxiliaries to optimise functional and aesthetic performance. Suitable adjuvants and auxiliaries are well-known to those skilled in the art and can include hydrotropes, chelants, rheology modifiers, fragrances, preservatives, biocides, etc. For example, high molecular weight natural or synthetic polymers may be included in the compositions to thicken compositions and to provide and maintain good contact of cleaning product with soil (cling) on vertical and inclined surfaces. Also, polymer ingredients may aid the uniformity of deposition of cationic surfactant on to surfaces, and aid resistance to rinsing. In addition, short chain alkanols, such as ethanol and isopropanol may be included to maintain homogeneity and stability of compositions.

[0030] Furthermore the present invention is directed to the use of a cleaning composition as described above for facilitating the removal of soil, in particular fatty soil, more particularly chemically toughened fatty soil, from a hard surface. It was found that the compositions of the present invention make it easier to clean hard surfaces, i.e. one needs less energy to clean a surface when using the compositions of the present invention when compared to prior art compositions. This is especially true when cleaning greasy soil and in particular toughened or aged greasy soil.

[0031] In addition, the surface to be cleaned is preferably treated with the cleaning composition according to the present invention prior to deposition of the soil. The surface treated with the cleaning composition according to the present invention may be rinsed or not rinsed before the deposition of the soil. It was found that the cleaning compositions according to the present invention have a second cleaning benefit, i.e. the surface is more easily cleaned when the surface is treated with the cleaning composition according to the present invention before the soil is deposited. Preferably no rinsing step is applied.

[0032] The cationic surfactant-containing compositions of the invention can provide an antibacterial effect during and after cleaning. Although the preferred mono-alkyl cationic surfactants of the invention are known to be less effective as antibacterial agents than alkylbenzyl or di-alkyl cationics, they can still provide an effective combination of cleaning and antibacterial effect, particularly on surfaces.

[0033] Preferably the composition according to the invention is comprised in a reservoir in a container, wherein the container further comprises a spray dispenser for dispensing said composition in the form of a spray.

[0034] Suitably the composition according to the invention is used in a wipe impregnated with the composition.

[0035] In a suitable aspect of the present invention hard surfaces in kitchens and surfaces associated with cooking are cleaned with a composition according to the invention. These surfaces may be chosen from the group comprising stainless steel, chrome, vitreous enamel, vitroceramic, or ceramic tile.

[0036] The composition according to the invention may be very suitably used as a pre-treatment composition for a surface selected from the group comprising dishware, cookware, oven and grill surfaces.

[0037] The present invention furthermore is directed to a method for removing soil or stains from a hard surface, the method comprising the sequential steps:

treating the surface with a composition according to the invention and cleaning the surface to remove the soil or stains.

[0038] A preferred method according to the invention comprises an additional step after the treatment step wherein the surface is allowed to soak in contact with the cleaning composition and before the cleaning step.

[0039] Another preferred method according to the invention comprises the sequential steps:

treating the surface with a composition according to the invention, allowing the soil or stain to deposit and toughen, and cleaning the surface to remove the soil or stains.

[0040] Preferably no rinsing step is applied after treating the surface with said composition and before the deposit of the soil. In another preferred method a rinsing step is applied after treating the surface with said composition and before the deposit of the soil.

EXAMPLES

[0041] The following non-limiting examples further illustrate the tough soil cleaning benefits of the present invention.

Example 1: Primary (first-time) cleaning

Method for assessing cleaning of toughened oily soil

[0042] Dehydrated castor oil (DHCO) (John L Seaton & Co, Humberside, UK) is used as a model oily soil for the

assessment and comparison of cleaning of compositions.

[0043] The basic steps in the methodology are:

- Pre-cleaning of test piece
- Application of a film of DHCO soil on test piece surface
- Heat treatment of surface to induce oxidative toughening of DHCO soil
- Cleaning of soiled surface under standard scrubbing conditions, using Abrasion Tester apparatus
- Expression of cleaning results (% Soil Removal), based on gravimetric analysis of soiled versus cleaned surface

Test Surface

[0044] Cleaning compositions are evaluated on 10.0 x 10.0 cm pieces of 304 grade brushed stainless steel. Test pieces are previously unused, and are pre-cleaned prior to use.

Pre-cleaning of Stainless Steel Test Surfaces

[0045] Test pieces are soaked for at least 1 hour in ~17 % by weight potassium hydroxide in 50/50 % by weight aqueous methylated spirits to remove any surface contamination from the metalworking process, which might influence wetting of the surface by the DHCO soil. After soaking, surfaces are thoroughly rinsed in running tap water and allowed to dry naturally in air, stored vertically.

Soiling of Surfaces

[0046] The stainless steel tile is pre-weighed (to 4 decimal places). A 5.0 x 5.0 cm area in the centre of the stainless steel surface is marked out by a square of adhesive masking tape. 0.040 gram (+/-4 mg) of DHCO is applied to the central templated area of the surface and distributed over the 25cm^2 area of surface using a purpose-made spreader, to produce an even film of oil. The masking tape template is carefully removed and the soiled tile is reweighed.

Oxidative Toughening of DHCO Soil

[0047] To simulate the oxidative toughening that an unsaturated oil might experience on a cooker top, dishware, oven, etc., test surfaces are heated in an oven at 100°C for 60 minutes. Test surfaces are allowed to cool and equilibrate for at least 1 hour. The test surface is reweighed and the weight of aged oil ($W_{initial}$) calculated.

Cleaning

[0048] Cleaning by the composition under test is carried out in a Martindale Abrasion Tester apparatus (SDL International) over a fixed number of full lissajous figures (16 cycles), using a 1.5 cm diameter circle of non-woven cleaning cloth ('Ballerina', Unilever) attached to the cleaning head. By each full lissajous figure, the entire surface of the tile is cleaned once. The head has a total mass of 994 gram, applying a cleaning force of about 560 gram/cm^2 to the soiled test surface.

[0049] The soiled tile is fixed centrally in the Abrasion Tester's sample well and 20.0 gram cleaning composition under test is introduced. Immediately, the cleaning head is secured in place and the Abrasion Tester apparatus run for the required number of lissajous figures. The cleaned tile is removed and rinsed free from cleaning product and any loose soil under a running tap. The surface is allowed to dry, stored vertically, and then reweighed. The weight of any remaining DHCO soil (W_{final}) is calculated.

Calculation of Results

[0050] Cleaning performance of compositions is expressed as % Soil Removal, derived from the weights of the tiles at the different stages in the method:

$$\text{Soil Removal}\,(\%) = \frac{W_{initial} - W_{final}}{W_{initial}} \cdot 100\%$$

where

$W_{initial}$ = weight of aged DHCO, before cleaning
W_{final} = weight of residual DHCO, after cleaning

[0051] The outlined method is used to demonstrate the superior primary (first-time) cleaning of the compositions of the invention.

Ingredients of Compositions Tested

[0052]

91-8 = Neodol 91-8 nonionic ex Shell Chemicals
C-35 = Arquad C-35 mono-coco trimethyl cationic ex Akzo Nobel
HY = Praepagan HY mono-C12-14 dimethyl hydroxyethyl cationic ex Clariant
CTAC = Arquad 16-29 mono-C16 trimethyl cationic ex Akzo Nobel
BAC = C14 benzyl dimethyl cationic ex Sigma-Aldrich
SAS = Hostapur SAS30 alkane sulphonate anionic ex Clariant
BTLF = Genamin BTLF mono-C22 trimethyl cationic ex Clariant
Na2CO3 = sodium carbonate

[0053] The following 10 compositions were examined in the Abrasion Tester apparatus according to the method already described. Scrubbing in the Abrasion Tester was for 3 lissajous figures.

Table 1: Results of primary cleaning

Ingredient	**Comp. Ex. A**	**Ex 1**	**Ex 2**	**Comp. Ex. B**	**Ex 3**	**Ex 4**	**Ex 5**	**Ex 6**	**Comp. Ex. C**	**Comp.Ex. D**
91-8	5.0%	-	1.0%	3.0%	-	-	-	1.0%	-	-
C-35	-	5.0%	4.0	2.0	-	-	-	-	-	-
HY	-	-	-	-	5.0%	2.0%	-	-	-	-
CTAC							5.0%	4.0		
BAC	-	-	-	-	-	-	-	-	5.0%	-
SAS	-	-	-	-	-	-	-	-	-	5.0%
Na2CO3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Soil Removal, %									
	29.9	85.9	80.3	20.7	83.3	63.8	70.2	61.3	30.6	18.4

[0054] All compositions were at a fixed pH (11.4), adjusted by addition of sodium hydroxide or hydrochloric acid, as required. The above compositions are made to 100% with demineralised water.

[0055] Examples 1 to 6 containing cationic surfactant according to the invention show a significant boost in tough oily soil removal compared to compositions with alcohol ethoxylate nonionic (comparative Example A), benzalkonium chloride cationic (comparative Example C) and secondary alkane sulphonate anionic (comparative Example D) as sole surfactant.

[0056] Examples 1 and 3 with mono-coco and mono-C12-14 cationic surfactants give better cleaning compared to Example 5 with mono-C16 cationic surfactant.

[0057] Examples 2 and 6, binary mixtures of cationic and nonionic surfactants according to the invention (cationic: nonionic ratio 4:1), provide good cleaning. Example 2 is much superior to a binary composition of ratio 1:1.5 (comparative Example B).

[0058] Primary cleaning of a composition with mono-C12-14 cationic surfactant was examined at lower pH in the Abrasion Tester apparatus according to the method already described. Scrubbing in the Abrasion Tester was for 3 lissajous figures.

Table 2: Primary cleaning at pH 10

Ingredients	Comp. Ex. E	Ex 7	Comp. Ex. F
91-8	2.5%	-	-
HY	-	2.5%	-
SAS	-	-	2.5%
Na2CO3	1.0	1.0	1.0
	Soil Removal, %		
	6.4	36.1	15.2

[0059] Compositions were at a fixed pH (10.0), adjusted by addition of sodium hydroxide or hydrochloric acid, as required. The above compositions are made to 100% with demineralised water.

[0060] Cleaning of tough oily soil is more difficult for all systems at lower pH. Example 7, with mono-C12-14 cationic surfactant according to the invention, gives superior cleaning to alcohol ethoxylate or secondary alkane sulphonate (comparative Examples E & F).

Example 2: Secondary (next-time) cleaning

[0061] Secondary (next-time) cleaning by compositions of the invention is demonstrated by the same basic method as previously described to assess primary cleaning, with the following differences in the method:

i) after pre-cleaning and before soiling with oil, templated stainless steel tiles are treated with 0.01ml test composition which is applied to the central 25cm^2 area of surface and distributed uniformly over the area using a glass spreader. The treatment is allowed to dry naturally.
ii) 7 mg (+/- 2 mg) DHCO oil is applied uniformly to the treated tile by spraying using a DeVilbiss gravity-feed spray gun (model MPS-514/515) operating at 15psi compressed air.
iii) cleaning of the thermally-toughened soil is carried out with the Abrasion Tester for 1 lissajou, using a simple, standard surfactant solution (5% Neodol 91-8 in demin. water at pH 10.0)
iv) soil removal during cleaning is expressed as mg oil removed

[0062] The following 4 compositions were examined in the Abrasion Tester apparatus according to the method described. Soil removal results are the means of triplicate evaluations.

Table 3: Next time cleaning effect

Ingredient.	Comp. Ex. G	Ex 8	Ex. 9	Comp. Ex H
91-8	1.0%	-	-	-
C-35	-	1.0%	-	-
HY	-	-	1.0%	-
BTLF	-	-	-	1.0%
	Soil Removal, mg			
	0.30	2.30	1.30	2.30
	Standard Deviation, mg			
	0.21	0.29	0.15	0.23

[0063] All compositions were at a fixed pH (10.0), adjusted by addition of sodium hydroxide, as required. The above compositions are made to 100% with demineralised water. The results show the ability of cationic surfactant in compositions of the invention (Examples 8 & 9) to deliver a secondary (next-time) cleaning effect on oily soil compared to alcohol ethoxylate nonionic (comparative Example G). The mono-coco cationic Arquad C-35 (Example 8) gives a statistically superior effect to mono-C12-14 Praepagen HY (Example 9). Arquad C-35 (Example 8) of the present invention gives as good a secondary cleaning effect as Genamin BTLF (C22 mono-alkyl cationic - comparative Example H) of prior art WO 98/28391. However, cationic surfactants of WO 98/28391 are more difficult to formulate than the cationic

surfactants of the present invention and do not provide as good primary cleaning of tough oily soils.

Claims

1. A cleaning composition comprising at most two surfactants, wherein at least one surfactant is a quaternary ammonium compound of the formula R1R2R3R4N+ wherein R1 is an C10-C16 alkyl, R2, R3, R4 are each H or C1-C3 alkyl or substituted C1-C3 alkyl, and wherein the quaternary ammonium compound is present in an amount of 0.1-10 wt% of the composition and if the composition comprises a non-ionic surfactant, the non-ionic surfactant is present in an amount of less than 3 wt%.

2. A cleaning composition according to claim 1 wherein R1 is a linear alkyl.

3. A cleaning composition according to claims 1 or 2 wherein at least two of R2, R3, and R4 is CH3.

4. A cleaning composition according to any of claims 1 to 3 wherein R1 is C10-C14, preferably C12-C14.

5. A cleaning composition according to any of claims 1 to 4 wherein the pH is at least 9, preferably at least 10.5

6. A cleaning composition according to any of claims 1 to 5 wherein the ratio of quaternary ammonium compound to non-ionic surfactant is 50:1 to 3:1.

7. Use of a cleaning composition according to any of claims 1 to 6 for facilitating the removal of soil, in particular fatty soil, more particularly chemically toughened fatty soil, from a hard surface.

8. Use according to claim 7 wherein the surface is treated with the cleaning composition prior to deposition of the soil.

9. Use according to claim 8 wherein either a rinsing step or no rinsing step is applied after the surface has been treated with the composition and before deposition of the soil.

10. Use of a composition according to any of claims 1 to 6 as a pre-treatment composition for a surface selected from the group comprising dishware, cookware, oven and grill surfaces.

11. A method for removing soil or stains from a hard surface, the method comprising the sequential steps:

    a) treating the surface with a composition according to any of claims 1 to 6
    b) cleaning the surface to remove the soil or stains.

12. A method according to claim 11 comprising the additional step of allowing the surface to soak in contact with the cleaning composition after the treating step and before the cleaning step.

13. A method according to claim 11 or 12 comprising the additional step of allowing the soil or stain to deposit and toughen after the treating step and before the cleaning step.

14. A method according to claim 13 wherein either a rinsing step or no rinsing step is applied after treating the surface with said composition and before the deposit step.

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EUROPEAN SEARCH REPORT

Application Number
EP 09 16 8534

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 94/28108 A (ECOLAB INC [US]) 8 December 1994 (1994-12-08) * page 1, lines 4-25 * * page 4, lines 22-37 * * claims; examples *	1-14	INV. C11D1/62 C11D1/835 C11D11/00
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X	EP 0 605 178 A (JEYES GROUP PLC [GB]) 6 July 1994 (1994-07-06) * page 1, lines 1-7; examples *	1-5,7-9, 11-14	
X	US 5 910 473 A (ALFANO STEFANO [IT] ET AL) 8 June 1999 (1999-06-08) * column 1, lines 10-16 * * column 4, lines 51,52 * * claims; examples *	1-4,6-9, 11-14	TECHNICAL FIELDS SEARCHED (IPC) C11D
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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	8 February 2010	Péntek, Eric

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 16 8534

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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