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- (73) Patenthaver: **Ecolab USA Inc., 1 Ecolab Place, St. Paul, MN 55102, USA**
- (72) Opfinder: **SCHMIDT, Michael, Fritz-Müller-Strasse 72, 41065 Mönchengladbach, Tyskland**
KRACK, Ralf, Humboldtstrasse 86, 40237 Düsseldorf, Tyskland
ALTMANN, Thomas, Knechtstedenerstrasse 11 C, 41540 Dormagen, Tyskland
SCHMITZ, Matthias, Mettlacher Strasse 28, 40468 Düsseldorf, Tyskland
PATTEN, Anja, Bechhauser Weg 20, 42799 Leichlingen, Tyskland
- (74) Fuldmægtig i Danmark: **JESPER LEVIN A/S, Jægersborg Alle 93, 2820 Gentofte, Danmark**
- (54) Benævnelse: **RENGØRINGSSAMMENSÆTNING MED FORBEDRET AKTIVITET**
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DESCRIPTION

Field of the Invention

[0001] The invention relates to a cleaning composition with enhanced cleaning activity and to the use for cleaning of hard and soft surfaces. In particular, the invention relates to a liquid alkaline cleaning composition useful in the cleaning of all kinds of articles or surfaces.

Background of the Invention

[0002] Many commercial and domestic articles, facilities and devices needs effective cleaning. Such articles, facilities and devices are known to those skilled in a variety of occupations or domestic activities, particularly those working in industrial plants, beverage and food industry, hospitals, maintenance and repair services, manufacturing facilities, kitchens, restaurants, vehicle cleaning and the like.

[0003] Aqueous alkali cleaners are known as effective cleaning agents. However, many such alkali cleaners have disadvantages when used for automated cleaning processing due to the formation of foam, thus requires the content of additional foam inhibiting agents, which make the composition more complex. The formation of foam lowers the cleaning properties, due to the loss of mechanical agitation. Further, pumping of foam dramatically reduce the liquid flow rates, thus causes dosing and transport problems in the sump, liquid conduits, as well as in the dispensing drawer. Thus, foam is not acceptable in an automated cleaning process, such as automated washer.

[0004] US 2003/176305 A1 refers to an alkaline sensitive metal cleaning composition containing an alkaline concentrate and a corrosion inhibitor concentrate. The alkaline concentrate includes a source of alkalinity in an amount sufficient to provide a use solution having a pH of at least 10.0, and a first chelant component that exhibits soil removal properties when used at a pH of at least 10.0. The corrosion inhibitor concentrate includes a corrosion inhibitor component for reducing corrosion of alkaline sensitive metals when used in a use solution having a pH of at least 10.0, a second chelant component for stabilizing the corrosion inhibitor in the corrosion inhibitor concentrate when the corrosion inhibitor concentrate is provided at a pH that is less than 8.0, and a surfactant component for providing cleaning properties when used at a pH of at least 10.0. A threshold inhibitor/crystal modifier can be provided in at least one of the alkaline concentrate and the corrosion inhibitor concentrate to stabilize the corrosion inhibitor in a use solution at a pH of at least 10.0.

[0005] US 2010/000579 A1 refers to a compositions for removing scale and/or inhibiting formation thereof including an alkaline agent, a primary scale inhibitor, a secondary scale inhibitor and a solvent. The primary scale inhibitor may include phosphonic acid, salts of phosphonic acids and combinations thereof. Suitable secondary scale inhibitor may include aminocarboxylic acids, salts of aminocarboxylic acids, carboxylic acids, salts of carboxylic

acids, polycarboxylic acids, salts of polycarboxylic acids, gluconic acids, salts of gluconic acids, steroids, tetrapyrrols, ionophores, 2,2'-bipyridine, dimercaptopropanol, ortho-phenanthroline and combinations thereof. The compositions may be prepared as a stable concentrates that have pH values greater than or equal to 11. The compositions may also be prepared on site as a use solution.

[0006] Many articles having a surface that requires cleaning contain an alkaline sensitive surface, such as plastic or metal surfaces. Sensitive metal surfaces are aluminum or aluminum containing alloys. Exemplary equipment having a surface containing an alkaline sensitive metals include surgical, medical, and dental instruments, sinks, cookware, utensils, machine parts, vehicles, tanker trucks, vehicle wheels, work surfaces, tanks, immersion vessels, spray washers, and ultrasonic baths. Especially conveyer bands, conduits, tanks and containers in the beverage and food industry. Aqueous alkali cleaners are known as effective cleaning agents. However, many alkali cleaners have disadvantages when used on alkaline sensitive hard and soft surfaces. A problem with using aqueous alkali systems to clean alkaline sensitive hard and soft surfaces is the potential to corrode and/or discolor.

[0007] Further, the amount of effective cleaning components of common cleaning compositions is large dosed to provide an enhanced cleaning. Often, cleaning compositions are bulky and having a high weight that causes transport, storing and handling problems.

[0008] Furthermore, the level of hardness in water can have a deleterious effect in many systems. For example, when water is used in conjunction with cleaning compositions, water hardness can cause precipitation of water scale or components of a cleaning agent. In general, water hardness refers to water having a level of calcium and magnesium ions. Although most locations have hard water, water hardness tends to vary from one location to another. Precipitation of scale and/or corrosion of glass, porcelain, ceramic and metal surfaces due to water hardness is a common problem in ware washing and surface cleaning of soft and hard surfaces. Water hardness can be addressed in a number of ways. For example, the water can be softened by replacing the calcium and the magnesium present in the water with sodium. As a result, free calcium ions may be available to attack active components of the composition, to cause corrosion or precipitation, or other deleterious effects.

[0009] Another drawback is the residue of cleaning components on the cleaned surfaces.

[0010] It is still a need in prior art to provide a cleaning composition for hard and/or soft surfaces that comprises a cleaning components with an enhanced cleaning effect and allows simultaneously to lower the concentration of cleaning components to a minimum.

[0011] Further, it is a need to provide a cleaning composition for automated cleaning processing of hard and soft surfaces that provides an improved cleaning effect, shows no foam or practical no foam formation during the automated processing, and prevents corrosion of sensitive surfaces that are exposed to the cleaning composition.

[0012] Another need is it to provide a cleaning composition that is less bulky but can easily be transferred to the ready-to-use cleaning composition.

Summary of the Invention

[0013] The object of the present invention is to provide a cleaning composition for cleaning of hard and/or soft surfaces that possesses an enhanced cleaning effect, shows practical no foam formation during the cleaning processing, prevents corrosion of sensitive surfaces that are exposed to the cleaning composition, having a remarkable low effective cleaning component concentration of the ready-to-use cleaning composition, avoids or significantly reduces precipitation of scale and overcomes the above mentioned drawbacks.

[0014] Surprisingly it has been found that the use of a mixture of the 4 components a) to d) can effectively be formulated and used as cleaning product with improved cleaning and scaling behavior compared to the existing cleaners.

[0015] According to the present invention, a composition for cleaning is provided that comprises:

1. a) two water-soluble biodegradable aminopolycarboxylate chelants of glutamic acid N,N-diacetic acid and methylglycinediacetic acid;
2. b) a gluconate;
3. c) at least one sequestering agent of a phosphonate;
4. d) at least one liquid conditioner polymer of monomers of water-soluble monoethylenically unsaturated C₃-C₈-carboxylates and/or unsaturated C₃-C₈-carboxylic acids;
5. e) at least one solvent; wherein the weight ratio of the gluconate and/or gluconic acid to acid and/or salt of glutamic acid N,N-diacetic acid and methylglycinediacetic acid is in the range from 1 : 1 to 1 : 5.

[0016] Depending on the pH value of the composition the components of the composition for cleaning according to the invention can be present in the form of an acid and/or as a salt thereof. It should be understood that an alkaline solution comprises the components of the composition for cleaning in its salt form respectively to the pH value of the solution. With respect to an acid solution of the composition for cleaning the components are present in its acid form depending on the pH value.

[0017] The cleaning composition of the invention can be a cleaning solution. The cleaning solution can be an alkaline cleaning solution. The alkaline cleaning solution can be a concentrated cleaning solution. The concentrated alkaline solution can be further diluted by admixing a solvent, preferably water. This diluted liquid alkaline composition obtainable from the liquid alkaline concentrated composition of the invention is referred to as "ready-to-use" solution.

[0018] The ratio of components is the weight ratio, if not otherwise indicated in the specification.

[0019] The formation of foam lowers in particular the cleaning properties, due to the loss of mechanical agitation. Further, pumping of foam dramatically reduce the liquid flow rates, thus causes dosing and transport problems in the sump, liquid conduits, as well as in the dispensing drawer. Thus, foam may not being acceptable in an automated cleaning process. It has surprisingly been found that the cleaning composition of the invention is remarkably mild to sensitive hard and soft surfaces thus avoids corrosion; it provides an improved cleaning effect and shows practically no foam formation during the automated cleaning processing. Moreover, the concentration of the active cleaning components is remarkably low but provides at the same time an enhanced cleaning result.

[0020] The "phrase" alkaline sensitive hard and/or soft surfaces" identifies those surfaces that exhibit corrosion and/or discoloration when exposed to an alkaline solution.

[0021] Exemplary alkaline sensitive materials include plastic surfaces and metals such as soft metals comprising aluminum, nickel, tin, zinc, copper, brass, bronze, and mixtures thereof. Aluminum and aluminum alloys are common alkaline sensitive metals that can be cleaned by the cleaning compositions of the invention.

[0022] Hard and/or soft surface can be metal surfaces and/or plastic surfaces. Metal surfaces and/or plastic surfaces in need of cleaning are found in several locations. Exemplary locations include surgical instruments, medical instruments, and dental instruments, sinks, cookware, utensils, machine parts, vehicles, tanker trucks, vehicle wheels, work surfaces, tanks, immersion vessels, spray washers, and ultrasonic baths.

[0023] The composition of the invention comprises at least two water-soluble aminopolycarboxylate and/or aminopolycarboxylic acid chelants of glutamic acid N,N-diacetic acid and methylglycinediacetic acid, wherein the weight ratio of the gluconate to the first water-soluble aminopolycarboxylate and/or aminopolycarboxylic acid chelant is preferably in the range from 1 : 0.1 to 1 : 4; and the weight ratio of the gluconate to the second water-soluble aminopolycarboxylate and/or aminopolycarboxylic acid chelant is preferably in the range from 1 : 0.1 to 1 : 4; and most preferably the first and second ratios are in the range from 1 : 0.2 to 1 : 2.

[0024] A composition for cleaning according to the present invention can be present in form of a solution having a pH value in the range of ≥ 1 pH to ≤ 14 pH, preferably in the range of ≥ 1.5 pH to ≤ 13.8 pH, further preferred in the range of ≥ 2 pH to ≤ 13.5 pH, also preferred in the range of ≥ 2.5 pH to ≤ 13.0 pH and in addition preferred in the range of ≥ 3 pH to ≤ 12.9 pH.

[0025] A solvent, preferably water, can be added add. 100 wt.-% to the composition of the invention. The solvent content, preferably water, of the composition according to the invention is simply determined by subtracting the amounts of all the usual components from 100 wt. %.

[0026] The weight amount (wt.-%) is calculated on the total weight amount of the composition for cleaning, if not otherwise stated. The total weight amount of all components of the composition for cleaning does not exceed 100 wt.-%.

[0027] It should be understood that the composition for cleaning of the invention can be free of surfactant/s, such as nonionic tensides, anionic tensides, cationic tensides and amphoteric tensides.

[0028] It should be understood that the composition for cleaning of the invention can be free of a hydrotrope component.

[0029] It should be understood that the composition for cleaning of the invention can be free of a phosphate.

[0030] It should be understood that the composition for cleaning of the invention can be free of a corrosion inhibitor, such as mono silicate.

[0031] It should be understood that the composition for cleaning of the invention can be free of at least one additive, preferably all additives, selected from the group of dye, color transfer inhibitor, anti-redeposition agents, optical brighteners, builder, oil and water repellent agents, foam inhibitor, color fastness agents, starch/sizing agents, fabric softening agents, antimicrobials, fungicides, UV absorbers, thickeners, oxidizers, fragrances and/or mixtures thereof.

[0032] The combination of an alkaline source in combination with a tenside leads to a foam formation, thus not very suitable for use in an automated cleaning processing. However, surfactants, such as nonionic tensides, anionic tensides, cationic tensides and amphoteric tensides are known to have an improved cleaning effect.

[0033] Surprisingly, it has been found that the use of a composition comprising the components a) to e) of the invention provides an excellent cleaning effect on hard and/or soft surfaces.

[0034] Moreover, it has been found that the use of a composition comprising the components a) to e) of the invention avoids or significantly reduces scale precipitation, such as scale build up on cleaned hard and/or soft surfaces.

[0035] Tenside composition known in prior art provides a spontaneous foam formation in the dispensing draw of an apparatus for cleaning processing as well as in the cleaning chamber is observed. Further, nonionic tensides known to be of low foaming have a tendency to degrade under alkaline conditions and results in an increased foam formation. Further, if the weight ratio of the surfactant, such as nonionic tenside, anionic tenside, cationic tenside and/or amphoteric tenside, is selected low to reduce foam formation, the cleaning action is insufficient.

[0036] It has been found that the use of a composition with the components a) to e) of the invention shows no foam formation when used for automated cleaning processing.

[0037] According to the present invention, a composition, preferably a liquid alkaline composition, for cleaning comprising the components a) to e) having a good cleaning activity and no tendency of foam formation can be used.

[0038] According to a preferred embodiment of the invention, the liquid alkaline composition for cleaning may comprises:

1. a) two water-soluble aminopolycarboxylate and/or aminopolycarboxylic acid chelants of glutamic acid N,N-diacetic acid and methylglycinediacetic acid;
2. b) a gluconate;
3. c) at least one sequestering agent of a phosphonate;
4. d) at least one liquid conditioner polymer of monomers of water-soluble monoethylenically unsaturated C₃-C₈-carboxylates and/or unsaturated C₃-C₈-carboxylic acids;
5. e) at least one solvent, preferably water;
6. f) at least one alkaline source, preferably sodium hydroxide;

wherein the weight ratio gluconate to water-soluble aminopolycarboxylate and/or aminopolycarboxylic acid is in the range from 1 : 1 to 1 : 5.

[0039] The weight ratio of alkaline source to the components a) to d) can be adjusted in the range from 1 : 0.001 to 1 : 2, preferably 1 : 0.002 to 1 : 1.5, further preferred 1 : 0.003 to 1 : 1, and also preferred 1 : 0.0035 to 1 : 0.8.

[0040] According to a further preferred embodiment of the invention, the liquid alkaline composition for cleaning may further comprise:

g) at least one corrosion inhibitor, preferably a disilicate.

[0041] The weight ratio of corrosion inhibitor to the components a) to d) can be adjusted in the range from 0.000004 : 1 to 1 : 1, preferably 0.00001 : 1 to 0.8 : 1, further preferred 0.0001 : 1 to 0.6 : 1, and also preferred 0.001 : 1 to 0.4 : 1.

[0042] According to a further preferred embodiment of the invention, the liquid alkaline composition for cleaning further comprise:

h) at least one tenside, preferably a nonionic tenside.

[0043] The weight ratio of tenside to the components a) to d) can be adjusted in the range from 0.1 : 1 to 2 : 1, preferably 0.2 : 1 to 1.8 : 1, further preferred 0.3 : 1 to 1.6 : 1, and also preferred 0.4 : 1 to 1.4 : 1.

[0044] Due to none or marginal foam formation the automated pumping flow rate of water-dissolved composition according to the present invention is not affected.

[0045] Further, the cleaning action of the liquid alkaline composition of the present invention used in an automated washing process is surprisingly good, even when no surfactant is used. Especially, grease soil can be cleaned with the cleaning composition of the invention.

[0046] According to the invention, a preferred liquid composition comprises an acid or a salt of methylglycine-N,N-diacetate, glutamic acid-N,N-diacetate, glutamic acid-N,N-diacetic acid; the phosphonic acid and/or phosphonate sequestering agent is preferably 2-phosphonobutane-1,2,4-tricarboxylic acid and/or 2-phosphonobutane-1,2,4-tricarboxylate; a preferred liquid conditioner polymer is an acrylic acid polymer and/or acrylate polymer; a preferred source of alkalinity is sodium hydroxide; and water is a preferred solvent. More preferred are methylglycine-N,N-diacetic acid, glutamic acid-N,N-diacetic acid; gluconic acid; 2-phosphonobutane-1,2,4-tricarboxylic acid; acrylic acid polymer; and water.

[0047] Most preferred is when the source of alkalinity is sodium hydroxide. A problem with using aqueous alkali systems to clean for example plastic and metal surfaces, such as aluminum surfaces, especially eloxadized aluminum, is the potential to corrode and/or discolor. The liquid alkaline cleaning composition of the invention is surprisingly extremely mild and reduces this effect to a minimum. However, depending on the pH-value a corrosion inhibitor can be added, preferably to an alkaline composition.

[0048] A liquid composition for cleaning according to the present invention that is extremely mild, that means that corrosion is reduced to a minimum, having an improved cleaning effect with respect to hard and/or soft surfaces to be processed therewith, prevents scale build up and has no tendency with respect to foam formation at processing can be a liquid composition, preferably a liquid alkaline composition, that comprises:

- > 0 wt.-% to ≤ 26 wt.-%, preferably ≥ 0.04 wt.-% to ≤ 24 wt.-%, further preferred ≥ 0.4 wt.-% to ≤ 22 wt.-%, and more preferred ≥ 0.6 wt.-% to ≤ 20 wt.-%, of an acid or a salt of methylglycine-N,N-diacetate and/or glutamic acid-N,N-diacetate;
- > 0 wt.-% to ≤ 20 wt.-%, preferably ≥ 0.25 wt.-% to ≤ 19 wt.-%, further preferred ≥ 0.5 wt.-% to ≤ 17.5 wt.-%, and more preferred ≥ 0.75 wt.-% to ≤ 15 wt.-%, of a salt of gluconic acid;
- > 0 wt.-% to ≤ 32.5 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 30 wt.-%, further preferred ≥ 0.25 wt.-% to ≤ 29 wt.-%, and more preferred ≥ 0.5 wt.-% to ≤ 27.5 wt.-%, of at least one sequestering agent of a phosphonate and/or phosphonic acid, more preferred an acid or a salt of 2-phosphonobutane-1,2,4-tricarboxylic acid;
- > 0 wt.-% to ≤ 13.5 wt.-%, preferably ≥ 0.045 wt.-% to ≤ 11.25 wt.-%, further preferred ≥ 0.225 wt.-% to ≤ 9 wt.-%, and more preferred ≥ 0.45 wt.-% to ≤ 15 wt.-%, of at least one liquid conditioner polymer of monomers of water-soluble monoethylenically unsaturated C₃-C₈-carboxylates and/or unsaturated C₃-C₈-carboxylic acid, preferably an acid or a salt of an acrylic polymer;
- ≥ 0 wt.-% to ≤ 20 wt.-%, preferably ≥ 1 wt.-% to ≤ 18 wt.-%, further preferred ≥ 1.5 wt.-% to ≤ 15 wt.-%, and more preferred ≥ 2 wt.-% to ≤ 12 wt.-%, of at least one source of alkalinity, preferably sodium hydroxide;
- ≥ 0 wt.-% to ≤ 12 wt.-%, preferably ≥ 0.01 wt.-% to ≤ 10 wt.-%, further preferred ≥ 0.025 wt.-% to ≤ 9 wt.-%, and more preferred ≥ 0.03 wt.-% to ≤ 8 wt.-%, of at least one corrosion inhibitor, preferably a disilicate;
- ≥ 0 wt.-% to ≤ 10 wt.-%, preferably ≥ 0.01 wt.-% to ≤ 9 wt.-%, further preferred ≥ 0.1 wt.-% to ≤ 8.5 wt.-%, and more preferred ≥ 0.5 wt.-% to ≤ 8 wt.-%, of at least one salt, preferably sodium chloride;

and a solvent, preferably water, is added add. 100 wt.-%; wherein the weight-% of the components are based on the total weight of the composition.

[0049] Depending on the pH value components of the composition for cleaning according to the invention can be present in the form of an acid and/or as a salt thereof.

[0050] The time of exposure to the cleaning surface, flow characteristics of the composition of the invention as well as processing properties can be affected by adjusting the viscosity of the composition for cleaning. Suitable components to use for adjusting the viscosity of the composition for cleaning are water soluble polymers of monomers of water-soluble monoethylenically unsaturated C₃-C₈-carboxylic acids and/or C₃-C₈-carboxylates.

[0051] According to a preferred embodiment of the invention, the composition for cleaning can possess a viscosity range of from 0.9 to 500 mPas at 20° C measured at 5 and/or 50 revolutions per minute on a Brookfield RVT viscosimeter with a spindle 1.

[0052] The composition for cleaning can be a basis solution, a concentrated solution, or a ready-to-use solution. Preferably, the composition can be an alkaline basis solution, an alkaline concentrated solution, or an alkaline ready-to-use solution.

Basis composition for cleaning

[0053] Another object of the present invention is directed to a basis composition for cleaning of hard and/or soft surfaces. The basis composition for cleaning comprises a reduced number of components of the composition for cleaning of the invention. The basis composition for cleaning of hard and/or soft surfaces possesses an enhanced cleaning effect, shows no foam formation, prevents corrosion of sensitive surfaces that are exposed to the cleaning composition, needs a significant low concentration of the effective cleaning components to provide the enhanced cleaning effect as well as avoids or significantly reduces precipitation of scale on the hard and soft surfaces cleaned therewith.

[0054] The basis composition for cleaning can be a liquid. The liquid basis composition for cleaning can have a pH value in the range of ≥ 1 pH to ≤ 14 pH, preferably in the range of ≥ 2 pH to ≤ 13.8 pH, further preferred in the range of ≥ 2.5 pH to ≤ 13.5 pH, also preferred in the range of ≥ 2.8 pH to ≤ 12.5 pH and in addition preferred in the range of ≥ 2.9 pH to ≤ 12 pH.

[0055] Preferably, the basis composition is an alkaline liquid composition, having a pH value in the range of > 7 pH to ≤ 14 pH, preferably in the range of ≥ 8 pH to ≤ 14 pH, further preferred in the range of ≥ 9 pH to ≤ 14 pH, also preferred in the range of ≥ 10 pH to ≤ 14 pH, in addition preferred in the range of ≥ 11 pH to ≤ 14 pH an more preferred in the range of ≥ 12 pH to ≤ 14 pH.

[0056] According to an embodiment of the invention, the basis composition for cleaning can comprise in addition to features a) to e) as defined above:

f) ≥ 0 wt.-% to ≤ 49.5 wt.-%, preferably ≥ 0.5 wt.-% to ≤ 47.5 wt.-%, further preferred > 0.75 wt.-% to ≤ 45 wt.-%, and more preferred ≥ 1 wt.-% to ≤ 42.5 wt.-%, of at least one source of alkalinity.

[0057] Depending on the pH value of the composition the components of the basis composition for cleaning according to the invention can be present in the form of an acid and/or as a salt thereof.

[0058] According to a preferred embodiment the basis composition for cleaning of the invention may comprise a salt of a glutamic acid N, N-diacetic acid, a salt of a methylglycinediacetic acid, a solvent, preferably water and a source of alkalinity, preferably sodium hydroxide.

[0059] According to a further preferred embodiment the basis composition for cleaning of the invention may comprise a polyacrylic acid. The liquid basis composition for cleaning according to the present invention is extremely mild, that means that corrosion is reduced to a minimum, having an improved cleaning effect with respect to hard and/or soft surfaces to be processed therewith, prevents scale build up and has no tendency with respect to foam formation at processing that can comprise:

- > 0 wt.-% to ≤ 26 wt.-%, preferably ≥ 0.04 wt.-% to ≤ 24 wt.-%, further preferred ≥ 0.4 wt.-% to ≤ 22 wt.-%, and more preferred ≥ 0.6 wt.-% to ≤ 20 wt.-%, of two water-soluble aminopolycarboxylate and/or aminopolycarboxylic acid chelants which are the salts or acid forms of methylglycine-N,N-diacetate and/or glutamic acid-N,N-diacetate;
- > 0 wt.-% to ≤ 20 wt.-%, preferably ≥ 0.25 wt.-% to ≤ 19 wt.-%, further preferred ≥ 0.5 wt.-% to ≤ 17.5 wt.-%, and more preferred ≥ 0.75 wt.-% to ≤ 15 wt.-%, of an acid or a salt of gluconic acid; - > 0 wt.-% to ≤ 32.5 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 30 wt.-%, further preferred ≥ 0.25 wt.-% to ≤ 29 wt.-%, and more preferred ≥ 0.5 wt.-% to ≤ 27.5 wt.-%, of at least one sequestering agent of a phosphonate and/or phosphonic acid, more preferred an acid or a salt of 2-phosphonobutane-1,2,4-tricarboxylic acid;
- > 0 wt.-% to ≤ 13.5 wt.-%, preferably ≥ 0.045 wt.-% to ≤ 11.25 wt.-%, further preferred ≥ 0.225 wt.-% to ≤ 9 wt.-%, and more preferred ≥ 0.45 wt.-% to ≤ 15 wt.-%, at least one liquid conditioner polymer of monomers of water-soluble monoethylenically unsaturated C₃-C₈-carboxylates and/or unsaturated C₃-C₈-carboxylic acids, preferably an acid or a salt of an acrylic polymer;
- ≥ 0 wt.-% to ≤ 20 wt.-%, preferably ≥ 1 wt.-% to ≤ 18 wt.-%, further preferred ≥ 1.5 wt.-% to ≤ 15 wt.-%, and more preferred ≥ 2 wt.-% to ≤ 12 wt.-%, of at least one source of alkalinity; and a solvent is added add. 100 wt.-%; wherein the weight-% of the components are based on the total weight of the basis composition.

It should be understood that the basis composition for cleaning of the invention can be free of additives, selected from the group of dye, color transfer inhibitor, anti-redeposition agents, optical brighteners, builder, oil and water repellent agents, foam inhibitor, color fastness agents, starch/sizing agents, fabric softening agents, antimicrobials, fungicides, UV absorbers, thickeners, oxidizers, fragrances and/or mixtures thereof.

Concentrated solution

[0060] The concentrated solution can have a pH value in the range of ≥ 5 pH to ≤ 14 pH, preferably in the range of ≥ 5.5 pH to $\leq 13,8$ pH, further preferred in the range of ≥ 7 pH to $\leq 13,6$ pH and also preferred in the range of ≥ 9 pH to $\leq 113,5$ pH.

[0061] According to the invention a concentrated composition solution for cleaning, preferably an alkaline concentrated composition solution for cleaning of the invention may comprise:

- > 0 wt.-% to ≤ 10 wt.-%, preferably $\geq 2 \times 10^{-4}$ wt.-% to ≤ 9.60 wt.-%, further preferred $\geq 2 \times 10^{-3}$ wt.-% to ≤ 8.80 wt.-%, and more preferred $\geq 3 \times 10^{-3}$ wt.-% to ≤ 8.00 wt.-%, of two water-soluble aminopolycarboxylate and/or aminopolycarboxylic acid chelants of an acid or a salt of methylglycine-N,N-diacetate and/or glutamic acid-N,N-diacetate;
- > 0 wt.-% to ≤ 8.0 wt.-%, preferably $\geq 1.3 \times 10^{-3}$ wt.-% to ≤ 7.6 wt.-%, further preferred $\geq 2.5 \times 10^{-3}$ wt.-% to ≤ 7.0 wt.-%, and more preferred ≥ 0.037 wt.-% to ≤ 6.0 wt.-%, of an acid or a salt of gluconic acid;
- > 0 wt.-% to ≤ 13.0 wt.-%, preferably $\geq 2.5 \times 10^{-4}$ wt.-% to ≤ 12.0 wt.-%, further preferred $\geq 1.25 \times 10^{-3}$ wt.-% to ≤ 11.6 wt.-%, and more preferred $\geq 2.5 \times 10^{-3}$ wt.-% to ≤ 11.0 wt.-%, of at least one sequestering agent of a phosphonate and/or phosphonic acid, more preferred an acid or a salt of 2-phosphonobutane-1,2,4-tricarboxylic acid;
- > 0 wt.-% to ≤ 5.4 wt.-%, preferably $\geq 2.5 \times 10^{-4}$ wt.-% to ≤ 4.5 wt.-%, further preferred $\geq 1.125 \times 10^{-3}$ wt.-% to ≤ 3.6 wt.-%, and more preferred $\geq 2.5 \times 10^{-3}$ wt.-% to ≤ 2.7 wt.-%, at least one liquid conditioner polymer of monomers of water-soluble monoethylenically unsaturated C_3 - C_8 -carboxylates and/or unsaturated C_3 - C_8 -carboxylic acids, preferably an acid or a salt of an acrylic polymer;
- > 0 wt.-% to ≤ 49.5 wt.-%, preferably ≥ 0.5 wt.-% to ≤ 47.5 wt.-%, further preferred ≥ 0.75 wt.-% to ≤ 45 wt.-%, and more preferred ≥ 1 wt.-% to ≤ 42.5 wt.-%, of at least one source of alkalinity, preferably sodium hydroxide;
- > 0 wt.-% to ≤ 4.8 wt.-%, preferably $\geq 5 \times 10^{-5}$ wt.-% to ≤ 3.6 wt.-%, further preferred $\geq 1.25 \times 10^{-4}$ wt.-% to ≤ 3.4 wt.-%, and more preferred $\geq 1.5 \times 10^{-4}$ wt.-% to ≤ 3.2 wt.-%, of at least one corrosion inhibitor, preferably a disilicate;
- ≥ 0 wt.-% to ≤ 4.0 wt.-%, preferably $\geq 5 \times 10^{-5}$ wt.-% to ≤ 3.6 wt.-%, further preferred $\geq 5 \times 10^{-4}$ wt.-% to ≤ 3.4 wt.-%, and more preferred $\geq 2.5 \times 10^{-3}$ wt.-% to ≤ 3.2 wt.-%, of at least one salt, preferably potassium iodide; and the solvent is added add. 100 wt.-%; wherein the weight-% of the components are based on the total weight of the composition.

[0062] Depending on the pH value of the concentrated composition the components of the concentrated composition for cleaning according to the invention can be present in the form of an acid and/or as a salt thereof.

Ready to use solution

[0063] The liquid ready-to-use composition, preferably an alkaline ready-to-use composition, of the invention, can be obtained from the composition for cleaning of the invention, from the basis composition and/or from the concentrated composition for cleaning of the invention by adding additional solvent, preferably water, thereto. In the above it is referred to a concentrated solution. However, it is clear for an expert, that the ready to use solution can be obtained also from the composition for cleaning and/or the basis solution.

[0064] It can be preferred that the ready-to-use solution is directly prepared at the place of use. For example, the concentrated composition for cleaning of the invention is filled into a storage tank of the cleaning apparatus. At the time of use, at least a portion of the concentrated composition for cleaning of the invention is piped to the place of use, such as the cleaning chamber or cleaning drum, wherein the concentrated composition for cleaning of the invention is further diluted with a solvent, preferably water, before or at the time, it arrives the place of use. For example, the concentrated composition for cleaning of the invention can be diluted with additional solvent, such as water, to obtain the ready-to-use solution, in a dispensing draw or dispensing tank of a cleaning apparatus. However, the composition for cleaning of the invention can be used without being diluted to a ready-to-use solution.

[0065] Using a concentrated solution, such as the composition for cleaning of the invention, which is further diluted at the time of use has the advantage, that the concentrated solution is less bulky compared to the more diluted ready-to-use solution. Thus, total weight, transport volume as well as storage volume of the composition for cleaning of the invention is reduced thus facilitates the handling for the user.

[0066] The cleaning compositions according to the invention can take the form of a single concentrate or multiple concentrates that can be diluted and combined to provide a ready-to-use solution, and as a ready-to-use solution that can be used to clean articles having a plastic and/or metal surface.

[0067] In addition, the ready-to-use solution can be provided as a relatively dilute solution that can be, without the addition of water, to provide an organic ready-to use solution, for example an alcohol based ready-to use solution, that can be for cleaning applied to articles having a metal surface, such as surgical, medical, and dental instruments.

[0068] As already mentioned before, it is advantageous to provide the composition for cleaning of the invention as a concentrate and then to dilute the concentrate at the situs of use in order to decrease transportation costs associated with transporting large amounts of solvent, such as water.

[0069] The composition for cleaning of the invention and/or the ready-to-use solution obtained there from can be used in an automated washing process for cleaning.

[0070] In order to obtain to provide the ready-to-use aqueous solution, additional solvent,

preferably water, can be added to further dilute the concentrated composition for cleaning of the invention. Thus, the aqueous solution of the liquid alkaline composition according to the present invention can be further diluted with a solvent to the desired concentration of the ready-to-use solution, wherein the weight ratio for the dilution, i.e. added solvent (weight) : liquid alkaline composition (weight), can be in the range of from 800 : 1 to 1 : 1, preferably 700 : 1 to 10 : 1, further preferred 600 : 1 to 20 : 1, also preferred 550 : 1 to 30 : 1, more preferred 500 : 1 to 40 : 1, in particular preferred 450 : 1 to 40 : 1, especially preferred 400 : 1 to 50 : 1, and most preferred 350 : 1 to 60 : 1. However, the weight ratio for the dilution, i.e. added solvent (weight) : liquid alkaline composition (weight), can be 340 : 1 to 70 : 1, 335 : 1 to 80 : 1, 330 : 1 to 90 : 1, 325 : 1 to 100 : 1, 320 : 1 to 110 : 1, 320 : 1 to 120 : 1, 310 : 1 to 130 : 1, 300 : 1 to 140 : 1, 290 : 1 to 140 : 1, 250 : 1 to 150 : 1.

[0071] However, it can be preferred that the ready-to-use solution is a ≥ 0.1 wt.-% to ≤ 10.0 wt.-%, preferably ≥ 0.2 wt.-% to ≤ 9.0 wt.-%, further preferred ≥ 0.3 wt.-% to ≤ 8.0 wt.-%, also preferred ≥ 0.4 wt.-% to ≤ 7.0 wt.-%, ≥ 0.4 wt.-% to ≤ 6.0 wt.-%, diluted solution of the concentrated composition for cleaning of the invention.

[0072] The ready to use solution of the invention can have a pH value in the range of ≥ 7 pH to ≤ 14 pH, preferred in the range of ≥ 8 pH to $\leq 13,8$ pH, further preferred in the range of ≥ 9 pH to $\leq 13,6$ pH, in addition preferred in the range of ≥ 10 pH to $\leq 13,5$ pH and also preferred in the range of ≥ 10.5 pH to $\leq 13,4$ pH.

[0073] A ready to use solution for cleaning according to the invention, preferably a ready to use alkaline composition solution for cleaning may comprise:

- > 0 wt.-% to ≤ 1.04 wt.-%, preferably $\geq 2 \times 10^{-6}$ wt.-% to ≤ 0.96 wt.-%, further preferred $\geq 2 \times 10^{-5}$ wt.-% to ≤ 0.88 wt.-%, and more preferred $\geq 3 \times 10^{-5}$ wt.-% to ≤ 0.80 wt.-%, of two water-soluble aminopolycarboxylate and/or aminopolycarboxylic acid chelants of an acid or a salt of methylglycine-N,N-diacetate and/or glutamic acid-N,N-diacetate;
- > 0 wt.-% to ≤ 0.80 wt.-%, preferably $\geq 1.25 \times 10^{-5}$ wt.-% to ≤ 0.76 wt.-%, further preferred $\geq 2.5 \times 10^{-5}$ wt.-% to ≤ 0.70 wt.-%, and more preferred $\geq 3.75 \times 10^{-5}$ wt.-% to ≤ 0.60 wt.-%, of an acid or a salt of gluconic acid;
- > 0 wt.-% to ≤ 1.30 wt.-%, preferably $\geq 2.5 \times 10^{-6}$ wt.-% to ≤ 1.20 wt.-%, further preferred $\geq 1.25 \times 10^{-5}$ wt.-% to ≤ 1.16 wt.-%, and more preferred $\geq 2.5 \times 10^{-5}$ wt.-% to ≤ 1.10 wt.-%, of at least one sequestering agent of a phosphonate and/or phosphonic acid, more preferred an acid or a salt of 2-phosphonobutane-1,2,4-tricarboxylic acid;
- > 0 wt.-% to ≤ 0.54 wt.-%, preferably $\geq 2.5 \times 10^{-6}$ wt.-% to ≤ 0.46 wt.-%, further preferred $\geq 1.25 \times 10^{-5}$ wt.-% to ≤ 0.36 wt.-%, and more preferred $\geq 2.5 \times 10^{-5}$ wt.-% to ≤ 0.27 wt.-%, of at least one liquid conditioner polymer of monomers of water-soluble monoethylenically unsaturated C₃-C₈-carboxylates and/or unsaturated C₃-C₈-carboxylic acids, preferably an acid or a salt of an acrylic polymer;
- ≥ 0 wt.-% to ≤ 4.99 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 47.5 wt.-%, further preferred ≥ 0.075 wt.-% to ≤ 4.50 wt.-%, and more preferred ≥ 0.10 wt.-% to ≤ 4.25 wt.-%, of at least one source of alkalinity, preferably sodium hydroxide;

- > 0 wt.-% to ≤ 0.48 wt.-%, preferably ≥ 5×10^{-6} wt.-% to ≤ 0.36 wt.-%, further preferred ≥ 5×10^{-5} wt.-% to ≤ 0.34 wt.-%, and more preferred ≥ 2.5×10^{-4} wt.-% to ≤ 0.32 wt.-%, of at least one corrosion inhibitor, preferably a disilicate;
- > 0 wt.-% to ≤ 0.4 wt.-%, preferably ≥ 5×10^{-6} wt.-% to ≤ 0.36 wt.-%, further preferred ≥ 5×10^{-5} wt.-% to ≤ 0.34 wt.-%, and more preferred ≥ 2.5×10^{-4} wt.-% to ≤ 0.32 wt.-%, of at least one salt, preferably potassium iodide; and the solvent is added add. 100 wt.-%; wherein the weight-% of the components are based on the total weight of the composition.

[0074] Depending on the pH value of the ready to use solution the components of the ready to use solution for cleaning according to the invention can be present in the form of an acid and/or as a salt thereof.

Chelant

[0075] The liquid composition according to the present invention comprises the salt of or the acid of glutamic acid N, N-diacetic acid, and of methylglycinediacetic; most preferred are the tetrasodium salt of glutamic acid N, N-diacetic acid and the trisodium salt of methylglycinediacetic acid.

[0076] The composition for cleaning can comprise additional chelants known in prior art. It should be understood that additional chelants can be omitted.

Additional Chelants

[0077] Additional chelants can be added to the composition for cleaning, the basis composition, the concentrated composition and/or to the ready to use composition.

[0078] The additional chelant can be selected from the group of salts, preferably sodium salts, of diethylenetriamine pentaacetic acid, sodium glucoheptonic acid, salts of ethylene diamine tetraacetic acid, salts of hydroxyethyl ethylene diamine triacetic acid, salts of nitrilotriacetic acid, diethanolglycine sodium salt, ethanoldiglycine disodium salt, salts of hydroxymonocarboxylic acid compounds, salts of hydroxydicarboxylic acid compounds, salts of amine containing carboxylic acids, and mixtures thereof, preferably the chelant is selected from the group of salts of nitrilotriacetic acid (NTA), salts of ethylene diamine tetraacetic acid, the corresponding acid form and mixtures thereof, most preferred as salt is a sodium salt.

[0079] Depending on the pH value of the solution of the cleaning composition of the invention the chelant can be present in its acid form.

[0080] In particular preferred is at least one chelant that exhibits soil removal properties when

used at a pH of at least 10.0. The chelant can be provided for tying up metals in the soil to assist in cleaning and detergency. The chelant can be provided as part of the liquid alkaline composition. Exemplary chelants that exhibit soil removal properties at a pH of greater than 10.0 that can be used according to the invention include sodium gluconate, pentasodium salt of diethylenetriamine pentaacetic acid (available under the name Versenex 80), sodium glucoheptonate, ethylene diamine tetraacetic acid (EDTA), salts of ethylene diamine tetraacetic acid, hydroxyethyl ethylene diamine triacetic acid (HEDTA), salts of hydroxyethyl ethylene diamine triacetic acid, nitrilotriacetic acid (NTA), salts of nitrilotriacetic acid, diethanolglycine sodium salt (DEG), ethanoldiglycine disodium salt (EDG), and mixtures thereof. Exemplary salts of ethylene diamine tetraacetic acid include disodium salts, tetrasodium salts, diammonium salts, and trisodium salts. An exemplary salt of hydroxyethyl ethylene diamine triacetic acid is the trisodium salt. More preferred the chelant can be selected from the group comprising salts of phosphonocarboxylic acids, salts of 1-hydroxyethylidene -1,1,-diphosphonic acid (HEDP), salts of glucoheptonic acid, salts of nitrilotriacetic acid, salts of diethanolglycine, salts of ethanoldiglycine acid, salts of hydroxylmonocarboxylic acid, salts of hydroxydicarboxylic acid, the corresponding acid form and mixtures thereof, most preferred as salt is the sodium salt.

Alkaline Source

[0081] The source of alkalinity can be any source of alkalinity that is compatible with the other components of the cleaning composition and that will provide the use solution, i.e. solution as well as the ready-to-use solution with the desired pH. Exemplary sources of alkalinity include alkali metal hydroxides, alkali metal salts, phosphates, amines, and mixtures thereof.

[0082] Exemplary alkali metal hydroxides include sodium hydroxide, potassium hydroxide, and lithium hydroxide.

[0083] Exemplary alkali metal salts include sodium carbonate, trisodium phosphate, potassium carbonate, and mixtures thereof.

[0084] Exemplary phosphates include sodium pyrophosphate, potassium pyrophosphate, and mixtures thereof.

Exemplary amines include alkanolamine selected from the group comprising triethanolamine, monoethanolamine, diethanolamine, and mixtures thereof.

[0085] The source of alkalinity, preferably an alkali metal hydroxide, may be added to the composition in a variety of forms, dissolved in an aqueous solution or a combination thereof. Alkali metal hydroxides are commercially available as pellets or beads having a mix of particle sizes ranging from 12-100 U. S. mesh, or as an aqueous solution, as for example, as a 45 wt. %, 50 wt. % and a 73 wt. % solution.

Corrosion Inhibitor

[0086] It has been found that the use of disilicates in the composition of the invention compared to monosilicates avoids deposit as well as deposit corrosion inside a cleaning chamber of an automated cleaning apparatus, even after a high number of cleaning processes and on the surface of articles processed therein. The deposit can be a colored residue that remains preferably on surfaces inside the cleaning chamber. The use of disilicates in the composition for cleaning of the invention overcomes this drawback. In particular, if the composition for cleaning of the invention is free of a surfactant. Thus, it can be preferred that the composition of the invention comprises at least one disilicate.

[0087] However, the composition for cleaning of the invention is surprisingly mild and remarkable minimizes a corrosion effect to cleaned hard and soft surfaces. It should be understood that corrosion inhibitors can be omitted.

[0088] Mono silicates, comprising sodium mono silicate, have a tendency to begin precipitating from aqueous solution at a pH below 11, thus reducing its effectiveness to prevent corrosion of the contacted surfaces when used in liquid, preferably aqueous, alkaline cleaning solutions having a lower pH. Additionally, when mono silicates are allowed to dry on the surface to be cleaned, films or spots are often formed, which are visible and which are themselves very difficult to remove. The presence of these mono silicate-containing deposits can affect the texture of the cleaned surface, the appearance of the surface, and on cooking or storage surfaces, can affect the taste of the materials that come into contact with the cleaned surfaces. Therefore, it can be preferred that the liquid alkaline composition of the present invention is free of mono silicates.

[0089] It has been found that the use of disilicates in the composition of the invention compared to monosilicates avoids deposit as well as deposit corrosion inside a cleaning chamber of an automated cleaning apparatus, even after a high number of cleaning processes and on the surface of articles processed therein. The deposit can be a colored residue that remains preferably on surfaces inside the cleaning chamber. The use of disilicates in the composition for cleaning of the invention overcomes this drawback. In particular, if the composition for cleaning of the invention is free of a surfactant. Thus, it can be preferred that the composition of the invention comprises at least one disilicate.

[0090] Therefore, a disilicate(s) corrosion inhibitor can be preferably used in composition of the invention. Preferably, the composition according to the present invention is a liquid composition or a liquid alkaline composition. A disilicate is a silicate compound that has two silicon atoms in the molecule.

[0091] The disilicate(s) corrosion inhibitor can be an alkali disilicate, particularly preferably crystalline or amorphous alkali disilicates .

[0092] Suitable disilicates can have the formula $\text{NaMSi}_x\text{O}_{22x+1}\cdot y\text{H}_2\text{O}$. Crystalline, layered silicates of the above formula, in which x stands for 2, are particularly suitable for the purposes of the present invention. Na-SKS-5 (alpha - $\text{Na}_2\text{Si}_2\text{O}_5$), Na-SKS-7 (beta - $\text{Na}_2\text{Si}_2\text{O}_5$, Natrosilit), Na-SKS-9 ($\text{NaHSi}_2\text{O}_5\cdot\text{H}_2\text{O}$), Na-SKS-10 ($\text{NaHSi}_2\text{O}_5\cdot 3\text{H}_2\text{O}$, Kanemit), Na-SKS-11 (t- $\text{Na}_2\text{Si}_2\text{O}_5$) and Na-SKS-13 (NaHSi_2O_5) are most notably suitable, particularly Na-SKS-6 (delta -

Na₂Si₂O₅). In the context of the present application, silicates can comprise a content by weight of crystalline layered silicates of formula NaMSi_xO_{2x+1}.yH₂O of 0.1 to 20 wt. %, preferably 0.2 to 15 wt. % and particularly 0.4 to 10 wt. %, each based on the total weight of the corrosion inhibitor agent.

[0093] Particularly preferred are especially those that can have a total silicate content ≥ 1 and ≤ 7 wt.-%, advantageously below 6 wt.-%, preferably below 5 wt.-%, particularly preferably below 4 wt.-%, quite particularly preferably below 3 wt.-% and especially below 2.5 wt.-%, wherein this silicate, based on the total weight of the comprised silicate, is advantageously at least 70 wt.-%, preferably at least 80 wt.-% and especially at least 90 wt.-% of a silicate of the general formula NaMSi_xO_{2x+1}.yH₂O. It should be understood that a silicate(s) corrosion inhibitor that have a total silicate content of < 2 and/or > 2 is optional and can be omitted.

[0094] More preferred is that the composition for cleaning may comprise at least one corrosion inhibitor selected from the group comprising silicate, sodium silicate, calcium acetate, calcium chloride, calcium gluconate, calcium phosphate, calcium borate, calcium carbonate, calcium citrate, calcium lactate, calcium sulfate, calcium tartrate, benzotriazole, 1,2,3-benzotriazole and mixtures thereof.

[0095] In particular, a heterocyclic compound, preferably a triazole derivate can be used as corrosion inhibitor. The triazole derivate can be selected from the group comprising benzotriazole, 1,2,3-benzotriazole and mixtures thereof.

[0096] The composition for cleaning can comprise at least one corrosion inhibitor. It should be understood that a corrosion inhibitor can be omitted.

Salts

[0097] However, salts can be suitable added to the composition for cleaning of the invention. The components that can be added to the composition for cleaning, the concentrated solution and/or ready to use solution include salts provided in water-soluble form. The salt can be function as analytical tracer.

[0098] Preferred are salts selected from the group of lithium chloride, lithium iodide, sodium chloride, sodium iodide, potassium chloride, potassium iodide, sodium sulphate, sodium acetate, potassium acetate, sodium nitrate, sodium phosphate and mixtures thereof.

[0099] The composition of cleaning of the invention can comprises an amount of salt of ≥ 0 wt.-% to ≤ 10 wt.-%, preferably ≥ 0.01 wt.-% to ≤ 9 wt.-%, further preferred ≥ 0.1 wt.-% to ≤ 8.5 wt.-%, and more preferred ≥ 0.5 wt.-% to ≤ 8 wt.-%.

[0100] The composition for cleaning can comprise at least one salt. It should be understood that the addition of a salt to the composition for cleaning can be omitted.

Liquid conditioner

[0101] The liquid alkaline composition according to the present invention can comprise at least one liquid conditioner. The amount of liquid conditioner can be > 0 wt.-% to ≤ 13.5 wt.-%, preferably ≥ 0.045 wt.-% to ≤ 11.25 wt.-%, further preferred ≥ 0.225 wt.-% to ≤ 9 wt.-%, and more preferred ≥ 0.45 wt.-% to ≤ 15 wt.-%, based on the weight of the cleaning composition of the invention.

[0102] In order to maintain the dispersibility of the magnesium and/or zinc corrosion inhibitors in aqueous solution, and in the presence of agents which would otherwise cause precipitation of the zinc or magnesium ions, e. g. , carbonates, phosphates, etc. , it might be advantageous to include a carboxylated polymer to the solution.

[0103] The useful carboxylated polymer corrosion inhibitors may be generically categorized as water-soluble carboxylic acid polymers such as polyacrylic and polymethacrylic acids or vinyl addition polymers, in addition to the acid-substituted polymers used in the present invention.

[0104] Of the vinyl addition polymer corrosion inhibitors contemplated, maleic anhydride copolymers as with vinyl acetate, styrene, ethylene, isobutylene, acrylic acid and vinyl ethers are examples.

[0105] More preferred can be the use of a liquid conditioner selected from the group of salts of acid substituted polymers of monomers of monoethylenically unsaturated C_3 - C_8 -carboxylic acid, preferably from salts of C_3 - C_4 -monocarboxylic acid, acrylate, methacrylate, salts of polyitaconate, salts of polymaleate, and mixtures thereof, most preferred is a polyacrylate; and/or the liquid conditioner can be selected from the group of acid substituted polymers of monomers of monoethylenically unsaturated C_3 - C_8 -carboxylic acid, preferably from a C_3 - C_4 -monocarboxylic acid, acrylic acid, methacrylic acid, polyitaconic acid, polymaleic acid, and mixtures thereof, most preferred is a polyacrylic acid.

[0106] The polymers tend to be water-soluble or at least colloiddally dispersible in water. The molecular weight of these polymers may vary over a broad range although it is preferred to use polymers having an average molecular weights (Mw) ranging from $\geq 1,000$ up to $\leq 1,000,000$, preferably $\geq 2,000$ up to $\leq 800,000$, further preferred $\geq 2,500$ up to $\leq 500,000$, also preferred $\geq 3,000$ up to $\leq 250,000$, more preferred $\geq 3,500$ up to $\leq 100,000$, especially preferred $\geq 4,000$ up to $\leq 50,000$ and in particular preferred $\geq 4,500$ up to $\leq 10,000$.

[0107] The polymers or copolymers (either the acid-substituted polymers or other added polymers) may be prepared by either addition or hydrolytic techniques. Thus, maleic anhydride copolymers are prepared by the addition polymerization of maleic anhydride and another comonomer such as styrene. Preferably salts of acid substituted polymers of monomers of acrylate, methacrylate, salts of polyitaconic acid, salts of polymaleic acid, and mixtures thereof. In particular preferred are salts of polyacrylic acid.

[0108] The low molecular weight acrylic acid polymer corrosion inhibitors may be prepared by addition polymerization of acrylic acid or its salts either with itself or other vinyl comonomers.

[0109] Alternatively, such polymers may be prepared by the alkaline hydrolysis of low molecular weight acrylonitrile homopolymers or copolymers.

[0110] More preferred can be the use of a liquid conditioner such as a homo polyacrylic acid and/or a homo polyacrylate. Most preferred is the use of a homo polyacrylic acid and/or a homo polyacrylate having a Mw ranging from $\geq 1,000$ up to $\leq 1,000,000$, preferably $\geq 2,000$ up to $\leq 800,000$, further preferred $\geq 2,500$ up to $\leq 500,000$, also preferred $\geq 3,000$ up to $\leq 250,000$, more preferred $\geq 3,500$ up to $\leq 100,000$, especially preferred $\geq 4,000$ up to $\leq 50,000$ and in particular preferred $\leq 4,500$ up to $\leq 10,000$.

[0111] It should be understood that other liquid conditioners, with the exception of polymer of monomers of water-soluble monoethylenically unsaturated C_3 to C_8 -carboxylates, can be omitted.

Sequestering Agent

[0112] The composition for cleaning can include a sequestrant. In general, a sequestrant is a molecule capable of coordinating (i.e., binding) the metal ions commonly found in natural water to prevent the metal ions from interfering with the action of the other detergent ingredients of a cleaning composition. Some sequestering agents can also function as a threshold agent when included in an effective amount. For a further discussion of sequestrants, see Kirk-Othmer, Encyclopedia of Chemical Technology, Third Edition, volume 5, pages 339-366 and volume 23, pages 319-320. A variety of sequestrants can be used including, for example, organic phosphonate, aminocarboxylic acid, condensed phosphate, inorganic sequestrant, polymeric polycarboxylate, mixture thereof, or the like. Such sequestrants and sequestrants are commercially available.

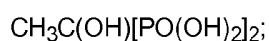
[0113] Suitable condensed phosphates include sodium and potassium orthophosphate, sodium and potassium pyrophosphate, sodium and potassium tripolyphosphate, sodium hexametaphosphate, preferably of tripolyphosphate.

[0114] In an embodiment, the composition of the invention includes as sequestrant condensed phosphate and polyacrylate, or another polymer, for example, sodium tripolyphosphate and polyacrylate.

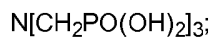
[0115] Sodium salts of condensed phosphates are preferred to the corresponding potassium salts.

[0116] The sequestrant can include an organic phosphonate, such as an organic-phosphonic acid and alkali metal salts thereof. Some examples of suitable organic phosphonates include:

1-hydroxyethane-1,1-diphosphonic acid:



aminotri(methylenephosphonic acid):



aminotri(methylenephosphonate), sodium salt;

2-hydroxyethyliminobis(methylenephosphonic acid):

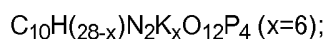


diethylenetriaminepenta(methylenephosphonic acid):
 $(\text{HO})_2\text{POCH}_2\text{N}[\text{CH}_2\text{CH}_2\text{N}[\text{CH}_2\text{PO}(\text{OH})_2]_2]_2;$

diethylenetriaminepenta(methylene-phosphonate), sodium salt:



hexamethylenediamine(tetramethylenephosphonate), potassium salt:



bis(hexamethylene)triamine(pentamethylenephosphonic acid):

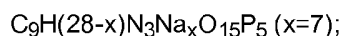
$(\text{HO}_2)\text{POCH}_2\text{N}[\text{CH}_2]_6\text{N}[\text{CH}_2\text{PO}(\text{OH})_2]_2$; and phosphorus acid H_3PO_3 ; and other similar organic phosphonates, and mixtures thereof.

2-hydroxyethyliminobis(methylenephosphonic acid):

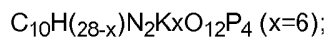


diethylenetriaminepenta(methylenephosphonic acid):
 $(\text{HO})_2\text{POCH}_2\text{N}[\text{CH}_2\text{CH}_2\text{N}[\text{CH}_2\text{PO}(\text{OH})_2]_2]_2;$

diethylenetriaminepenta(methylenephosphonate), sodium salt:



hexamethylenediamine(tetramethylenephosphonate), potassium salt:



bis(hexamethylene)triamine(pentamethylenephosphonic acid):

$(\text{HO}_2)\text{POCH}_2\text{N}[\text{CH}_2]_6\text{N}[\text{CH}_2\text{PO}(\text{OH})_2]_2$; and

phosphorus acid H_3PO_3 ; and other similar organic phosphonates, and mixtures thereof.

[0117] More preferred can be sequestering agents selected from the group comprising salts of phosphonates, salts of phosphonocarboxylic acids, salts of 1-hydroxyethylidene -1,1,-diphosphonic acid (HEDP), phosphonates, the corresponding acid form and mixtures thereof,

wherein the salt can be preferably a sodium salt. Most preferred can be an acid and/or a salt of 2-phosphonobutane-1,2,4-tricarboxylic acid.

[0118] The composition for cleaning of the invention can comprise ≥ 0 wt.-% to ≤ 32.5 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 30 wt.-%, further preferred ≥ 0.25 wt.-% to ≤ 29 wt.-%, and more preferred ≥ 0.5 wt.-% to ≤ 27.5 wt.-%, of at least one sequestering agent.

[0119] It should be understood that the sequestering agent can include mixtures of different sequestering agents.

Organic carboxylates

[0120] Depending on the pH value of the solution of the cleaning composition of the invention the organic carboxylic acids can be present in its salt form, preferably as sodium salt.

[0121] Suitable organic carboxylic acids, but are not limited to, are C₃ to C₉ organic carboxylic acids selected from the group lactic acid, citric acid, glycolic acid, acetic acid, propionic acid, succinic acid, glutaric acid, adipinic acid, butanedioic acid, isoascorbic acid, ascorbatic acid and tatric acid.

[0122] Suitable organic carboxylates, but are not limited to, are C₃ to C₉ organic carboxylates selected from the group comprising lactate, citrate, glycolate, acetate, propionate, succinate, glutarate, adipate, butanedioate, isoascorbate, sodium ascorbate and tatratre and preferably sodium salts thereof.

[0123] The composition for cleaning can comprise the C₃ to C₉ organic carboxylate and/or C₃ to C₉ organic carboxylic acid in an amount of ≥ 0 wt.-% to ≤ 20 wt.-%, preferably ≥ 0.25 wt.-% to ≤ 19 wt.-%, further preferred ≥ 0.5 wt.-% to ≤ 17.5 wt.-%, and more preferred ≥ 0.75 wt.-% to ≤ 15 wt.-%.

Solvents

[0124] Suitable solvents include, but are not limited to, water, alcohols, glycols, glycol ethers, esters, and the like, or combinations thereof. Suitable alcohols include, but are not limited to, ethanol, propanol, isopropanol (propan-2-ol), 2-butoxy ethanol (butyl glycol), 1-decanol, benzyl alcohol, glycerin, monoethanolamine (MEA), and the like, or mixtures thereof.

[0125] Suitable glycols include, but are not limited to, ethylene glycol (monoethylene glycol or MEG), diethylene glycol (propylene glycol or butoxy diglycol or DEG), triethylene glycol (TEG), tetraethylene glycol (TETRA EG), glycerin, propylene glycol, dipropylene glycol, hexylene glycol, and the like, or combinations thereof.

[0126] Preferred solvents that can be used are include alcohols, such as C₂-C₆ alcohols, N-

alkyl pyrrolidones, such as a C₈-C₁₈ alkyl pyrrolidone, e.g. N-octyl pyrrolidone, N-lauryl pyrrolidone, and the like.

[0127] Lauryl (or n-dodecyl) pyrrolidone is commercially available, for example, as sold by ISF Chemicals under the brand name Surfadone, such as Surfadone LP-300.

[0128] Solvents of similar structure can also be used. Such solvents include lactones, such as decanolactone. Other suitable solvents include diacetone alcohol, long chain, e.g. greater than C₆-alkyl ethers, cyclic alkyl ketones, a 1,2 alkane diol having 5 to 10 carbon atoms such as 1,2 hexanediol, a C₈-C₁₀ alkene carbonate, a pyrrol (such as N-capryl pyrrol, N-lauryl pyrrol, and the like), and mixtures thereof.

[0129] More preferred are solvents selected from the group comprising water, alcohols, glycols, glycol ethers, esters, preferably ethanol, methanol, propanol, propan-2-ol, 2-butoxy ethanol, 1-decanol, benzyl alcohol, glycerin, monoethanolamine and mixtures thereof, most preferred is water.

Tenside

[0130] The composition for cleaning of the invention can comprises at least one tenside. The tenside can be selected from the group of nonionic tenside, cationic tenside, anionic tenside, amphoteric tenside and mixtures thereof. More preferred are tenside which are biodegradable..

[0131] The additional surfactant component can be used for enhancing the cleaning properties of the composition for cleaning of the invention, in particular the ready to use solution. The surfactant component can be used to reduce surface tension and wet the soil particulate to allow penetration of the use solution and separation of the soil.

[0132] It should be understood that the addition of a tenside to the composition for cleaning of the invention can be omitted.

Nonionic Surfactants

[0133] Exemplary nonionic surfactants that can be used in the composition for cleaning of the invention are alkoxyated, preferably ethoxyated or ethoxyated and propoxyated, fatty acid alkyl esters preferably containing 1 to 4 carbon atoms in the alkyl chain, more particularly the fatty acid methyl esters.

[0134] The nonionic low alkoxyated alcohol tensides can be used to reduce surface tension, wet the soil particulate to allow penetration of the use solution, separation of the soil.

[0135] The alkoxyated alcohol tensides mentioned above includes end capped alkoxyated

alcohol tensides.

[0136] Exemplary nonionic low alkoxyated alcohol tensides that can be used are alkoxyated alcohols containing 1 to 4 ethylene oxide groups (1-4EO), 1 to 4 butylene oxide groups (1-4BO), 1 to 4 propylene oxide groups (1-4PO), end capped alkoxyated alcohol tensides thereof or mixtures thereof.

[0137] Advantageously low alkoxyated alcohols useful according to the invention are particularly primary and/or branched alcohols, preferably containing 8 to 18 carbon atoms, and containing 1 to 4 ethylene oxide groups (1-4EO), 1 to 4 butylene oxide groups (1-4BO), 1 to 4 propylene oxide groups (1-4PO), end capped alkoxyated alcohol tensides thereof or may contain a mixture. The alcohol radical may be linear, branched, or may contain a mixture.

[0138] Exemplary nonionic higher alkoxyated alcohol tensides in the composition for cleaning according to the invention are alkoxyated alcohols containing 5 to 40 ethylene oxide groups (5-40EO), butylene oxide groups (5-40BO), propylene oxide groups (5-40PO), preferably 6 to 30 ethylene oxide groups (6-30EO), butylene oxide groups (6-30BO), propylene oxide groups (6-30PO), further preferred 7 to 20 ethylene oxide groups (7-20EO), butylene oxide groups (7-20BO), propylene oxide groups (7-20PO), more preferred 8 to 10 ethylene oxide groups (8-10EO), butylene oxide groups (8-10BO), propylene oxide groups (8-10PO), and most preferred 8 ethylene oxide groups (8EO), butylene oxide groups (8BO), propylene oxide groups (8PO) groups, end capped alkoxyated alcohol tensides thereof, or mixtures thereof.

[0139] Advantageously higher alkoxyated alcohols useful in the composition of the invention are particularly linear and/or branched alcohols, preferably containing 8 to 18 carbon atoms, and 5 to 40 ethylene oxide groups (5-40EO), butylene oxide groups (5-40BO), propylene oxide groups (5-40PO), preferably 6 to 30 ethylene oxide groups (6-30EO), butylene oxide groups (6-30BO), propylene oxide groups (6-30PO), further preferred 7 to 20 ethylene oxide groups (7-20EO), butylene oxide groups (7-20BO), propylene oxide groups (7-20PO), more preferred 8 to 10 ethylene oxide groups (8-10EO), butylene oxide groups (8-10BO), propylene oxide groups (8-10PO), and most preferred 8 ethylene oxide groups (8EO), butylene oxide groups (8BO), propylene oxide groups (8PO), end capped alkoxyated alcohol tensides thereof, or may contain a mixture. The alcohol radical may be linear, branched, or may contain a mixture.

[0140] Particularly preferred are higher alkoxyated alcohols, preferably alcohol ethoxylates with linear or branched radicals of alcohols with 12 to 18 carbon atoms, e.g. from coco-, palm-, tallow- or oleyl alcohol, containing 8 to 18 carbon atoms, and 5 to 40 ethylene oxide groups (5-40EO), butylene oxide groups (5-40BO), propylene oxide groups (5-40PO), preferably 6 to 30 ethylene oxide groups (6-30EO), butylene oxide groups (6-30BO), propylene oxide groups (6-30PO), further preferred 7 to 20 ethylene oxide groups (7-20EO), butylene oxide groups (7-20BO), propylene oxide groups (7-20PO), more preferred 8 to 10 ethylene oxide groups (8-10EO), butylene oxide groups (8-10BO), propylene oxide groups (8-10PO), and most preferred 8 ethylene oxide groups (8EO), butylene oxide groups (8BO), propylene oxide groups (8PO), end capped alkoxyated alcohol tensides thereof, or may contain a mixture. However, most preferred is isotridecyl alcohol in the composition of the invention with 6EO to 14EO, 6PO to 14PO, 6BO to 14BO, preferably 7EO to 10EO, 7PO to 10PO, 7BO to 10BO, and

most preferred 8EO, 8PO, 8BO, or may contain a mixture.

[0141] According to the present invention higher alkoxyated alcohols can be used with 5EO, 6EO, 7EO, 8EO, 9EO, 10EO, 11EO, 12EO, 13EO, 14EO, 15EO, 16EO, 17EO, 18EO, 19EO, 20EO, 21EO, 22EO, 23EO, 24EO or 25EO, 5PO, 6PO, 7PO, 8PO, 9PO, 10PO, 11PO, 12PO, 13PO, 14PO, 15PO, 16PO, 17PO, 18PO, 19PO, 20PO, 21PO, 22PO, 23PO, 24PO or 25PO, 5BO, 6BO, 7BO, 8BO, 9BO, 10BO, 11BO, 12BO, 13BO, 14BO, 15BO, 16BO, 17BO, 18BO, 19BO, 20BO, 21BO, 22BO, 23BO, 24BO or 25BO, end capped alkoxyated alcohol tensides thereof, or may contain a mixture.

[0142] Exemplary higher alkoxyated alcohols with 5EO to 40EO, preferably 6EO or 30EO, further preferred 7EO to 20EO, more preferred 8EO to 10EO and most preferred 8EO; 5PO to 40PO, preferably 6PO or 30PO, further preferred 7PO to 20PO, more preferred 8PO to 10PO and most preferred 8PO; 5BO to 40BO, preferably 6BO or 30BO, further preferred 7BO to 20BO, more preferred 8BO to 10BO and most preferred 8BO include C₁₂-C₁₄-alcohols; C₉-C₁₁-alcohols, C₁₃-C₁₅-alcohols, C₁₂-C₁₈-alcohols, end capped alkoxyated alcohol tensides thereof, and mixtures thereof, as well as mixtures of C₁₂-C₁₄-alcohols and C₁₂-C₁₈-alcohols, end capped alkoxyated alcohol tensides thereof, and most preferred is a C₁₃-alcohol.

[0143] In addition to these nonionic tensides, fatty alcohols containing more than 12 EO, 12 PO, 12 BO may also be used. Examples of such fatty alcohols are tallow fatty alcohol containing 14 EO, 25 EO, 30 EO or 40 EO, 14 PO, 25 PO, 30 PO or 40 PO, 14 BO, 25 BO, 30 BO or 40 BO and end capped alkoxyated alcohol tensides thereof.

[0144] The degrees of 5EO to 40EO, 5PO to 40PO, 5BO to 40BO preferably 6EO or 30EO, 6PO or 30PO, 6BO or 30BO, further preferred 7EO to 20EO, 7PO to 20PO, 7BO to 20BO, more preferred 8EO to 10 EO, 8PO to 10 PO, 8BO to 10 BO and most preferred 8EO, 8PO, 8BO alkoxylation mentioned are statistical mean values, which for a special product, may be either a whole number or a fractional number. However, more preferred, the degrees of 5EO to 40EO, 5PO to 40PO, 5BO to 40BO preferably 6EO or 30EO, 6PO or 30PO, 6BO or 30BO further preferred 7EO to 20EO, 7PO to 20PO, 7BO to 20BO, more preferred 8EO to 10 EO, 8PO to 10 PO, 8BO to 10 BO and most preferred 8EO, 8PO, 8BO alkoxylation mentioned may be either a whole number or a fractional number. Most preferred, the degrees of 5EO to 40EO, 5PO to 40PO, 5BO to 40BO, preferably 6EO or 30EO, 6PO or 30PO, 6BO or 30BO, further preferred 7EO to 20EO, 7PO to 20PO, 7BO to 20BO, more preferred 8EO to 10 EO, 8PO to 10PO, 8BO to 10BO and most preferred 8EO, 8PO, 8BO. The alkoxylation grade mentioned may be a whole number.

[0145] Preferred higher alkoxyated alcohols have a narrow homolog distribution (narrow range ethoxylates, NRE).

[0146] Further surfactants include alkoxyated long chain fatty acid amides where the fatty acid has 8-20 carbon atoms and the amide group is alkoxyated with 1-20 ethylene oxide, propylene oxide and/or butylenes oxide units.

[0147] A further class of nonionic surfactants, which can be used as ingredients in a

composition for cleaning according to the invention, is that of the alkyl polyglycosides (APG). Suitable alkyl polyglycosides satisfy the general Formula $RO(G)_z$ where R is a linear or branched, particularly 2-methyl-branched, saturated or unsaturated aliphatic radical containing 8 to 22 and preferably 12 to 18 carbon atoms and G stands for a glucose unit containing 5 or 6 carbon atoms, preferably glucose. The degree of oligomerization z is a number between 1.0 and 4.0 and preferably between 1.1 and 1.4.

[0148] Silicone containing nonionic surfactants, such as the ABIL B8852 or Silwet 7602, can also be used. An exemplary silicone-containing surfactant is silicone polybutane.

[0149] Examples of amine oxide surfactants include: dimethyldodecylamine oxide, dimethyltetradecylamine oxide; ethylmethyltetradecylamine oxide, cetyldimethylamine oxide, dimethylstearylamine oxide, cetylethylpropylamine oxide, diethyldodecylamine oxide, diethyltetradecylamine oxide, dipropyldodecylamine oxide, lauryl dimethyl amine oxide, bis- (2-hydroxyethyl) dodecylamine oxide, bis- (2-hydroxyethyl)-3-dodecoxy-1- hydroxypropyl amine oxide, (2-hydroxypropyl) methyltetradecylamine oxide, dimethyloleyamine oxide, dimethyl- (2-hydroxydodecyl) amine oxide, and the corresponding decyl, hexadecyl and octadecyl homologs of the above compounds.

[0150] Additional nitrogen-containing surfactants include ethoxylated primary alkyl amines where the alkyl group has 10-20 carbon atoms and the amine is ethoxylated with 2-20 ethylene oxide units.

[0151] Additionally, non-ionic surfactants derived from the condensation of ethylene oxide with the product resulting from the reaction of propylene oxide and ethylene diamine are also useful. For example, there are compounds containing from 40% to 80% of polyoxyethylene by weight and having a molecular weight from 5,000 to 11,000 resulting from the reaction of ethylene oxide groups with a hydrophobic base constituted of the reaction product from ethylene diamine and excess propylene oxide wherein the base has a molecular weight on order of 2,500-3, 000.

[0152] Suitable nonionic surfactants include the polyoxyethylene-polyoxypropylene condensates, which are sold by BASF under the trade name 'Pluronic', polyoxyethylene condensates of aliphatic alcohols/ethylene oxide condensates having from 1 to 30 moles of ethylene oxide per mole of coconut alcohol; ethoxylated long chain alcohols sold by Shell Chemical Co. under the trade name 'Neodol', polyoxyethylene condensates of sorbitan fatty acids, alkanolamides, such as the monoalkoanolamides, dialkanolamides and the ethoxylated alkanolamides, for example coconut monoethanolamide, lauric isopropanolamide and lauric diethanolamide; and amine oxides for example dodecyldimethylamine oxide.

[0153] Further exemplary non-ionic surfactants include alkylphenol alkoxyates, and amine oxides such as alkyl dimethylamine oxide or bis (2- hydroxyethyl) alkylamine oxide.

[0154] The additional nonionic surfactants can be provided in the composition for cleaning of the invention in an amount of ≥ 0 wt.-% to ≤ 40 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 35 wt.-%, further preferred ≥ 0.5 wt.-% to ≤ 32 wt.-%, and more preferred 1.0 wt.-% to 30 wt.-%, based

on the weight of all components of the total composition.

[0155] It should be understood that the addition of a nonionic tenside to the composition for cleaning of the invention can be omitted.

Anionic Surfactants

[0156] The composition for cleaning according to the invention is preferably free of anionic surfactants.

[0157] Exemplary anionic surfactants that can be used include organic carboxylates, organic sulfonates, organic sulfates, organic phosphates and the like, particularly linear alkylaryl sulfonates, such as alkylarylcarboxylates, alkylarylsulfonates, alkylarylphosphates, and the like. These classes of anionic surfactants are known within the surfactant art as linear alkyl benzyl sulfonates (LABS), alpha olefin sulfonates (AOS), alkyl sulfates, and secondary alkane sulfonates.

[0158] The anionic surfactants can be provided in the composition for cleaning of the invention in an amount of ≥ 0 wt.-% to ≤ 40 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 35 wt.-%, further preferred ≥ 0.5 wt.-% to ≤ 32 wt.-%, and more preferred 1.0 wt.-% to 30 wt.-%, based on the weight of all components of the total composition.

[0159] It should be understood that the addition of an anionic tenside to the composition for cleaning of the invention can be omitted.

Cationic Surfactants

[0160] The presence of the nonionic surfactants enables the use of low levels of higher foaming cationic surfactants, while keeping the foaming at an acceptable level. In a preferred embodiment of the invention, the composition for cleaning also comprises a cationic surfactant.

[0161] Suitable cationic surfactants include quaternary ammonium compounds having the formula of $RR'R''R'''N^+X^-$, where R, R', R'' and R''' are each a C_1 - C_{24} alkyl, aryl or arylalkyl group that can optionally contain one or more P, O, S or N heteroatoms, and X is F, Cl, Br, I or an alkyl sulfate. Additional preferred cationic surfactants include ethoxylated and/or propoxylated alkyl amines, diamines, or triamines.

[0162] Each of R, R', R'' and R''' can independently include, individually or in combination, substituents including 6 to 24 carbon atoms, preferably 14 to 24 carbon atoms, and more preferably, 16 to 24 carbon atoms.

[0163] Each of R, R', R'' and R''' can independently be linear, cyclic, branched, saturated, or unsaturated, and can include heteroatoms such as oxygen, phosphorous, sulfur, or nitrogen.

Any two of R, R', R'' and R''' can form a cyclic group. Any one of three of R, R', R'' and R''' can independently can be hydrogen. X is preferably a counter ion and preferably a non-fluoride counter ion. Exemplary counter ions include chloride, bromide, methosulfate, ethosulfate, sulfate, and phosphate.

[0164] In an embodiment, the quaternary ammonium compound includes alkyl ethoxylated and/or propoxylated quaternary ammonium salts (or amines).

Preferably, the alkyl group contains between about 6 and about 22 carbon atoms and can be saturated and/or unsaturated. The degree of alkoxylation is preferably between about 2 and about 20, and/or the degree of propoxylation is preferably between about 0 and about 30.

In an embodiment, the quaternary ammonium compound includes an alkyl group with about 6 to about 22 carbon atoms and a degree of alkoxylation between about 2 and about 20.

[0165] The cationic surfactants can be provided in the composition for cleaning of the invention in an amount of ≥ 0 wt.-% to ≤ 40 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 35 wt.-%, further preferred ≥ 0.5 wt.-% to ≤ 32 wt.-%, and more preferred 1.0 wt.-% to 30 wt.-%, based on the weight of all components of the total composition.

[0166] It should be understood that the addition of a cationic tenside to the composition for cleaning of the invention can be omitted.

Amphoteric Surfactants

[0167] The composition for cleaning according to the invention is preferably free of amphoteric surfactants.

[0168] Examples of suitable amphoteric surfactants include capryloamphopropionate, disodium lauryl B-iminodipropionate, and cocoamphocarboxypropionate, and disodium octylimino dipropionate.

[0169] The amphoteric surfactants can be provided in the composition in an amount of ≥ 0 wt.-% to ≤ 40 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 35 wt.-%, further preferred ≥ 0.5 wt.-% to ≤ 32 wt.-%, and more preferred 1.0 wt.-% to 30 wt.-%, based on the weight of all components of the total composition.

[0170] It should be understood that the addition of an amphoteric tenside to the composition for cleaning of the invention can be omitted.

Zeolite

[0171] The composition for cleaning according to the invention is preferably free of zeolites. However, the composition of the present invention can comprise zeolites. The amount of zeolites can be ≥ 0 wt.-% to ≤ 40 wt.-%, preferably ≥ 1 wt.-% to ≤ 35 wt.-%, further preferred ≥ 1.5 wt.-% to ≤ 30 wt.-%, and more preferred ≥ 2.0 wt.-% to ≤ 25 wt.-%, based on the weight of

all components of the total composition.

[0172] Suitable zeolites are fine crystalline, synthetic zeolites containing bound water, zeolite A and/or P are preferred. A particularly preferred zeolite P is zeolite MAP (Registered trademark) (a commercial product of Crosfield). However, the zeolites X as well as mixtures of A, X and/or P are also suitable. Commercially available and preferred in the context of the present invention is, for example, also a co-crystallizate of zeolite X and zeolite A (ca. 80 wt. % zeolite X), which is marketed under the name of VEGOBOND AX (Registered trademark) by Condea Augusta S.p.A.

[0173] Suitable zeolites have a mean particle size of less than 10 μm (volume distribution, as measured by the Coulter Counter Method) and comprise preferably 18% to 22% by weight and more preferably 5% to 22% by weight of bound water.

Hydrotrope Component

[0174] It should be understood that the hydrotrope component is optional and can be omitted if it is not needed for stabilizing the surfactant component. In many cases, it is expected that the hydrotrope component will be present to help stabilize the surfactant component. Thus, the composition for cleaning according to the invention is preferably free of hydrotrope component. However, the hydrotrope component can be used to help stabilize the surfactant.

[0175] Examples of the hydrotropes include the sodium, potassium, ammonium and alkanol ammonium salts of xylene, toluene, ethylbenzoate, isopropylbenzene, naphthalene, alkyl naphthalene sulfonates, phosphate esters of alkoxyated alkyl phenols, phosphate esters of alkoxyated alcohols, short chain (C8 or less) alkyl polyglycoside, sodium, potassium and ammonium salts of the alkyl sarcosinates, salts of cumene sulfonates, amino propionates, diphenyl oxides, and disulfonates.

[0176] The hydrotropes are useful in maintaining the organic materials including the surfactant readily dispersed in the aqueous cleaning solution and, in particular, in an aqueous which is an especially preferred form of packaging the compositions of the invention and allow the user of the compositions to accurately provide the desired amount of cleaning composition into the aqueous wash solution.

[0177] The hydrotrope component can be provided in the corrosion inhibitor in an amount sufficient to stabilize the surfactant component. When the hydrotrope component is used, it can be provided in an amount of ≥ 1 wt.-% to ≤ 20 wt.-%, preferably ≥ 2 wt.-% to ≤ 15 wt.-%, further preferred ≥ 4 wt.-% to ≤ 10 wt.-%, and more preferred ≥ 6 wt.-% to ≤ 8 wt.-%, based on the weight of all components of the total composition.

Foam Inhibitor

[0178] The composition for cleaning according to the invention is preferably free of foam

inhibitors. However, suitable non-surface-active foam inhibitors are, for example, organopolysiloxanes and mixtures thereof with microfine, optionally silanised silica and also paraffins, waxes, microcrystalline waxes and mixtures thereof with silanised silica or bis-fatty acid alkylenediamides such as bis-stearyl ethylenediamide. The amount of foam inhibitors can be ≥ 1 wt.-% to ≤ 10 wt.-%, preferably ≥ 2 wt.-% to ≤ 9 wt.-%, further preferred > 3 wt.-% to ≤ 6 wt.-%, and more preferred > 4 wt.-% to ≤ 5 wt.-%, based on the weight of the total first component.

[0179] Mixtures of various foam inhibitors, for example mixtures of silicones, paraffins or waxes, are also used with advantage.

Other Additives

[0180] The composition for cleaning according to the invention is preferably free of other additives. However, other additives may be included in the composition according to the present invention.

[0181] Other additives may include, but are not limited to dyes, color transfer inhibitors, solvents, Exemplary additional agents include dye, color transfer inhibitor, anti-redeposition agents, optical brighteners, builder, oil and water repellent agents, hydrotrope, foam inhibitor, color fastness agents, starch/sizing agents, fabric softening agents, antimicrobials, fungicides, UV absorbers, thickeners, oxidizers, fragrances and/or mixtures thereof.

[0182] For laundry cleaning or sanitizing compositions, preferred dyes and odorants include one or more blue dyes, which can be employed at concentrations up to 1 wt.-%.

Color Transfer Inhibitors

[0183] Color transfer inhibitors are polymers of vinyl pyrrolidone, vinyl imidazole, vinyl pyridine-N-oxide or copolymers thereof. Polymers of vinyl imidazole, vinyl pyrrolidone and copolymers thereof are particularly suitable.

Enzyme

[0184] The composition for cleaning according to the invention may comprise an enzyme material. The enzyme material can be selected from proteases, amylases, lipases, cellulases, peroxidases, and mixtures thereof. The enzyme material can be present in said composition in a concentration of from 0.001 wt.-% to 3 wt.-%, based on the weight of the total first component.

Dyes

[0185] Various dyes, odorants including perfumes, and other aesthetic enhancing agents may also be included in the composition.

[0186] Dyes may be included to alter the appearance of the composition, as for example, Direct Blue 86 (Miles), Fastsol Blue (Mobay Chemical Corp.), Acid Orange 7 (American Cyanamid), Basic Violet 10 (Sandoz), Acid Yellow 23 (GAF), Acid Yellow 17 (Sigma Chemical), Sap Green (Keystone Analine and Chemical), Metanil Yellow (Keystone Analine and Chemical), Acid Blue 9 (Hilton Davis), Sandolan Blue/Acid Blue 182 (Sandoz), Hisol Fast Red (Capitol Color and Chemical), Fluorescein (Capitol Color and Chemical), Acid Green 25 (Ciba-Geigy), and the like.

Fragrances

[0187] Fragrances or perfumes that may be included in the compositions include, for example, terpenoids such as citronellol, aldehydes such as amyl cinnamaldehyde, a jasmine such as CIS-jasmine or jasmal, vanillin, and the like.

Anti-Redeposition Agents

[0188] Anti-redeposition agents can be used to facilitate sustained suspension of soils in a use solution and reduce the tendency of the soils to be redeposited onto a substrate from which they have been removed.

[0189] Exemplary anti-redeposition agents include fatty acid amides, fluorocarbon surfactants, complex phosphate esters, styrene maleic anhydride copolymers, and cellulosic derivatives such as carboxymethyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, and the like. Specific exemplary anti-redeposition agents include styrene maleic anhydride copolymers, sodium tripolyphosphate, sodium carboxymethyl cellulose, polyvinylpyrrolidone, acrylic acid polymers, polyethylene glycole and maleic/olefinic copolymers. The amount of anti-redeposition agents can be ≥ 0.1 wt.-% to ≤ 20 wt.-%, preferably ≥ 0.2 wt.-% to ≤ 10 wt.-%, further preferred ≥ 0.3 wt.-% to ≤ 5 wt.-%, and more preferred > 0.4 wt.-% to ≤ 1 wt.-%, based on the weight of all components of the total composition.

Optical Brightener

[0190] Optical brightener, referred to as fluorescent whitening agent or fluorescent brightening agent, provides optical compensation for the yellow cast in fabric substrates. With optical brighteners, yellowing is replaced by light emitted from optical brighteners present in the area commensurate in scope with yellow color. The violet to blue light supplied by the optical brighteners combines with other light reflected from the location to provide a substantially complete or enhanced bright white appearance. The brightener through fluorescence produces this additional light. Optical brighteners can absorb light in the ultraviolet range (e.g.,

275-400 nm) and can emit light in the ultraviolet blue spectrum (e.g., 400-500 nm).

[0191] Fluorescent compounds belonging to the optical brightener family are typically aromatic or aromatic heterocyclic materials often containing condensed ring system. An important feature of these compounds is the presence of an uninterrupted chain of conjugated double bonds associated with an aromatic ring. The number of such conjugated double bonds is dependent on substituents as well as the planarity of the fluorescent part of the molecule.

[0192] Most brightener compounds are derivatives of stilbene or 4,4'-diamino stilbene, biphenyl, five membered heterocycles (triazoles, oxazoles, imidazoles, etc.) or six membered heterocycles (cumarins, naphthalamides, triazines, etc.).

[0193] The choice of optical brighteners for use in the composition for cleanings will depend upon a number of factors, such as the type of detergent, the nature of other components present in the composition for cleaning, the temperature of the wash water, the degree of agitation, and the ratio of the material washed to the tub size. The brightener selection is also dependent upon the type of material to be cleaned, e.g., cottons, synthetics, etc.. Since most laundry detergent products are used to clean a variety of fabrics, the composition for cleanings should contain a mixture of brighteners, which are effective for a variety of fabrics. It is of course necessary that the individual components of such a brightener mixture be compatible.

[0194] Optical brighteners useful in the present invention are known and commercially available. Commercial optical brighteners which may be useful in the present invention can be classified into subgroups, which include, but are not necessarily limited to, derivatives of stilbene, pyrazoline, coumarin, carboxylic acid, methinecyanines, dibenzothiophene-5,5-dioxide, azoles, 5- and 6-membered-ring heterocycles and other miscellaneous agents.

[0195] Examples of these types of brighteners are disclosed in 'The Production and Application of Fluorescent Brightening Agents', M. Zahradnik, Published by John Wiley & Sons, New York (1982), the disclosure of which is incorporated herein by reference.

[0196] Stilbene derivatives which may be useful in the present invention include, but are not necessarily limited to, derivatives of bis(triazinyl)amino-stilbene; bisacylamino derivatives of stilbene; triazole derivatives of stilbene; oxadiazole derivatives of stilbene; oxazole derivatives of stilbene; and styryl derivatives of stilbene. Preferred optical brighteners include stilbene derivatives.

[0197] Optical brighteners that can be suitably used are 4,4'-bis-(2-sulostyryl)biphenyl (CBS-X) and/or 4,4'-bis-[(4,6-di-anilino-s-triazin-2-yl)-amino]-2,2'-stilbenedisulfonate (DMS-X).

[0198] The amount of optical brighteners can be ≥ 0.1 wt.-% to ≤ 2 wt.-%, and more preferred > 0.2 wt.-% to ≤ 1 wt.-%, based on the weight of all components of the total composition.

Color Fastness Agents

[0199] Exemplary color fastness agents that can be used include polyvinyl pyrrolidone and quaternary amines. It should be understood that the color fastness agents are optional, but when they are used, they can be used in the composition for cleaning in amounts of ≥ 0.1 wt.-% to ≤ 10 wt.-%, preferably ≥ 0.2 wt.-% to ≤ 5 wt.-%, further preferred ≥ 0.3 wt.-% to ≤ 3 wt.-%, and more preferred ≥ 0.5 wt.-% to ≤ 1 wt.-%, based on the weight of all components of the total composition.

Softening Agents

[0200] The composition for cleaning can include softening agents. Exemplary softening agents include quaternary ammonium compounds such as alkylated quaternary ammonium compounds, ring or cyclic quaternary ammonium compounds, aromatic quaternary ammonium compounds, diquaternary ammonium compounds, alkoxyated quaternary ammonium compounds, amidoamine quaternary ammonium compounds, ester quaternary ammonium compounds, and mixtures thereof. Exemplary alkylated quaternary ammonium compounds include ammonium compounds having an alkyl group containing between 6 and 24 carbon atoms. Exemplary alkylated quaternary ammonium compounds include monoalkyl trimethyl quaternary ammonium compounds, monomethyl trialkyl quaternary ammonium compounds, and dialkyl dimethyl quaternary ammonium compounds. Examples of the alkylated quaternary ammonium compounds are available commercially under the names Adogen (Registered Trademark), Arosurf (Registered trademark), Variquat (Registered trademark), and Varisoft (Registered trademark). The alkyl group can be a C₈-C₂₂ group or a C₈-C₁₈ group or a C₁₂-C₂₂ group that is aliphatic and saturated or unsaturated or straight or branched, an alkyl group, a benzyl group, an alkyl ether propyl group, hydrogenated-tallow group, coco group, stearyl group, palmityl group, and soya group. Exemplary ring or cyclic quaternary ammonium compounds include imidazolinium quaternary ammonium compounds and are available under the name Varisoft (Registered trademark). Exemplary imidazolinium quaternary ammonium compounds include methyl-1 hydr. tallow amido ethyl-2-hydr. tallow imidazolinium-methyl sulfate, methyl-1-tallow amido ethyl-2-tallow imidazolinium-methyl sulfate, methyl-1-oleyl amido ethyl-2-oleyl imidazolinium-methyl sulfate, and 1-ethylene bis (2-tallow, 1-methyl, imidazolinium-methyl sulfate). Exemplary aromatic quaternary ammonium compounds include those compounds that have at least one benzene ring in the structure. Exemplary aromatic quaternary ammonium compounds include dimethyl alkyl benzyl quaternary ammonium compounds, monomethyl dialkyl benzyl quaternary ammonium compounds, trimethyl benzyl quaternary ammonium compounds, and trialkyl benzyl quaternary ammonium compounds. The alkyl group can contain between 6 and 24 carbon atoms, and can contain between 10 and 18 carbon atoms, and can be a stearyl group or a hydrogenated tallow group. Exemplary aromatic quaternary ammonium compounds are available under the names Variquat (Registered trademark) and Varisoft (Registered trademark). The aromatic quaternary ammonium compounds can include multiple benzyl groups. Diquaternary ammonium compounds include those compounds that have at least two quaternary ammonium groups. An exemplary diquaternary ammonium compound is N-tallow pentamethyl propane diammonium dichloride and is available under the name Adogen 477. Exemplary alkoxyated quaternary ammonium compounds include methylalkoxy alkyl quaternary ammonium compounds, trialkoxy alkyl quaternary ammonium compounds, trialkoxy methyl quaternary ammonium

compounds, dimethyl alkoxy alkyl quaternary ammonium compounds, and trimethyl alkoxy quaternary ammonium compounds. The alkyl group can contain between 6 and 24 carbon atoms and the alkoxy groups can contain between 1 and 50 alkoxy groups units wherein each alkoxy unit contains between 2 and 3 carbon atoms. Exemplary alkoxyated quaternary ammonium compounds are available under the names Variquat (Registered trademark), Varstat (Registered trademark), and Variquat (Registered trademark) . Exemplary amidoamine quaternary ammonium compounds include diamidoamine quaternary ammonium compounds. Exemplary diamidoamine quaternary ammonium compounds are available under the name Varisoft (Registered trademark) . Exemplary amidoamine quaternary ammonium compounds that can be used according to the invention are methyl-bis(tallow amidoethyl)-2-hydroxyethyl ammonium methyl sulfate, methyl bis (oleylamidoethyl)-2-hydroxyethyl ammonium methyl sulfate, and methyl bis (hydr.tallowamidoethyl)-2-hydroxyethyl ammonium methyl sulfate. Exemplary ester quaternary compounds are available under the name Stephantex (Registered Trademark)

[0201] The quaternary ammonium compounds can include any counter ion that allows the component to be used in a manner that imparts fabric-softening properties. Exemplary counter ions include chloride, methyl sulfate, ethyl sulfate, and sulfate.

[0202] It should be understood that the softening agents are optional components and need not be present in the composition for cleaning of the invention. When fabric softening agents are incorporated into the composition of the invention, they can be included in amounts of ≥ 1 wt.-% to ≤ 20 wt.-%, preferably > 2 wt.-% to ≤ 18 wt.-%, further preferred > 4 wt.-% to ≤ 15 wt.-%, and more preferred > 5 wt.-% to ≤ 10 wt.-%, based on the weight of all components of the total composition.

Manufacture of Liquid alkaline composition

[0203] There are a number of processes known in prior art to provide a liquid product. For example, all components of the composition for cleaning of the invention, the basis solution, the concentrated solution as well as the ready-to-use solution can be mixed together or added portionwise or one component is added after the other.

[0204] The ready-to-use composition, the basis composition, the concentrated composition and/or the composition for cleaning of the invention, in particular the aqueous alkaline ready-to-use solution and/or the concentrated composition for cleaning of the invention, may be used at any temperature, including an elevated temperature of from about 20° C to 140° C, preferably 30° C to 120° C, further preferred 45° C to 90° C, also preferred 50° C to 60° C and more preferred 55° C. After contact with the cleaning solution, the solution is removed from the plastic and/or metal surface.

[0205] The contact time of the ready-to-use composition, the basis composition, the concentrated composition and/or the composition for cleaning of the invention, preferably the ready-to-use solution, in an automated process with the plastic and/or metal substrates may vary depending upon the degree of contamination but broadly will range between a few

seconds or ≥ 1 minute to ≤ 60 minutes, with > 3 minutes to ≤ 30 minutes being more typical and most preferred is ≥ 5 minutes to ≤ 15 minutes.

[0206] The following examples are presented to help to illustrate the invention and should not be construed as limiting the invention.

Example

[0207] The following examples E1 to E6 were carried out to illustrate the improved cleaning effect, especially the improved prevention of scale build up.

Scale Build Up Test

[0208] This test method provides a basis to assess the scale build up reduction of the composition of the invention.

Equipment

[0209] 1000 ml beakers for each test condition
Stainless steel test plates of 5 cm x 10 cm x 1mm (V2A)
(The stainless steel test plates are cleaned first with nitric acid and afterwards with acetone before use)
Stop watch
Drying oven
Analytical balance capable of weighing to the 0.0001 place

Test method for examples 1 to 6

[0210] Six stainless steel test plates (V2A) were first cleaned with nitric acid and afterwards with acetone, placed in a drying oven at 90° C for 2 min and allowed to cool at room temperature. Thereafter the stainless steel test plates (V2A) were scaled and the weight was recorded.

[0211] A 600 ml beaker was filled up with 600 ml of a 0.75 wt.-% NaOH (50%) aqueous solution 16° dH (dH = German water hardness) containing the composition E1 to E6 in an amount as shown in table 1. In each beaker a stainless steel test plates of 5 cm x 10 cm x 1mm (V2A) was dipped vertical along its longest axis for 7 min, so that 90 % of the outer surface of the stainless steel test plate was completely dipped. Thereafter the so treated stainless steel test plate (V2A) were dipped vertical along its longest axis, so that 90 % of the outer surface of the stainless steel test plate was completely dipped for 2 min into a 600 ml beaker with water of 16° dH (dH = German water hardness) and placed in a drying zone at 90°

C for 2 min and allowed to cool at room temperature. This sequence was repeated 100 times with the same set of 6 plates. After that the stainless steel test plates (V2A) were scaled to determine the scale build up, which is the resulting weight gain difference of the stainless steel test plates (V2A) before and after the scale build up, see table 1.

Table 1

Scale build up test						
Examples	Gluconic acid	sequestering agent ^{*1}	Polyacrylat MW 4500	Chelant ^{*2}	Chelant ^{*3}	Scale build up
	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]	[g/m ²]
1	1000	-	-	-	-	12.34
2	-	500	-	-	-	0.31
3	-	-	730	-	-	0.1
4	-	-	-	1053	-	2.42
5	-	-	-	-	750	3.16
6	100	50	70	80	60	0.03

^{*1} = 2-phosphonobutane-1,2,4-tricarboxylic acid
^{*2} = tetra sodium salt of glutamic acid N, N-diacetic acid (GLUDA)
^{*3} = trisodium salt of methylglycinediacetic acid (MGDA)

[0212] Example 6 of table 1 clearly demonstrates that the composition for cleaning being formulated of the five components E6 provides a significant reduction of scale compared to the use of the single components E1 to E5, although the concentration of all five components E5 are lower compared to each single component of examples E1 to E5.

Test method for examples 7 to 12

[0213] Six stainless steel test plates (V2A) were first cleaned with nitric acid and afterwards with acetone, placed in a drying oven at 90° C for 2 min and allowed to cool at room temperature. Thereafter the stainless steel test plates (V2A) were scaled and the weight was recorded each.

[0214] Twelve 1000 ml beaker was filled up with 900 ml of a 0.75 wt.-% NaOH (50%) aqueous solution 16° dH (dH = German water hardness) and a temperature of 50° C containing the compositions E7 to E12 in an amount as shown in table 2. The upper surface of said twelve stainless steel test plates of 5 cm x 10 cm x 1mm (V2A) were coated so that a boundary area of 10% remains not coated. The first six of said stainless steel test plates were coated with cold milk and the weight was recorded each. The plates were allowed to dry for about 15 hours at ambient temperature. The second six of said stainless steel test plates were homogeneously coated with 0.2 g lard each. Thereafter the twelve coated stainless steel test plates were scaled and the weight was recorded respectively. In each of said twelve beakers, a stainless steel test plates of 5 cm x 10 cm x 1mm (V2A) were dipped vertical along its longest axis for 5

min and moved completely out and dipped in again 12 times per minute, so that the coated 90 % of the outer surface of the stainless steel test plate were completely dipped. Thereafter the so treated stainless steel test plate (V2A) were removed and allowed to cool at ambient temperature for 15 hours. After that, the stainless steel test plates (V2A) were scaled again to determine cold milk and lard removal effectiveness of Examples 7 to 12 as shown in table 2.

Table 2

Cold milk removal and lard removal							
Examples	Gluconic acid	sequestering agent ^{*1}	Polyacrylat MW 4500	Chelant ^{*2}	Chelant ^{*3}	Cold milk (removal in %)	Lard (removal in %)
	[ppm]	[ppm]	[ppm]	[ppm]	[ppm]		
7	1000	-	-	-	-	95	54,7
8	-	500	-	-	-	97	51
9	-	-	730	-	-	99	55,3
10	-	-	-	1053	-	98	49,3
11	-	-	-	-	750	99	52
12	100	50	70	80	60	99	69

^{*1} = 2-phosphonobutane-1,2,4-tricarboxylic acid

^{*2} = tetra sodium salt of glutamic acid N, N-diacetic acid (GLUDA)

^{*3} = trisodium salt of methylglycinediacetic acid (MGDA)

[0215] Example 12 of table 2 clearly demonstrates that the composition for cleaning being formulated of the five components E12 provides a significant reduction of cold milk and lard compared to the use of the single components E7 to E11, although the concentration of all five components E12 are lower compared to each single component of examples E7 to E11.

Table 3

Acidic compositions for cleaning					
Examples	Gluconic acid	sequestering agent ^{*4}	Polyacrylat MW 4500	Chelant ^{*5}	Chelant ^{*6}
	[weight.-%]	[weight.-%]	[weight.-%]	[weight.-%]	[weight.-%]
13	7.5	2.5	3.15	3.0	2.4
14	7.5	2.5	6.75	3.0	2.4
15	7.5	2.5	7.30	3.0	2.4
16	7.5	2.5	3.15	3.0	2.4
17	7.5	2.5	3.15	3.8	4
18	7.5	10	3.15	3.0	2.4

Water is added to examples E13 to E18 add. 100 wt.-%

^{*4} = 2-phosphonobutane-1,2,4-tricarboxylic acid

^{*5} = glutamic acid N, N-diacetic acid (GLUDA)

^{*6} = methylglycinediacetic acid (MGDA)

Table 4

Alkaline compositions for cleaning						
Examples	Gluconic acid	sequestering agent ^{*7}	Polyacrylat MW 4500	Chelant ^{*2}	Chelant ^{*3}	NaOH
	[weight.-%]	[weight.-%]	[weight.-%]	[weight.-%]	[weight.-%]	
19	0.65	0.314	0.396	0.38	0.3	19
20	1.0	0.5	0.63	0.6	0.48	19
21	0.65	0.314	0.396	0.38	0.3	37.5
22	1.0	0.5	0.63	0.6	0.48	37.5

Water is added to examples E19 to E22 add. 100 wt.-%

^{*7} = Sodium salt of 2-phosphonobutane-1,2,4-tricarboxylic acid

^{*2} = tetra sodium salt of glutamic acid N, N-diacetic acid (GLUDA)

^{*3} = trisodium salt of methylglycinediacetic acid (MGDA)

Foam Formation Test

[0216] This test method provides a basis to assess the foam formation properties of the liquid alkaline cleaning composition of the invention.

Foam testing equipment

[0217] 250 ml long-necked glass cylinder
Rubber stopper to close the long-necked glass cylinder

Test method

[0218] 100 ml of the cleaning compositions E6, E12 and E13 to E22 were filled each into a long-necked glass cylinder, respectively. The long-necked glass cylinder was then turned up and down 20 x times in 20 seconds. Thereafter the glass cylinder was placed and the foam depth of each cylinder was scaled in ml to determine the foam formation. This test was carried out at a temperature of the cleaning solution at ambient temperature, 50° C and 80° C.

[0219] For none of said tested solutions a foam formation could be observed. Thus, the cleaning composition of the invention can be regarded as a non-foaming composition.

[0220] Most preferred is the use of the composition for cleaning, preferably the concentrated and/or ready to use solution, of the invention, to clean hard surfaces and/or soft surfaces, preferably in an automated cleaning processing, for example of metal and/or plastic articles.

[0221] It should be noted that, as used in this specification and the appended claims, the singular forms "a", "an" and "the" include plural referents unless the content clearly dictates otherwise.

[0222] Thus, for example, reference to a composition containing "a compound" includes a mixture of two or more compounds. It should also be noted that the term "or" is generally employed in its sense including "and/or" unless the content clearly dictates otherwise. All publications and patent applications in this specification are indicative of the level of ordinary skill in the art to which this invention pertains. The invention has been described to various specific and preferred embodiments and techniques.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- [US2003176305A1 \[0004\]](#)
- [US2010000579A1 \[0005\]](#)

Non-patent literature cited in the description

- **KIRK-OTHMER** Encyclopedia of Chemical Technology vol. 5, 339-366 [0112]
- **ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY** vol. 23, 319-320 [0112]
- **M. ZAHRADNIK** The Production and Application of Fluorescent Brightening Agents John Wiley & Sons 19820000 [0195]

Patentkrav**1. Rengørings sammensætning, som omfatter:**

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a) to vandopløselige bionedbrydelige aminopolycarboxylatchelatdannere af glutaminsyre-N,N-diiddikesyre og methylglycindiiddikesyre;

b) et gluconat;

c) mindst ét sekvestreringsmiddel af et fosfonat;

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d) mindst én flydende konditioneringspolymer af monomerer af vandopløselige monoethylenisk umættede (C₃-C₈)-carboxylater og/eller af vandopløselige monoethylenisk umættede (C₃-C₈)-carboxylsyrer;

e) mindst ét opløsningsmiddel; hvor vægtforholdet mellem gluconatet og/eller gluconsyren og syre og/eller salt af

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glutaminsyre-N,N-diiddikesyre og methylglycindiiddikesyre er i intervallet fra 1:1 til 1:5.

2. Sammensætning ifølge krav 1, som omfatter glutaminsyre-N,N-diiddikesyre og methylglycindiiddikesyre, hvor vægtforholdet mellem gluconatet og/eller gluconsyren og det første vandopløselige salt og/eller den første vandopløselige syre af glutaminsyre-N,N-diiddikesyre er i intervallet fra 1:0,1 til 1:4;

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og vægtforholdet mellem gluconatet og/eller gluconsyren og det andet salt

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og/eller den anden syre af methylglycindiiddikesyre er i intervallet fra 1:0,1 til 1:4; og det første og det andet vandopløselige aminopolycarboxylat- og/eller

den første og den anden vandopløselige aminopolycarboxylsyrechelatdanner af glutaminsyre-N, N-diiddikesyre og methylglycindiiddikesyre mest foretrukket er i intervallet fra 1:0,2 til 1:2.

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3. Sammensætning ifølge krav 1 eller 2, hvor fosfonatsekvestreringsmidlet er valgt fra gruppen omfattende en syre og/eller et salt af fosfonsyre, fosphonocarboxylsyre, 1-hydroxyethyliden-1,1-diphosphorsyre (HEDP),
5 2-fosfonobutan-1,2,4-tricarboxylsyre og blandinger deraf, og saltet mest foretrukket er et natriumsalt.
4. Sammensætning ifølge krav 1 til 3, hvor det flydende konditioneringsmiddel er valgt fra gruppen bestående af salte af og/eller substituerede syrepolymerer
10 af monomerer af monoethylenisk umættet (C₃-C₈)-carboxylsyre, fortrinsvis blandt en (C₃-C₄)-monocarboxylsyre, acrylsyre, methacrylsyre, polyitaconsyre, polymaleinsyre og blandinger deraf, og mest foretrukket er en polyacrylsyre eller et polyacrylat.
- 15 5. Sammensætning ifølge krav 1 til 4, hvor opløsningsmidlet er valgt fra gruppen omfattende vand, alkoholer, glycoler, glycolethere, estere, fortrinsvis ethanol, methanol, propanol, propan-2-ol, 2-butoxyethanol, 1-decanol, benzylalkohol, glycerol, monoethanolamin og blandinger deraf og mest foretrukket er vand.
- 20 6. Sammensætning ifølge krav 1 til 5, hvor sammensætningen omfatter mindst én kilde til alkalinitet valgt fra gruppen bestående af alkalimetahydroxider, alkalimetalsalte, phosphater, aminer og blandinger deraf, fortrinsvis alkalimetahydroxider, som indbefatter natriumhydroxid, kaliumhydroxid og
25 lithiumhydroxid og blandinger deraf; idet kilden mest foretrukket er natriumhydroxid.
7. Sammensætning ifølge krav 1 til 6, hvor sammensætningen omfatter mindst én korrosionshæmmer valgt fra gruppen omfattende silicat, natriumsilicat,
30 calciumacetat, calciumchlorid, calciumgluconat, calciumphosphat, calciumborat, calciumcarbonat, calciumcitrat, calciumlactat, calciumsulfat, calciumtartrat, benzotriazol, 1,2,3-benzotriazol og blandinger deraf.

8. Sammensætning ifølge krav 1 til 7, hvor sammensætningen omfatter mindst ét tensid valgt fra gruppen bestående af ikke-ionisk tensid, kationisk tensid, anionisk tensid, amfotert tensid og blandinger deraf.

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9. Sammensætning ifølge krav 1 til 8, hvor sammensætningen omfatter mindst ét salt valgt fra gruppen bestående af lithiumchlorid, lithiumiodid, natriumchlorid, natriumiodid, kaliumiodid, kaliumchlorid, kaliumiodid, natriumsulfat, natriumacetat, kaliumacetat, natriumnitrat, natriumphosphat og blandinger deraf.

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10. Sammensætning ifølge krav 1 til 9, hvor

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- rengørings sammensætningen har en pH-værdi i intervallet fra \geq pH 1 til \leq pH 14, fortrinsvis i intervallet fra \geq pH 1,5 til \leq pH 13,8, yderligere foretrukket i intervallet fra \geq pH 2 til \leq pH 13,5, også foretrukket i intervallet fra \geq pH 2,5 til \leq pH 13,0 og desuden foretrukket i intervallet fra \geq pH 3 til \leq pH 12,9;

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- basisrengørings sammensætningen har en pH-værdi i intervallet fra \geq pH 1 til \leq pH 14, fortrinsvis i intervallet fra \geq pH 2 til \leq pH 13,8, yderligere foretrukket i intervallet fra \geq pH 2,5 til \leq pH 13,5, også foretrukket i intervallet fra \geq pH 2,8 til \leq pH 12,5 og desuden foretrukket i intervallet fra \geq pH 2,9 til \leq pH 12;

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- den koncentrerede opløsning har en pH-værdi i intervallet fra \geq pH 5 til \leq pH 14, fortrinsvis i intervallet fra \geq pH 5,5 til \leq pH 13,8, yderligere foretrukket i intervallet fra \geq pH 7 til \leq pH 13,6 og også foretrukket i intervallet fra \geq pH 9 til \leq pH 13,5; og

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- den brugsklare opløsning har en pH-værdi i intervallet fra \geq pH 7 til \leq pH 14, foretrukket i intervallet fra \geq pH 8 til \leq pH 13,8, yderligere foretrukket i intervallet fra \geq pH 9 til \leq pH 13,6, desuden foretrukket i intervallet fra \geq pH 10 til \leq pH 13,5 og også foretrukket i intervallet fra \geq pH 10,5 til \leq pH 13,4.

11. Sammensætning ifølge krav 1 til 10, hvor sammensætningen omfatter:

- 5 - > 0 vægtprocent til ≤ 26 vægtprocent, fortrinsvis $\geq 0,04$ vægtprocent til ≤ 24 vægtprocent, yderligere foretrukket $\geq 0,4$ vægtprocent til ≤ 22 vægtprocent, og mere foretrukket $\geq 0,6$ vægtprocent til ≤ 20 vægtprocent, af to vandopløselige aminopolycarboxylat- og/eller aminopolycarboxylsyrechelatladdere af glutaminsyre-N,N-dieddikesyre og methylglycindieddikesyre;
- 10 - > 0 vægtprocent til ≤ 20 vægtprocent, fortrinsvis $\geq 0,25$ vægtprocent til ≤ 19 vægtprocent, yderligere foretrukket $\geq 0,5$ vægtprocent til $\leq 17,5$ vægtprocent, og mere foretrukket $\geq 0,75$ vægtprocent til ≤ 15 vægtprocent, af mindst ét gluconat og/eller gluconsyre;
- 15 - > 0 vægtprocent til $\leq 32,5$ vægtprocent, fortrinsvis $\geq 0,05$ vægtprocent til ≤ 30 vægtprocent, yderligere foretrukket $\geq 0,25$ vægtprocent til ≤ 29 vægtprocent, og mere foretrukket $\geq 0,5$ vægtprocent til $\leq 27,5$ vægtprocent, af mindst ét fosfonatsekvestringsmiddel;
- 20 - > 0 vægtprocent til $\leq 13,5$ vægtprocent, fortrinsvis $\geq 0,045$ vægtprocent til $\leq 11,25$ vægtprocent, yderligere foretrukket $\geq 0,225$ vægtprocent til ≤ 9 vægtprocent, og mere foretrukket $\geq 0,45$ vægtprocent til ≤ 15 vægtprocent, af mindst én flydende konditioneringspolymer af monomerer af vandopløselige monoethylenisk umættede (C₃-C₈)-carboxylater og/eller vandopløselig monoethylenisk umættet (C₃-C₈)-carboxylsyre;
- 25 - ≥ 0 vægtprocent til ≤ 20 vægtprocent, fortrinsvis ≥ 1 vægtprocent til ≤ 18 vægtprocent, yderligere foretrukket $\geq 1,5$ vægtprocent til ≤ 15 vægtprocent, og mere foretrukket ≥ 2 vægtprocent til ≤ 12 vægtprocent, af mindst én kilde til alkalinitet;
- 30 - ≥ 0 vægtprocent til ≤ 12 vægtprocent, fortrinsvis $\geq 0,01$ vægtprocent til ≤ 10 vægtprocent, yderligere foretrukket $\geq 0,025$ vægtprocent til ≤ 9 vægtprocent, og mere foretrukket $\geq 0,03$ vægtprocent til ≤ 8 vægtprocent, af mindst én korrosionshæmmer;

- ≥ 0 vægtprocent til ≤ 10 vægtprocent, fortrinsvis $\geq 0,01$ vægtprocent til ≤ 9 vægtprocent, yderligere foretrukket $\geq 0,1$ vægtprocent til $\leq 8,5$ vægtprocent, og mere foretrukket $\geq 0,5$ vægtprocent til ≤ 8 vægtprocent, af mindst ét salt; og

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opløsningsmidlet er tilsat op til 100 vægtprocent; hvor vægtprocenten af bestanddelene er baseret på den samlede vægt af sammensætningen.

10 **12.** Basissammensætning ifølge krav 1 til 11, hvor basissammensætningsopløsningen omfatter:

- > 0 vægtprocent til ≤ 26 vægtprocent, fortrinsvis $\geq 0,04$ vægtprocent til ≤ 24 vægtprocent, yderligere foretrukket $\geq 0,4$ vægtprocent til ≤ 22 vægtprocent, og mere foretrukket $\geq 0,6$ vægtprocent til ≤ 20 vægtprocent, af mindst én/ét vandopløselig syre eller vandopløseligt salt af methylglycin-N,N-diacetat og glutaminsyre-N,N-diacetat;

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- > 0 vægtprocent til ≤ 20 vægtprocent, fortrinsvis $\geq 0,25$ vægtprocent til ≤ 19 vægtprocent, yderligere foretrukket $\geq 0,5$ vægtprocent til $\leq 17,5$ vægtprocent, og mere foretrukket $\geq 0,75$ vægtprocent til ≤ 15 vægtprocent, af en syre eller et salt af gluconsyre;

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- > 0 vægtprocent til $\leq 32,5$ vægtprocent, fortrinsvis $\geq 0,05$ vægtprocent til ≤ 30 vægtprocent, yderligere foretrukket $\geq 0,25$ vægtprocent til ≤ 29 vægtprocent, og mere foretrukket $\geq 0,5$ vægtprocent til $\leq 27,5$ vægtprocent, af mindst ét sekvestringsmiddel af et fosfonat og/eller fosfonsyre, mere foretrukket en syre eller et salt af 2-phosphonobutan-1,2,4-tricarboxylsyre;

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- > 0 vægtprocent til $\leq 13,5$ vægtprocent, fortrinsvis $\geq 0,045$ vægtprocent til $\leq 11,25$ vægtprocent, yderligere foretrukket $\geq 0,225$ vægtprocent til ≤ 9 vægtprocent, og mere foretrukket $\geq 0,45$ vægtprocent til ≤ 15 vægtprocent, af mindst én flydende konditioneringspolymer af monomerer af vandopløselige monoethylenisk umættede

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(C₃-C₈)-carboxylater og/eller vandopløselige monoethylenisk umættede (C₃-C₈)-carboxylsyrer, fortrinsvis en syre eller et salt af en acrylpolymer;

5 ≥ 0 vægtprocent til ≤ 20 vægtprocent, fortrinsvis ≥ 1 vægtprocent til ≤ 18 vægtprocent, yderligere foretrukket ≥ 1,5 vægtprocent til ≤ 15 vægtprocent, og mere foretrukket ≥ 2 vægtprocent til ≤ 12 vægtprocent, af mindst en kilde til alkalinitet; og et opløsningsmiddel er tilsat op til 100 vægtprocent; hvor vægtprocenten af bestanddelene er baseret på den samlede vægt af basissammensætningen.

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13. Sammensætning ifølge krav 1 til 12, hvor den koncentrerede sammensætningsopløsning omfatter:

15 - > 0 vægtprocent til ≤ 10 vægtprocent, fortrinsvis ≥ 2×10^{-4} vægtprocent til ≤ 9,60 vægtprocent, yderligere foretrukket ≥ 2×10^{-3} vægtprocent til ≤ 8,80 vægtprocent, og mere foretrukket ≥ 3×10^{-3} vægtprocent til ≤ 8,00 vægtprocent, af to vandopløselige aminopolycarboxylat- og/eller aminopolycarboxylsyrechelatladdere af methylglycin-N,N-diacetat og glutaminsyre-N,N-diacetat;

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- > 0 vægtprocent til ≤ 8,0 vægtprocent, fortrinsvis ≥ $1,3 \times 10^{-3}$ vægtprocent til ≤ 7,6 vægtprocent, yderligere foretrukket ≥ $2,5 \times 10^{-3}$ vægtprocent til ≤ 7,0 vægtprocent, og mere foretrukket ≥ 0,037 vægtprocent til ≤ 6,0 vægtprocent, af en syre eller et salt af gluconsyre;

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- > 0 vægtprocent til ≤ 13,0 vægtprocent, fortrinsvis ≥ $2,5 \times 10^{-4}$ vægtprocent til ≤ 12,0 vægtprocent, yderligere foretrukket ≥ $1,25 \times 10^{-3}$ vægtprocent til ≤ 11,6 vægtprocent, og mere foretrukket ≥ $2,5 \times 10^{-3}$ vægtprocent til ≤ 11,0 vægtprocent, af mindst ét sekvestringsmiddel af et fosfonat og/eller fosfonsyre, mere foretrukket en syre eller et salt af 2-phosfonobutan-1,2,4-tricarboxylsyre;

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- > 0 vægtprocent til ≤ 5,4 vægtprocent, fortrinsvis ≥ $2,5 \times 10^{-4}$ vægtprocent til ≤ 4,5 vægtprocent, yderligere foretrukket ≥ $1,125 \times 10^{-3}$

- vægtprocent til $\leq 3,6$ vægtprocent, og mere foretrukket $\geq 2,5 \times 10^{-3}$ vægtprocent til $\leq 2,7$ vægtprocent, af mindst én flydende konditioneringspolymer af monomerer af vandopløselige monoethylenisk umættede (C₃-C₈)-carboxylater og/eller vandopløselige monoethylenisk umættede (C₃-C₈)-carboxylsyrer, fortrinsvis en syre eller et salt af en acrylpolymer;
- 5 - ≥ 0 vægtprocent til $\leq 49,5$ vægtprocent, fortrinsvis $\geq 0,5$ vægtprocent til $\leq 47,5$ vægtprocent, yderligere foretrukket $\geq 0,75$ vægtprocent til ≤ 45 vægtprocent, og mere foretrukket ≥ 1 vægtprocent til $\leq 42,5$ vægtprocent, af mindst én kilde til alkalinitet, fortrinsvis natriumhydroxid;
- 10 - ≥ 0 vægtprocent til $\leq 4,8$ vægtprocent, fortrinsvis $\geq 5 \times 10^{-5}$ vægtprocent til $\leq 3,6$ vægtprocent, yderligere foretrukket $\geq 1,25 \times 10^{-4}$ vægtprocent til $\leq 3,4$ vægtprocent, og mere foretrukket $\geq 1,5 \times 10^{-4}$ vægtprocent til $\leq 3,2$ vægtprocent, af mindst én korrosionshæmmer, fortrinsvis et disilicat;
- 15 - ≥ 0 vægtprocent til $\leq 4,0$ vægtprocent, fortrinsvis $\geq 5 \times 10^{-5}$ vægtprocent til $\leq 3,6$ vægtprocent, yderligere foretrukket $\geq 5 \times 10^{-4}$ vægtprocent til $\leq 3,4$ vægtprocent, og mere foretrukket $\geq 2,5 \times 10^{-3}$ vægtprocent til $\leq 3,2$ vægtprocent, af mindst ét salt, fortrinsvis kaliumiodid; og
- 20 opløsningsmidlet er tilsat op til 100 vægtprocent; hvor vægtprocenten af bestanddelene er baseret på den samlede vægt af sammensætningen.

- 14.** Sammensætning ifølge krav 1 til 13, hvor den brugsklare sammensætningsopløsning omfatter:
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- > 0 vægtprocent til $\leq 1,04$ vægtprocent, fortrinsvis $\geq 2 \times 10^{-6}$ vægtprocent til $\leq 0,96$ vægtprocent, yderligere foretrukket $\geq 2 \times 10^{-5}$ vægtprocent til $\leq 0,88$ vægtprocent, og mere foretrukket $\geq 3 \times 10^{-5}$ vægtprocent til $\leq 0,80$ vægtprocent, af to vandopløselige aminopolycarboxylat- og/eller aminopolycarboxylsyrechelatladdere af methylglycin-N,N-diacetat og glutaminsyre-N,N-diacetat;
- 30

- > 0 vægtprocent til $\leq 0,80$ vægtprocent, fortrinsvis $\geq 1,25 \times 10^{-5}$ vægtprocent til $\leq 0,76$ vægtprocent, yderligere foretrukket $\geq 2,5 \times 10^{-5}$ vægtprocent til $\leq 0,70$ vægtprocent, og mere foretrukket $\geq 3,75 \times 10^{-5}$ vægtprocent til $\leq 0,60$ vægtprocent, af en syre eller et salt af gluconsyre;
- 5 - > 0 vægtprocent til $\leq 1,30$ vægtprocent, fortrinsvis $\geq 2,5 \times 10^{-6}$ vægtprocent til $\leq 1,20$ vægtprocent, yderligere foretrukket $\geq 1,25 \times 10^{-5}$ vægtprocent til $\leq 1,16$ vægtprocent, og mere foretrukket $\geq 2,5 \times 10^{-5}$ vægtprocent til $\leq 1,10$ vægtprocent, af mindst ét sekvestringsmiddel af et fosfonat og/eller fosfonsyre, mere foretrukket en syre eller et salt af 2-fosfonobutan-1,2,4-tricarboxylsyre;
- 10 - > 0 vægtprocent til $\leq 0,54$ vægtprocent, fortrinsvis $\geq 2,5 \times 10^{-6}$ vægtprocent til $\leq 0,46$ vægtprocent, yderligere foretrukket $\geq 1,25 \times 10^{-5}$ vægtprocent til $\leq 0,36$ vægtprocent, og mere foretrukket $\geq 2,5 \times 10^{-5}$ vægtprocent til $\leq 0,27$ vægtprocent, af mindst én flydende
- 15 konditioneringspolymer af monomerer af vandopløselige monoethylenisk umættede (C₃-C₈)-carboxylater og/eller vandopløselige monoethylenisk umættede (C₃-C₈)-carboxylsyrer, fortrinsvis en syre eller et salt af en acrylpolymer;
- ≥ 0 vægtprocent til $\leq 4,99$ vægtprocent, fortrinsvis $\geq 0,05$ vægtprocent til $\leq 47,5$ vægtprocent, yderligere foretrukket $\geq 0,075$ vægtprocent til $\leq 4,50$ vægtprocent, og mere foretrukket $\geq 0,10$ vægtprocent til $\leq 4,25$ vægtprocent, af mindst én kilde til alkalinitet, fortrinsvis natriumhydroxid;
- 20 - ≥ 0 vægtprocent til $\leq 0,48$ vægtprocent, fortrinsvis $\geq 5 \times 10^{-6}$ vægtprocent til $\leq 0,36$ vægtprocent, yderligere foretrukket $\geq 5 \times 10^{-5}$ vægtprocent til $\leq 0,34$ vægtprocent, og mere foretrukket $\geq 2,5 \times 10^{-4}$ vægtprocent til $\leq 0,32$ vægtprocent, af mindst én korrosionshæmmer, fortrinsvis et disilicat;
- 25 - ≥ 0 vægtprocent til $\leq 0,4$ vægtprocent, fortrinsvis $\geq 5 \times 10^{-6}$ vægtprocent til $\leq 0,36$ vægtprocent, yderligere foretrukket $\geq 5 \times 10^{-5}$ vægtprocent til $\leq 0,34$ vægtprocent, og mere foretrukket $\geq 2,5 \times 10^{-4}$ vægtprocent til $\leq 0,32$ vægtprocent, af mindst ét salt, fortrinsvis kaliumiodid; og
- 30

opløsningsmidlet er tilsat op til 100 vægtprocent; hvor vægtprocenten af bestanddelene er baseret på den samlede vægt af sammensætningen.

- 5 **15.** Anvendelse af sammensætningen ifølge krav 1 til 14 til rengøring af hårde overflader og bløde overflader.