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(54) **HARD SURFACE TREATMENT COMPOSITION**

ZUSAMMENSETZUNG ZUR BEHANDLUNG HARTER OBERFLÄCHEN

COMPOSITION DE TRAITEMENT DE SURFACE DURE

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Description**Field of the invention**

5 [0001] The present invention is in the field of hard surface treatment compositions; and in particular relates to cleaning compositions that can provide long lasting hygiene to hard surfaces.

Background of the invention

10 [0002] Hard surface cleaners is a category of cleaning agents comprising mainly aqueous solutions of specialty chemicals that vary with the amount of dirt and the surface being cleaned. The different types of hard surface cleaners include all purpose cleaners, glass cleaners, metal cleaners, building facade cleaners, toilet bowl cleaners, scouring agents etc.

[0003] Toilet bowl cleaning often is aimed at removal of calcium carbonate deposits, which are attacked by acids. Powdered cleaners contain acids that come in the form of solid salts, such as sodium hydrogen sulphate. Liquid toilet bowl cleaners contain other acids, typically dilute hydrochloric, phosphoric, or formic acids. These convert the calcium carbonate into salts that are soluble in water or are easily rinsed away. However, the cleaning and disinfecting benefits achieved from such acid cleaners are limited. Therefore, there still lies a need for cleaning compositions which can provide prolonged hygiene benefits to hard surfaces like toilet bowls.

15 [0004] Silanes are well known in the art for delivering hydrophobic properties and a long lasting antimicrobial effect to hard surfaces as they prevent the deposition of dirt and microorganisms. However, addition of silanes to an acid based formulation disturbs the stability of the composition.

[0005] WO 97/36980 relates to an acidic cleaning formulation containing a surface modification agent selected from the group consisting of a hydrolyzed trialkoxysilane and a hydrolyzable quaternary silane.

20 [0006] GB 2 340 501 A relates to acidic hard surface cleaning and disinfecting compositions providing a protective layer for water and stain repellency.

[0007] US 2010/0093666 A1 relates to antimicrobial organosilane compositions, compounds, products, and methods for their use.

25 [0008] US 5,411,585 discloses a method of improving the stability and broadening the range of pH stability of an aqueous solution of from about 0.001% to 5% by weight of a water soluble organosilane containing silicon-bonded hydrolyzable groups, particularly water soluble quaternary ammonium functional organosilanes, by the addition of a water soluble organic non-silicon quaternary ammonium compound and at least one of non-ionic, amphoteric, sarcosine, anionic, and certain types of cationic surfactants. The resulting stable aqueous solutions are useful for depositing the water soluble organosilane on a variety of substrates to, among other things, serve as coupling agents, waterproofing agents and to render substrates antimicrobial and algicidal depending upon the nature of the organosilane. This document discloses as a thickener a water soluble non-ionic polymer Natrosol™ hydroxyethylcellulose. However, hydroxyethyl-cellulose is a non-ionic polymer not suitable in the present invention.

30 [0009] It is therefore an object of the invention to provide a stable acidic hard surface treatment composition with hydrophobic properties.

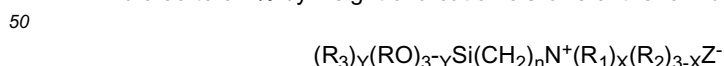
[0010] It is another object of the invention to provide a hard surface cleaning composition that provides prolonged hygiene benefits to hard surfaces.

35 [0011] Surprisingly, it has been found that specific water soluble non-ionic polymers having a specific molecular weight can stabilise silane in an acidic composition.

Summary of the invention

40 [0012] Accordingly, in a first aspect, the invention provides a hard surface treatment composition comprising

- a 0.1 to 10% by weight of a mixture of acid stable surfactants selected from cationic and non-ionic surfactants;
b 0.05 to 0.4% by weight of a cationic silane of the formula:

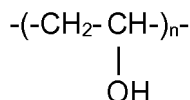


where,

- 55 R_1 is C6 to C18 alkyl or aryl group;
 R_2 is C1 to C5 alkyl group;
 R is C1 to C4 alkyl group;
 R_3 is C1 to C4 alkyl group;

Y is an integer from 0 to 2;
 X is an integer from 1 to 3;
 Z is an halide ion, preferably chloride (Cl⁻);
 O is oxygen;
 Si is silica;
 C is carbon;
 H is hydrogen;
 N is nitrogen; and
 n is 3;

c 0.05 to 4% by weight of a water soluble non- ionic polymer having a molecular weight between 10 and 150 kDa selected from formula B



where,
 n= 3-2300; and
 d water;

wherein the pH of the composition is less than or equal to 2, and wherein silane and polymer is in the weight ratio of 1:10 to 3.5:1.

[0013] In a second aspect, the invention provides a method for providing prolonged hygiene to a surface comprising the steps in sequence of applying the composition according to the invention onto a surface; allowing the surface to dry; and rinsing the surface.

[0014] In a third aspect, the invention provides use of the composition according to the invention for providing prolonged hygiene to a surface.

[0015] In the context of the present invention, the reference to "hard surface" typically means toilet bowls, floors and bathroom floors and tiles.

[0016] 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. Similarly, all percentages are weight/weight percentages unless otherwise indicated. 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

[0017] In a first aspect, the invention relates to a hard surface treatment composition comprising an acid stable surfactant, a cationic silane, a water soluble non-ionic polymer and water.

Acid stable surfactant

[0018] The hard surface treatment composition of the present invention comprises an acid stable surfactant.

[0019] The acid stable surfactant of the present invention is selected from a mixture of cationic and non-ionic surfactants.

[0020] Examples of cationic surfactants include C8 to C18 alkyltrimethylammonium salts, C8 to C18 alkyldimethyl ammonium salts and alphas-trimethylamino fatty acid betaines; the preferred surfactant being C8 to C18 alkyltrimethylammonium salts.

[0021] Examples of non-ionic surfactants include alkylbenzenesulphonates, linear alkyldiphenyletherdisulphonates, alpha-olefin sulphonates, ethoxylated alkyl alcohol ethers, ethoxylated alkyl alcohol ether sulphates, ethoxylated alkylphenols, ethoxylated alkylphenol ether sulphates, ethoxylated perfluoroalkylalkanols, amine ethoxylates, ethoxylated

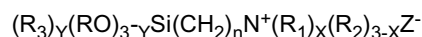
C8 to C18 amine salts; the preferred surfactant being ethoxylated C8 to C18 amine salts.

[0022] The acid stable surfactant is present in the composition in a concentration of 0.1 to 10%, preferably not more than 8%, more preferably not more than 6%, still more preferably not more than 4% or even not more than 2% but typically not less than 0.5%, preferably not less than 1% by weight of the total composition.

[0023] The cationic and non-ionic surfactant is present in the composition in a weight ratio of 1:1 to 1:10, preferably 1:2 to 1:8.

Cationic silane

[0024] The hard surface treatment composition of the present invention comprises a cationic silane of the formula:



where,

R_1 is C6 to C18 alkyl or aryl group, preferably C10 to C18 alkyl or aryl group, more preferably C14 to C18 alkyl or aryl group;

R_2 is C1 to C5 alkyl group, preferably C1 to C4 alkyl group, more preferably C1 to C2 alkyl group;

R is C1 to C4 alkyl group, preferably C1 to C2 alkyl group;

R_3 is C1 to C4 alkyl group; preferably C1 to C2 alkyl group;

Y is an integer from 0 to 2, preferably 0;

X is an integer from 1 to 3, preferably 1 to 2;

Z is an halide ion, preferably chloride (Cl^-);

O is oxygen;

Si is silica;

C is carbon;

H is hydrogen;

N is nitrogen; and

n is 3.

[0025] Non-limiting examples of the silane according to the present invention include dimethyloctadecyl[3-(triethoxysilyl)propyl]ammonium chloride, dimethyloctadecyl[3(trimethoxysilyl)propyl]ammonium chloride, dimethyltetradecyl[3(trimethoxysilyl)propyl]ammonium chloride and methyldidecyl[3-(triethoxysilyl)propyl]ammonium chloride.

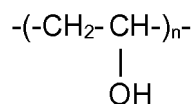
[0026] Preferred silanes are dimethyloctadecyl[3-(triethoxysilyl)propyl]ammonium chloride and dimethyloctadecyl[3-(trimethoxysilyl)propyl]ammonium chloride.

[0027] Cationic silane is present in the composition in a concentration of 0.05 to 0.4%, preferably at least 0.1%, more preferably at least 0.15% but typically not more than 0.3%, preferably not more than 0.2% by weight of the composition.

Non-ionic polymer

[0028] The hard surface treatment composition of the present invention comprises a non-ionic polymer which is water soluble.

[0029] The non-ionic polymer is selected from formula B



where,

$n = 3-2300$.

[0030] The non-ionic polymer of the present invention has a molecular weight of between 10 and 150 kDa, preferably between 10 and 100 kDa, more preferably between 50 and 100 kDa.

[0031] It is particularly preferred that for a superior antimicrobial effect, the molecular weight of the polymer is between 50 and 150 kDa, preferably between 60 and 150 kDa, more preferably between 70 and 130 kDa, still more preferably between 80 and 120 kDa or even more preferably between 80 and 100 kDa.

[0032] The non-ionic polymer is present in the composition in a concentration of 0.05 to 4%, preferably at least 0.1%, more preferably at least 0.5%, still more preferably at least 1% but typically not more than 3%, preferably not more than

2% by weight of the composition.

[0033] Cationic silane and non-ionic polymer are present in the composition in a weight ratio of 1:10 to 3.5:1, preferably between 1:5 and 1:1, based on the weight of the silane and non-ionic polymer.

5 pH

[0034] The pH of the hard surface treatment composition is less than or equal to 2, preferably between 1 and 2.

[0035] The pH of the composition is achieved using a strong acid.

[0036] The strength of an acid generally refers to its ability or tendency to lose a proton (H^+). A strong acid is one that completely ionizes (dissociates) in a solution. For example, in water, one mole of a strong acid HA dissolves yielding one mole of H^+ (as hydronium ion H_3O^+) and one mole of the conjugate base, A^- . Essentially none of the non-ionized acid HA remains. Hence strong acid can be defined as acids having $pK_a \leq 1$.

[0037] Examples of strong acids include hydrochloric acid, hydroiodic acid, hydrobromic acid, perchloric acid, nitric acid, sulphuric acid and sulphamic acid.

[0038] Acids preferred for use in the present invention are hydrochloric acid and sulphamic acid. Water

[0039] The hard surface treatment composition of the present invention comprises 65 to 90% by weight of water, preferably at least 70%, more preferably at least 75% but typically not more than 85%, preferably not more than 80% by weight of the composition.

20 Viscosity

[0040] The composition is preferably somewhat viscous. Consumers typically do not associate water thin compositions with high active (i.e. concentrated) detergent compositions. However, the viscosity should not be so high that the liquid is no longer pourable. Viscosity describes a fluid's internal resistance to flow and may be thought of as a measure of fluid friction. Simply put, the less viscous the fluid is, the greater its ease of movement (fluidity).

[0041] The viscosity of the compositions according to the invention is preferably between 100 and 2000 cP (1 cP = 10^{-2} P = 10^{-3} Pa·s = 1 mPa·s), more preferably between 500 and 1500, when measured using Haake Viscometer, VT550 (with "cup and "bob"), MV 2 bob at shear rate of $21s^{-1}$ and at a temperature of 20°C.

30 Optional ingredients

[0042] Common cleaner and aesthetic additives such as perfumery molecules including encapsulates, fluorescers and optical brighteners, antimicrobial actives such as essential oils and cationic amino surfactants, anti insect actives such as DEET and picaridin, fluoropolymers/ fluoro surfactants, viscosity modifiers such as gum resins, polysaccharides, fatty alcohols, polyols (such as polyvinyl alcohol, glycerol), ingredients that give a delayed release of perfumes, room freshening agents and anti stick agents, viscosifying agents such as gums (Xanthum, guar, kelzan), polymers (derivatives of polysaccharides), stabilizers such as polyols (polyvinyl alcohol, polyethylene glycols or copolymers), fluorosilanes, fluoro surfactants, fluoro siloxanes or fluoro polymers for anti oil sticking, oil repellence and easy oil removal properties, chelating agents such as hydroxamate, EDTA, NTA, DTPA type metal chelators, citrate and organic crystal habit modifying agents, surface care actives such as silicone emulsion, silicone resins, surface curing agents and silicone elastomers.

Method for providing prolonged hygiene

[0043] In a second aspect, the invention relates to a method for providing prolonged hygiene to a surface comprising the steps in sequence of applying the composition according to the invention onto a surface, allowing the surface to dry; and rinsing the surface.

[0044] The second aspect of the invention also relates to a method for providing an antimicrobial effect of greater than 2 log reduction to a hard surface, comprising the steps in sequence of:

- a applying the composition according to any of claims 1 to 6 onto a surface;
- b allowing the surface to dry; and
- c at least 10 times rinsing the surface by applying an amount of water on the same area of the hard surface as where the composition was first applied, wherein the amount of rinse water is between 1 and 100 times the amount of the composition first applied to the area.

[0045] Preferably the antimicrobial effect is greater than 3 log reduction, preferably greater than 4 log reduction and more preferably greater than 5 log reduction.

[0046] Preferably the number of rinses in step c is at least 15, preferably at least 20. The antimicrobial effect remains

at the desired level preferably for at least 15 rinses, more preferably at least 20 rinses, still more preferably at least 30 rinses, even more preferably at least 40 rinses and most preferably at least 45 rinses. Composition of the present invention is typically diluted in the ratio of at least 1:400, preferably at least 1: 500, more preferably at least 1:600, still more preferably at least 1:800 or even more preferably at least 1:1000.

[0047] After applying the composition onto the surface, the surface is allowed to dry at least for 5 minutes.

[0048] Optionally the surface may be wiped or scrubbed after the application of the composition and before it is allowed to dry. The applied composition may be optionally wiped using a mop, wipes, paper, cloth or scrubbed using a brush.

Use of the composition

[0049] In a third aspect, the invention relates to the use of the composition according to the invention for providing prolonged hygiene to a surface.

[0050] By "prolonged hygiene" it is typically meant that the antimicrobial effect remains greater than 2 log reduction for at least 10 rinses, wherein by rinse it is meant the application of an amount of water on the same area of the hard surface as where the composition was first applied, wherein the amount of rinse water is between 1 and 100 times the amount of the composition first applied to the area.

[0051] The antimicrobial effect is preferably greater than 3 log reduction, more preferably greater than 4 log reduction and still more preferably greater than 5 log reduction.

[0052] The antimicrobial effect remains at the desired level preferably for at least 15 rinses, more preferably at least 20 rinses, still more preferably at least 30 rinses, even more preferably at least 40 rinses and most preferably at least 45 rinses.

[0053] Composition of the present invention is typically diluted in the ratio of at least 1:400, preferably at least 1: 500, more preferably at least 1:600, still more preferably at least 1:800 or even more preferably at least 1:1000.

[0054] The invention will now be illustrated by means of the following non-limiting examples

Examples

[0055]

Materials

	Chemical /Material	Grade	Manufacturer/Supplier
Acid stable surfactant	Amine Ethoxylate 2EO	Commercial	Akzo nobel
	Cetyl trimethylammonium chloride (CTAC)	Commercial	Clariant
Non-ionic polymer	Polyvinyl alcohol (PVA) 13 kDa to 23 kDa (13 to 23 kDa)	Lab	Sigma aldrich
	Polyvinyl alcohol (PVA) 98 k (98 kDa)	Lab	Sigma aldrich
	Polyethylene glycol (PEG) 200 Da (0.2 kDa)	Lab	Sigma aldrich
	Polyethylene glycol (PEG) 35k Da (35 kDa)	Lab	Sigma aldrich
	Polyethylene glycol (PEG) 1L Da (100 kDa)	Lab	Sigma aldrich
	PEO 2L Da (200 kDa)	Lab	Sigma aldrich
	Hydroxyethyl cellulose 105k Da (105 kDa)	Commercial	Akzonobel
Cationic silane	Dimethyloctadecyl[3-(triethoxysilyl)propyl] ammonium chloride	Commercial	Zydex industries
Acid	Hydrochloric acid	Lab grade	Sigma Aldrich
	Sulphamic acid	Commercial	Sigma Aldrich
Sequestrant	Dequest 2010	Commercial	Italmatch chemicals
Water	Distilled water	Commercial	-

Preparing the compositions:

[0056] All the compositions were prepared in Heidolph overhead stirrer, model RZR 2051 control. Ingredients were dosed sequentially into the main mixer in the order of water, sulphamic acid, amine ethoxylate 2EO, premix solution of cationic silane and solution of non-ionic polymer, cetyl trimethylammonium chloride, sequestrant and hydrochloric acid. Before the addition of the next ingredient, it was ensured that the previous ingredient was dissolved completely. Perfume and dye, if required can be added to the main mixer before introduction of hydrochloric acid.

Stability:

[0057] Compositions which did not phase separate and were isotropic (clear visually/ slightly turbid) were considered to be stable while compositions which exhibited any phase separation/ precipitation observed immediately after preparation were considered to be unstable.

Contact angle measurements:

[0058] Contact angle in accordance with the present invention is the angle at which the liquid interface meets a solid surface. The contact angle determines the hydrophobicity imparted to a surface. Contact angles above 40° are considered to be good, more preferably above 70°. The contact angle of the sessile droplet was measured using a Kruss Goniometer by placing a 10 microlitre of distilled water droplet on the substrate. All contact angle measurements were done on commercially available ceramic tiles. About one gram of the product was applied on a (10X10cm) tile. Using a brush, the product was spread on the tile and was allowed to be in contact with the surface for 20 minutes. After 20 minutes, the product was rinsed off with water along with brushing and then the contact angle was measured.

Hygiene assessment of the compositions using EN 1276:

[0059] For hygiene assessment, the product was diluted with sterile water at different ratio (from 1:0 to 1:2000). 8 ml of the diluted samples were taken in a 100 ml sample container. A bacterial saline suspension containing 10⁸ cells was prepared. 4.1 ml of the bacterial suspension was added to 1 ml of sterile 0.3% BSA solution or (simulating clean conditions) 1 ml of sterile 3% BSA solution (simulating dirty conditions) and allowed to stand for 2 minutes. At the end of this contact period, the mixture was transferred into the sample container containing the dilutions of the compositions. At the end of 5 minutes contact time, the mixture was vortexed and 1 ml of it was transferred to 9 ml of neutralizing broth (D/E) containing tube. Serial dilutions of this were carried out in D/E and further enumeration was carried out using TSA medium. Results were recorded after 24-48 hours of incubation at 37°C and log reduction was calculated. Dilution at which greater than 5 log reduction in bacterial numbers was obtained was considered to pass the EN 1276 hygiene assessment.

Example 1: Effect of molecular weight of the non-ionic polymer on stability of the composition

[0060] In this example, Ex 1 to Ex 2 comprising a non-ionic polymer having a molecular weight within the scope of the invention are compared to Comp A comprising a non-ionic polymer having a molecular weight outside the scope of the present invention.

Ex 3 to 5 are not according to the invention and provided for better understanding.

Set		Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Comp A
Acid stable surfactant wt%	Amine Ethoxylate 2EO	1.55	1.55	1.55	1.55	1.55	1.55
	CTAC	0.77	0.77	0.77	0.77	0.77	0.77
Cationic silane wt%		0.1	0.1	0.1	0.1	0.1	0.1
Non-ionic polymer	wt%	0.1	0.1	0.1	0.1	0.1	0.1
	Type	PVA 13k Da (13 kDa)	PVA 98k Da (98 kDa)	PEG 200 Da (0.2 kDa)	PEG 35k Da (35 kDa)	PEG 1L Da (100 kDa)	PEO 2L Da (200 kDa)

(continued)

Set		Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Comp A
Acid wt%	Sulphamic Acid	6.00	6.00	6.00	6.00	6.00	6.00
	Hydrochloric Acid	8.00	8.00	8.00	8.00	8.00	8.00
Sequestrant wt%		0.19	0.19	0.19	0.19	0.19	0.19
Water wt%		upto 100	upto 100	upto 100	upto 100	upto 100	upto 100
pH		1	1	1	1	1	1
Stability		Single phase	Single phase	Single phase	Single phase	Single phase	Unstable
Contact angle		84°	86°	90°	83°	80°	-

[0061] The table above shows that a stable composition is obtained when the molecular weight of the polymer is according to the invention.

Example 2: Effect of concentration of the non-ionic polymer on stability of the composition

[0062] In this example, various concentrations of the non-ionic polymer are compared. Ex 6 is a composition comprising the non-ionic polymer in a concentration within the scope of the present invention and Comp B and Comp C are comparative compositions comprising the non-ionic polymer in concentrations outside the scope of the present invention.

Set		Comp B	Ex 6	Comp C
Acid stable surfactant wt%	Amine Ethoxylate 2EO	1.55	1.55	1.55
	CTAC	0.77	0.77	0.77
Cationic silane wt%		0.1	0.1	0.1
Non-ionic polymer (PVA 13K Da (13 kDa)) wt%		0.02	0.1	4.5
Acid wt%	Sulphamic Acid	6.00	6.00	6.00
	Hydrochloric Acid	8.00	8.00	8.00
Sequestrant wt%		0.19	0.19	0.19
Water wt%		upto 100	upto 100	upto 100
pH		1	1	1
Stability		Unstable	Single phase	Unstable
Contact angle		-	84°	-

[0063] The table above shows that a stable composition is obtained at a non-ionic polymer concentration according to the invention.

Example 3: Effect of non-ionic polymer outside the scope of the invention on stability of the composition

[0064] In this example, a composition (Comp AA) comprising the non-ionic polymer of US5411485 was prepared.

Set		Comp AA
Acid stable surfactant wt%	Amine Ethoxylate 2EO	1.55
	CTAC	0.77

(continued)

Set		Comp AA
Cationic silane wt%		0.1
Non-ionic polymer	wt%	0.1
	Type	Hydroxy ethyl cellulose 105k Da (105 kDa)
Acid wt%	Sulphamic Acid	6.00
	Hydrochloric Acid	8.00
Sequestrant wt%		0.19
Water wt%		upto 100
pH		1
Stability		Unstable
Contact angle		-

[0065] The table above shows that a stable composition is not obtained when the non-ionic polymer used is outside the scope of the present invention.

Example 4: Effect of concentration of the cationic silane on hydrophobicity and stability of the composition

[0066] In this example, various concentrations of the cationic silane are compared. Ex 7 is a composition comprising the silane in a concentration within the scope of the present invention and Comp D to Comp F are comparative compositions comprising the silane in concentrations outside the scope of the present invention.

Set		Comp D	Comp E	Ex 7	Comp F
Acid stable surfactant wt%	Amine Ethoxylate 2EO	1.55	1.55	1.55	1.55
	CTAC	0.77	0.77	0.77	0.77
Cationic silane wt%		0	0.01	0.1	0.5
Non-ionic polymer (PVA 13K Da (13 kDa) wt%		0	0.1	0.1	0.1
Acid wt%	Sulphamic Acid	6.00	6.00	6.00	6.00
	Hydrochloric Acid	8.00	8.00	8.00	8.00
Sequestrant wt%		0.19	0.19	0.19	0.19
Water wt%		upto 100	upto 100	upto 100	upto 100
pH		1	1	1	1
Stability		Single phase	Single phase	Single phase	Unstable
Contact angle		34°	34°	84°	-

[0067] The table above shows that a stable composition having the desired hydrophobicity is obtained at silane concentrations within the scope of the present invention. It is noted that in compositions comprising silane at concentrations below the required range, the hydrophobicity is compromised while in compositions comprising silane at concentrations above the required range, the stability of the composition is hampered.

Example 5: Effect of the ratio of cationic silane and non-ionic polymer on stability of the composition

[0068] This example demonstrates the effect of the ratio of cationic silane and non-ionic polymer on the stability of the composition. Examples 9 to 15 are compositions comprising the cationic silane and the polymer in a ratio according to the invention and Comp G and Comp H are compositions comprising the cationic silane and the polymer in a ratio outside the scope of the present invention.

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Set		Comp I1	Ex 9	Ex 10	Ex 11	Ex 12	Ex 13
Acid stable surfactant wt%	Amine Ethoxylate 2EO	1.55	1.55	1.55	1.55	1.55	1.55
	CTAC	0.77	0.77	0.77	0.77	0.77	0.77
Cationic silane wt%		0	0.02	0.04	0.06	0.08	0.1
Non-ionic polymer (PVA 13K Da (13 kDa) wt%		0.2	0.18	0.16	0.14	0.12	0.1
Cationic silane: Non-ionic polymer ratio		-	1:9	1:4	3:7	2:3	1:1
Acid wt%	Sulphamic Acid	6.00	6.00	6.00	6.00	6.00	6.00
	Hydrochlo- ric Acid	8.00	8.00	8.00	8.00	8.00	8.00
Sequestrant wt%		0.19	0.19	0.19	0.19	0.19	0.19
Water wt%		upto 100	upto 100	upto 100	upto 100	upto 100	upto 100
pH		1	1	1	1	1	1
Stability		S	S	S	S	S	S

Set		Ex 14	Ex 15	Comp G	Comp H	Comp I2
<u>Acid stable surfactant wt%</u>	<u>Amine Ethoxylate 2EO</u>	<u>1.55</u>	<u>1.55</u>	<u>1.55</u>	<u>1.55</u>	<u>1.55</u>
	<u>CTAC</u>	<u>0.77</u>	<u>0.77</u>	<u>0.77</u>	<u>0.77</u>	<u>0.77</u>
<u>Cationic silane wt%</u>		<u>0.12</u>	<u>0.14</u>	<u>0.16</u>	<u>0.18</u>	<u>0.2</u>
<u>Non-ionic polymer (PVA 13K Da (13 kDa) wt%</u>		<u>0.08</u>	<u>0.06</u>	<u>0.04</u>	<u>0.02</u>	<u>0</u>
<u>Cationic silane: Non-ionic polymer ratio</u>		<u>3:2</u>	<u>7:3</u>	<u>4:1</u>	<u>9:1</u>	<u>=</u>
<u>Acid wt%</u>	<u>Sulphamic Acid</u>	<u>6.00</u>	<u>6.00</u>	<u>6.00</u>	<u>6.00</u>	<u>6.00</u>
	<u>Hydrochloric Acid</u>	<u>8.00</u>	<u>8.00</u>	<u>8.00</u>	<u>8.00</u>	<u>8.00</u>
<u>Sequestrant wt%</u>		<u>0.19</u>	<u>0.19</u>	<u>0.19</u>	<u>0.19</u>	<u>0.19</u>
<u>Water wt%</u>		<u>upto 100</u>	<u>upto 100</u>	<u>upto 100</u>	<u>upto 100</u>	<u>upto 100</u>
<u>pH</u>		<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
<u>Stability</u>		<u>S</u>	<u>S</u>	<u>U</u>	<u>U</u>	<u>U</u>

S-Single phase; U-Unstable

[0069] The tables above shows that a stable composition is not obtained when the ratio of silane and non-ionic polymer is outside the scope of the present invention.

Example 6: Superior antimicrobial effect of the composition

[0070] This example demonstrates the superior antimicrobial effect of the composition when the non-ionic polymer used is of a higher molecular weight.

EN 1276 under clean conditions and 5 minutes contact time

Formulation	Dilution	Avg
<i>Staphylococcus aureus</i> ATCC 6538		
Composition of Comp D	1: 400	>5 log reduction
	1: 600	<5 log reduction
Composition of Example 2	1: 600	>5 log reduction
	1: 800	<5 log reduction
<i>Pseudomonas aeruginosa</i> ATCC 15442		
Composition of Comp D	1: 800	>5 log reduction
	1: 1000	<5 log reduction
Composition of Example 2	1: 1000	>5 log reduction
	1: 1200	>5 log reduction

EN 1276 under dirty conditions and 5 minutes contact time

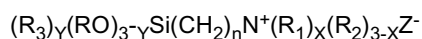
Formulation	Dilution	Avg
<i>Pseudomonas aeruginosa</i> ATCC 15442		
Composition of Comp D	1: 400	>5 log reduction
	1: 500	<5 log reduction
Composition of Example 2	1: 500	>5 log reduction
	1: 600	>5 log reduction

[0071] The above table shows that compositions of Example 2 exhibits more than 5 log reduction to pass the EN 1276 hygiene assessment when compared to a control with no polymer at all (Comp D).

Claims

1. A hard surface treatment composition comprising

- a 0.1 to 10% by weight of a mixture of acid stable surfactants selected from cationic and non-ionic surfactants;
b 0.05 to 0.4% by weight of a cationic silane of the formula:



where,

R_1 is C6 to C18 alkyl or aryl group;

R_2 is C1 to C5 alkyl group;

R is C1 to C4 alkyl group;

R_3 is C1 to C4 alkyl group;

Y is an integer from 0 to 2;

X is an integer from 1 to 3;

Z is an halide ion, preferably chloride (Cl^-);

O is oxygen;

Si is silica;

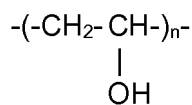
C is carbon;

H is hydrogen;

N is nitrogen; and

n is 3;

- c 0.05 to 4% by weight of a water soluble non-ionic polymer having a molecular weight between 10 and 150 kDa selected from formula B



where,

$n= 3-2300$; and

d water;

wherein the pH of the composition is less than or equal to 2, and

wherein silane and polymer is in the weight ratio of 1:10 to 3.5:1.

2. A hard surface treatment composition according to claim 1 wherein silane and polymer is in the weight ratio between

1:5 and 1:1.

3. A hard surface treatment composition according to claim 1 or 2 wherein the pH of the composition is between 1 and 2.

4. A hard surface treatment composition according to any one of claims 1 to 3 wherein integer Y is 0.

5. A hard surface treatment composition according to any one of claims 1 to 4 wherein R₁ is C10 to C18 alkyl or aryl group.

6. A hard surface treatment composition according to any one of claims 1 to 5 wherein the water soluble non- ionic polymer is polyvinyl alcohol.

7. A hard surface treatment composition according to any one of claims 1 to 6, wherein the non- ionic polymer has a molecular weight of between 10 and 100 kDa.

8. A method for providing prolonged hygiene to a surface comprising the steps in sequence of

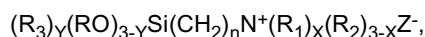
- a applying the composition according to any of claims 1 to 6 onto a surface;
- b allowing the surface to dry; and
- c rinsing the surface.

Patentansprüche

1. Zusammensetzung zur Behandlung harter Oberflächen, umfassend

a 0,1 bis 10 Gewichts-% einer Mischung von säurestabilen Tensiden, ausgewählt unter kationischen und nicht-ionischen Tensiden;

b 0,05 bis 0,4 Gewichts-% eines kationischen Silans der Formel:



worin

R₁ eine C6- bis C18-Alkyl- oder Aryl-Gruppe ist;

R₂ eine C1- bis C5-Alkyl-Gruppe ist;

R eine C1- bis C4-Alkyl-Gruppe ist;

R₃ eine C1- bis C4-Alkyl-Gruppe ist;

Y eine ganze Zahl von 0 bis 2 ist;

X eine ganze Zahl von 1 bis 3 ist;

Z ein Halogenidion, vorzugsweise Chlorid (Cl⁻) ist;

O Sauerstoff ist;

Si Siliciumdioxid ist;

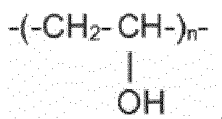
C Kohlenstoff ist;

H Wasserstoff ist;

N Stickstoff ist; und

n 3 ist;

c 0,05 bis 4 Gewichts-% eines wasserlöslichen nicht-ionischen Polymers, das ein Molekulargewicht zwischen 10 und 150 kDa aufweist, ausgewählt aus der Formel B



worin

n = 3 - 2300; und

d Wasser;

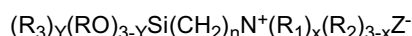
worin der pH der Zusammensetzung weniger als oder gleich 2 ist und
worin Silan und Polymer in dem Gewichtsverhältnis von 1:10 bis 3,5:1 liegen.

2. Zusammensetzung zur Behandlung harter Oberflächen nach Anspruch 1, wobei Silan und Polymer in dem Gewichtsverhältnis zwischen 1:5 und 1:1 liegen.
3. Zusammensetzung zur Behandlung harter Oberflächen nach Anspruch 1 oder 2, wobei der pH der Zusammensetzung zwischen 1 und 2 liegt.
4. Zusammensetzung zur Behandlung harter Oberflächen nach irgendeinem der Ansprüche 1 bis 3, worin die ganze Zahl Y 0 beträgt.
5. Zusammensetzung zur Behandlung harter Oberflächen nach irgendeinem der Ansprüche 1 bis 4, wobei R₁ eine C10- bis C18-Alkyl- oder Aryl-Gruppe ist.
6. Zusammensetzung zur Behandlung harter Oberflächen nach irgendeinem der Ansprüche 1 bis 5, wobei das wasserlösliche nicht-ionische Polymer Polyvinylalkohol ist.
7. Zusammensetzung zur Behandlung harter Oberflächen nach irgendeinem der Ansprüche 1 bis 6, wobei das nicht-ionische Polymer ein Molekulargewicht zwischen 10 und 100 kDa aufweist.
8. Verfahren zum Schaffen einer ausgedehnten Hygiene auf einer Oberfläche, umfassend die Schritte in der Reihenfolge:
 - a Aufbringen der Zusammensetzung nach irgendeinem der Ansprüche 1 bis 6 auf eine Oberfläche;
 - b Trockenlassen der Oberfläche; und
 - c Abspülen der Oberfläche.

Revendications

1. Composition de traitement de surface dure comprenant

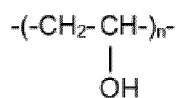
- a de 0,1 à 10 % en masse d'un mélange de tensioactifs stables aux acides choisis parmi des tensioactifs cationiques et non-ioniques ;
- b de 0,05 à 0,4 % en masse d'un silane cationique de la formule :



où,

- R₁ est un groupe alkyle ou aryle en C6 à C18 ;
- R₂ est un groupe alkyle en C1 à C5 ;
- R est un groupe alkyle en C1 à C4 ;
- R₃ est un groupe alkyle en C1 à C4 ;
- Y est un nombre entier de 0 à 2 ;
- X est un nombre entier de 1 à 3 ;
- Z est un ion halogénure, de préférence chlorure (Cl⁻) ;
- O est l'oxygène ;
- Si est la silice ;
- C est le carbone ;
- H est l'hydrogène ;
- N est l'azote ; et
- n est égal à 3 ;

- c de 0,05 à 4 % en masse d'un polymère non-ionique soluble dans l'eau présentant une masse moléculaire de 10 à 150 kDa choisi parmi la formule B



où,

n = 3-2300 ; et
d de l'eau ;

dans laquelle le pH de la composition est inférieur ou égal à 2, et
dans laquelle le silane et le polymère sont présents dans le rapport massique de 1:10 à 3,5:1.

2. Composition de traitement de surface dure selon la revendication 1, dans laquelle le silane et le polymère sont dans le rapport massique de 1:5 à 1:1.
3. Composition de traitement de surface dure selon la revendication 1 ou 2, dans laquelle le pH de la composition est de 1 à 2.
4. Composition de traitement de surface dure selon l'une quelconque des revendications 1 à 3, dans laquelle le nombre entier Y est égal à 0.
5. Composition de traitement de surface dure selon l'une quelconque des revendications 1 à 4, dans laquelle R₁ est un groupe alkyle ou aryle en C10 à C18.
6. Composition de traitement de surface dure selon l'une quelconque des revendications 1 à 5, dans laquelle le polymère non-ionique soluble dans l'eau est le poly(alcool vinylique).
7. Composition de traitement de surface dure selon l'une quelconque des revendications 1 à 6, dans laquelle le polymère non-ionique présente une masse moléculaire de 10 à 100 kDa.
8. Procédé pour fournir une hygiène prolongée à une surface comprenant des étapes successives de :
 - a application de la composition selon l'une quelconque des revendications 1 à 6 sur une surface ;
 - b laisser la surface sécher ; et
 - c rinçage de la surface.

REFERENCES CITED IN THE DESCRIPTION

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