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(54) **Title**: SOLID COMPOSITION FOR CLEANING, DISINFECTION AND LUBRICATION COMPRISING ALKYLAMINES

(57) **Abstract**: The invention relates to a solid composition and a ready-to-use solution obtained by dissolving the solid composition in water. The solid composition and ready-to-use solution comprise alkylamines suitable for use for a cleaning agent and disinfection agent, in particular for use for disinfection of surfaces in the food and beverage processing industry and/or as a lubricant. The solid composition comprises: (a) at least one alkylamine of mono-, di- and/or polyamines selected from the group of: R-NH-$(CH_2)_r$-NH_2 (1a) R-NH-$(CH_2)_r$-N^+H_3 X^- (1b) R-N^+H_2-$(CH_2)_r$-$N^+H_3 2X^-$ (1c), R-NH-[$(CH_2)_r$-NH]$_y$-$(CH_2)_m$-NH_2 (2a) R-NH-[$(CH_2)_r$-NH]$_y$$(CH_2)_m$-$NH_2$ $(H+X^-)_n$ (2b) R_2-NY (3a) R_2-$NY_2^+X^-$ (3b) wherein, R = a linear or branched alkyl residue with 6 to 22 C atoms, Y = independently represents hydrogen or a methyl group, X^- = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid, m, r, y = independently represent an integer ranging from 1 to 6, n = an integer ranging from 1 to 2+y, (b) ≥ 0 wt. -% to < 35 wt. -% of at least one water-soluble alkali base and/or earth alkali base, (c) at least one alkali and/or earth alkali salt of an organic acid, (d) ≥ 0 wt.-% of an organic acid; (e) ≥ 0 wt.-% water; and the amount of all components of the solid composition is selected such that the total weight is 100 wt.-%.

Solid composition for cleaning, disinfection and lubrication comprising alkylamines

Field of the invention

The invention relates to a solid composition comprising alkylamines suitable for use for a cleaning agent and disinfection agent, in particular for use for disinfection of surfaces in the food and beverage processing industry and/or as a lubricant in the beverage and other processing industry.

Background of the invention:

Concentrated aqueous liquid cleaning and disinfection products are used throughout residential and commercial properties in a variety of applications including the cleaning and disinfection of surfaces receiving beverages or foodstuff or other residues.

The use of concentrated liquids has the disadvantage of being bulky due the high water content and potentially hazardous if spilled due to the high concentration of the active cleaning components such as peroxides and/or concentrated alkaline or acidic components.

The European patent application EP 1196517 (ECOLAB) discloses the use of an aqueous liquid concentrate of amines and amphotensides for cleaning and/or disinfecting purposes. Further, EP 1196517 (ECOLAB) discloses an aqueous liquid lubricant concentrate for filling facilities for beverages or foodstuffs or other residues. The concentrated aqueous liquid lubricant is not ready for use and needs to be diluted by adding additional water before use.

The European patent application EP 1458418 (ECOLAB) discloses a thickened, ready for use liquid disinfectant for medical or dental suction apparatus, which includes an active substance selected from the group of alkylpropylenediamines with a defined viscosity of about 1000 mPas and a thickening agent being included as additional component.

The European patent application EP 0714434 (ECOLAB) discloses solid cleaners for removing fatty soils usable for hard surfaces, cooking utensils, laundry and other substrates. The solid cleaners contain a blend of surfactants comprising alkyldimethylamineoxide combined with an anionic sulfonate. The solid cleaners disclosed in EP 0714434 are used for the removal of vegetable and animal fat. However, the alkyldimethylamineoxides disclosed in EP 0714434 are not known to be used for disinfection properties, because they have

practical no or at most a poor disinfection activity only. Further, EP 0714434 (ECOLAB) does not disclose lubricants.

There also is still the problem of replacing peroxyacetic acid in liquid and solid compositions due to the higher safety conditions for storing and transportation. Further, the peroxyacetic acid has a pungent acidic odor even in diluted form.

Moreover, concentrated liquid solutions and solid compositions with a high concentration of active ingredients for use for a cleaning agent, as disinfection agent and/or as lubricant have an unpleasant pungent odor.

There is a need for a solid cleaning and disinfecting product and/or a solid lubricate product with a high content of active ingredients for use in residential, commercial, and industrial applications that after dissolution effectively cleans, disinfects and/or lubricates at the same time.

In particular, there is still the need to substitute concentrated liquid compositions of being bulky due to its water content. Further, concentrated liquid compositions as well as solid cleaning, disinfection and/or lubricant compositions have an unpleasant pungent odor and are hazardous or irritating to the skin in concentrated liquid or solid form due to the high concentration of active ingredients such as peroxides, chlorines, or suchlike.

The object of the present invention is to avoid the disadvantages mentioned above for concentrated liquids and solid compositions with a high concentration of active ingredients for use for a cleaning agent, disinfection and lubricant.

The object of the present invention is to provide a composition with a high concentration of active ingredients that is solid at temperatures below +45° C for use for a cleaning agent, disinfection agent and lubricant in an efficient way with the benefit of having a significant reduced pungent odor and being less bulky, more stable at storage, and less hazardous to the user.

Detailed description of the invention

The object of the present invention is solved by a solid composition described in detail below, which provides good cleaning, disinfecting and/or lubrication properties and shows much

lower skin irritation and significant reduced pungent odor compared to concentrated liquid or solid compositions comprising peroxyacid.

Using solid compositions with a high concentration of active ingredients instead of concentrated liquid products, results in the safety, health and environmental aspects become dramatically better. This is especially the case in dairy farms, where e.g. children can come into contact with said composition very easily.

With a solid composition of the present invention, it is possible to save a lot of storage space and transport costs. The volume of the solid composition compared to a concentrated liquid equivalent can be reduced for example to at least 80%.

The solid composition of the present invention comprises the active ingredients in a high concentration. The concentration of the active ingredients is calculated on the total weight of the solid composition of the present invention, if not otherwise stated. Before use, the solid composition of the present invention needs to be dissolved in an aqueous solution, preferably water, to obtain a ready-to-use solution. Preferably, the solid composition can be dissolved at the time of application and/or stored in a dilution device.

Another advantage of replacing peroxyacetic acid in liquid and solid compositions by alkylamine of mono-, di- and/or polyamines is that the alkylamine of mono-, di- and/or polyamines are sufficient stable for at least one year. Contrary thereto, peroxyacetic acid after it has been formed shows a tendency to decompose. Thus, the concentration of peroxyacetic acid decreases over the time of use. A comparison of a solid composition, a concentrated solution and/or a ready-to-use solution of the present invention with a peroxyacetic acid containing solid composition, a peroxyacetic acid containing concentrated solution and/or a peroxyacetic acid containing ready-to-use solution shows a significant reduction of the active component peroxyacetic acid, where else the concentration of the active alkylamine component of mono-, di- and/or polyamines remains practically stable. The benefit of the solid composition, the concentrated solution and/or the ready-to-use solution of the present invention is, that the concentration as well as the disinfecting effect remains stable over the time of use.

In a first embodiment of the present invention, a solid composition is provided, comprising:

(a) at least one alkylamine of mono-, di- and/or polyamines selected from the group of:

$$R\text{-}NH\text{-}(CH_2)_rNH_2 \qquad (1a)$$

$$R\text{-}NH\text{-}(CH_2)_r\text{-}N^+H_3\ X^- \qquad (1b)$$

$R\text{-}N^{+}H_2\text{-}(CH_2)_r\text{-}N^{+}H_3 2X^{-}$ (1c),

$R\text{-}NH\text{-}[(CH_2)_rNH]_y\text{-}(CH_2)_m\text{-}NH_2$ (2a)

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y(CH_2)_m\text{-}NH_2\ (H{+}X{-})_n$ (2b)

$R_2\text{-}NY$ (3a)

$R_2\text{-}NY_2^{+}X^{-}$ (3b)

wherein,

R = a linear or branched alkyl residue with 6 to 22 C atoms,

Y = independently represents hydrogen or a methyl group,

X^{-} = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid,

m, r, y = independently represent an integer ranging from 1 to 6,

n = an integer ranging from 1 to 2+y,

(b) ≥ 0 wt.-% to ≤ 35 wt.-% of a water-soluble alkali base and/or earth alkali base,

(c) at least one alkali and/or earth alkali salt of an organic acid,

(d) ≥ 0 wt.-% of an organic acid,

(e) ≥ 0 wt.-% water; and

the amount of all components of the solid composition is selected such that the total weight is 100 wt.-%.

The term “general formula” as used in the specification means the general formula of (1a), (1b), (1c), (2a), (2b), (3a) and/or (3b).

According to the present invention the amines and/or salts according to (a) given above provide an anti-pathogenic effect. Further, the amines and/or salts of the general formula (a) can be also effective as lubricants.

A further preferred embodiment of the present invention is a solid composition wherein ≥ 90% to ≤ 100%, preferably ≥ 94 % to ≤ 100 %, also preferred ≥ 96 % to ≤ 100 % and more preferred ≥ 98% to ≤ 100% of all (a) alkylamine is protonated.

It can be preferred that the amount of non-protonated groups of (a) alkylamine of mono-, di- and/or polyamines is in the range of ≥ 0 wt.-% to ≤ 15 wt.-%, preferably ≥ 0.001 wt.-% to ≤ 10 wt.-%, further preferred ≥ 0.01 wt.-% to ≤ 5 wt.-% and also preferred ≥ 0.1 wt.-% to ≤ 1 wt.-%, based on all components of the solid composition.

According to a further preferred embodiment of the present invention the amount in mol of (d) organic acid is selected so that it is equal to or higher than the amount of non-protonated amine groups of (a) alkylamine of mono-, di- and/or polyamines.

It can be preferred that the amount (b) of at least one water soluble alkali base and/or earth alkali base is in the range of ≥ 0 wt.-% to ≤ 35 wt.-%, ≥ 1 wt.-% to ≤ 25 wt.-%, preferably ≥ 5 wt.-% to ≤ 22 wt.-%, further preferred ≥ 10 wt.-% to ≤ 20 wt.-% and also preferred ≥ 15 wt.-% to ≤ 19 wt.-%, based on all components of the solid composition.

The amount of the water soluble alkali base and/or earth alkali base in the solid composition of the present invention is selected such that after dissolution in water no free alkali base and/or earth alkali base remains and the alkali base and/or earth alkali base has completely react to a salt.

It can be preferred that the amount wt.-% of (d) organic acid is in the range of ≥ 0 wt.-% to ≤ 35 wt.-%, preferably ≥ 0.001 wt.-% to ≤ 32 wt.-%, further preferred ≥ 0.01 wt.-% to ≤ 31 wt.-% and also preferred ≥ 0.1 wt.-% to ≤ 30 wt.-%, based on all components of the solid composition.

All weight % (wt.-%) of the components are calculated on the total amount of the solid composition if not otherwise stated. The total amount of all components of the solid composition does not exceed 100 wt.-%.

The solid composition of the present invention can contain in addition:
(e) water, and/or (f) at least one antifoam agent.

It can be preferred that the solid composition of the present invention consists of the components (a), (b), (c), (d) and (e) water

It can be further preferred that the solid composition of the present invention consists of the components (a), (b), (c), (d), (e) water and (f) antifoam agent, wherein the solid composition contains one component only of each group of (a), (b), (c), (d), (e) and (f).

The present of the components (a), (b), (c), (d), (e) and/or (f) in the solid composition of the present invention is possible because the reaction can be not complete in the solid phase. Thus, in the solid composition of the present invention an alkali or earth alkali base can be present as well as free organic acid.

It can be most preferred that the solid composition of the present invention consists of the components (a), (b), (c), (d), (e) and (f).

The term “water” as used in the specification comprises the use of water and/or deionized water. Deionized water can be preferred.

The term “(a) amine” or “(a) alkylamine” as used in the present specification states for alkylamines of mono-, di- and/or polyamine/s.

According to the present invention it can be preferred that the solid composition comprises (d) at least one organic acid suitable to provide a water-soluble salt of the (a) alkylamine of mono-, di- and/or polyamines.

The solid concentrate products of the present invention are more convenient, safe and economical than concentrated liquid products, because they do not spill or splash, have reduced manufacturing and distribution costs, and require less storage space and have a significant reduced pungent odor compared to concentrated liquids or solid peroxyacid comprising compositions.

All amines, which correspond to the general formula given above, can be produced according to processes known in the literature and/or are available as commercial products.

According to the present invention the residue R of the amines of the general formula given above can be a linear or branched alkyl residue with 6 C atoms to 22 C atoms, preferably 8 C atoms to 20 C atoms, further preferred 10 C atoms to 18 C atoms and also preferred 12 C atoms to 16 C atoms or 14 C atoms. The residue R of the amines of the general formula given above can be saturated, unsaturated, mono- or polyunsaturated. Preferred amines include amines, wherein R is C8 to C18 alkyl, most preferred C8 to C12 alkyl.

In a more preferred embodiment of the present invention the amine can have the formula R-NH-$(CH_2)_r$$NH_2$ (1a), wherein R is a C8 to C18 alkyl and most preferred a C8 to C12 alkyl.

It can be preferred for the amines of the general formula (1a), (1b), (1c), (2a), (2b), (3a) and/or (3b) that m, r, y = independently represent an integer ranging from 2 to 5 or 3 to 4 and most preferred 3.

References herein to a "solid" composition are to those, which are solid below +45° C. Preferably, the solid composition of the present invention may be form stable and/or rigid.

The solid composition may be present in different shapes, for example in form of a block. Depending on the device of the cleaning size, the solid composition can be for example a large cast or cylinder, and most preferred a cast.

The total weight of a single dosage use form of said solid composition of the present invention can be ≥ 0.01 kg to ≤ 1000 kg, preferably ≥ 3 kg to ≤ 3.5 kg and most preferred 3.2 kg. A powder or granulate of the composition is less preferred but also possible.

According to a preferred embodiment of the present invention the solid composition can comprise:

(a) ≥ 5 wt.-% to ≤ 75 wt.-%, preferably ≥ 10 wt.-% to ≤ 50 wt.-% and more preferred ≥ 15 wt.-% to ≤ 35 wt.-% of at least one alkylamine of mono-, di- and/or polyamines selected from the group of:

$R\text{-}NH\text{-}(CH_2)_rNH_2$ (1a)

$R\text{-}NH\text{-}(CH_2)_r\text{-}N^+H_3\ X^-$ (1b)

$R\text{-}N^+H_2\text{-}(CH_2)_r\text{-}N^+H_3 2X^-$ (1c),

$R\text{-}NH\text{-}[(CH_2)_rNH]_y\text{-}(CH_2)_m\text{-}NH_2$ (2a)

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y(CH_2)_m\text{-}NH_2\ (H+X\text{-})_n$ (2b)

$R_2\text{-}NY$ (3a)

$R_2\text{-}NY_2^+X^-$ (3b)

wherein,

R = a linear or branched alkyl residue with 6 to 22 C atoms,

Y = independently represents hydrogen or a methyl group,

X^- = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid,

m, r, y = independently represent an integer ranging from 1 to 6,

n = an integer ranging from 1 to 2+y,

(b) ≥ 0 wt.-% to ≤ 20 wt.-% of a water-soluble alkali base and/or earth alkali base,

(c) > 0 wt.-% to ≤ 60 wt.-%, preferably ≥ 5 wt.-% to ≤ 55 wt.-% and more preferred ≥ 10 wt.-% to ≤ 50 wt.-% of at least one alkali and/or earth alkali salt,

(d) ≥ 0 wt.-% to ≤ 35 wt.-% of at least one organic acid,

(e) ≥ 0 wt.-% to ≤ 35 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 25 wt.-%, further preferred ≥ 0.1 wt.-% to ≤ 20 wt.-%, furthermore preferred ≥ 0.5 wt.-% to ≤ 18 wt.-% and also preferred ≥ 10 wt.-% to ≤ 15 wt.-% water,

(f) ≥ 0 wt.-% to ≤ 15 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 10 wt.-% and more preferred ≥ 0.2 wt.-% to ≤ 5 wt.-% of at least one antifoam agent; wherein

the amount of all components of the solid composition is selected such that the total weight is 100 wt.-%.

According to a further preferred embodiment of the present invention the solid composition can comprise:

(a1) ≥ 5 wt.-% to ≤ 75 wt.-%, preferably ≥ 10 wt.-% to ≤ 50 wt.-% and more preferred ≥ 15 wt.-% to ≤ 35 wt.-% of at least one alkylamine of mono-, di- and/or polyamines selected from the group of:

$R\text{-}NH\text{-}(CH_2)_r\text{-}N^+H_3\ X^-$ (1b)

$R\text{-}N^+H_2\text{-}(CH_2)_r\text{-}N^+H_3 2X^-$ (1c),

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y(CH_2)_m\text{-}NH_2\ (H+X^-)_n$ (2b)

$R_2\text{-}NY_2^+X^-$ (3b)

(a2) ≥ 0 wt.-% to ≤ 15 wt.-%, preferably ≥ 0.001 wt.-% to ≤ 10 wt.-%, further preferred ≥ 0.01 wt.-% to ≤ 5 wt.-% and also preferred ≥ 0. 1 wt.-% to ≤ 1 wt.-% of at least one non-protonated alkylamine of mono-, di- and/or polyamines selected from the group of:

$R\text{-}NH\text{-}(CH_2)_rNH_2$ (1a)

$R\text{-}NH\text{-}[(CH_2)_rNH]_y\text{-}(CH_2)_m\text{-}NH_2$ (2a)

$R_2\text{-}NY$ (3a)

wherein,

R = a linear or branched alkyl residue with 6 to 22 C atoms,

Y = independently represents hydrogen or a methyl group,

X^- = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid,

m, r, y = independently represent an integer ranging from 1 to 6,

n = an integer ranging from 1 to 2+y,

(b) ≥ 0 wt.-% to ≤ 35 wt.-% of a water-soluble alkali base and/or earth alkali base,

(c) > 0 wt.-% to ≤ 60 wt.-%, preferably ≥ 5 wt.-% to ≤ 55 wt.-% and more preferred ≥ 10 wt.-% to ≤ 50 wt.-% of at least one alkali and/or earth alkali salt,

(d) ≥ 0 wt.-% to ≤ 35 wt.-% of at least one organic acid,

(e) ≥ 0 wt.-% to ≤ 35 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 25 wt.-%, further preferred ≥ 0.1 wt.-% to ≤ 20 wt.-%, furthermore preferred ≥ 0.5 wt.-% to ≤ 18 wt.-% and also preferred ≥ 10 wt.-% to ≤ 15 wt.-% water,

(f) ≥ 0 wt.-% to ≤ 15 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 10 wt.-% and more preferred ≥ 0.2 wt.-% to ≤ 5 wt.-% of at least one antifoam agent; wherein

the amount of all components of the solid composition is selected such that the total weight is 100 wt.-%.

According to another preferred embodiment of the present invention the solid composition can comprise:

(a1) ≥ 5 wt.-% to ≤ 75 wt.-%, preferably ≥ 10 wt.-% to ≤ 50 wt.-% and more preferred ≥ 15 wt.-% to ≤ 35 wt.-% of at least one alkylamine of mono-, di- and/or polyamines selected from the group of:

$$R\text{-}NH\text{-}(CH_2)_r\text{-}N^+H_3\ X^- \qquad (1b)$$

(a2) ≥ 0 wt.-% to ≤ 15 wt.-%, preferably ≥ 0.001 wt.-% to ≤ 10 wt.-%, further preferred ≥ 0.01 wt.-% to ≤ 5 wt.-% and also preferred ≥ 0. 1 wt.-% to ≤ 1 wt.-% of at least one non-protonated alkylamine of mono-, di- and/or polyamines selected from the group of:

$$R\text{-}NH\text{-}(CH_2)_r\text{-}NH_2 \qquad (1a)$$

wherein,

R = a linear or branched alkyl residue with 6 to 22 C atoms,

Y = independently represents hydrogen or a methyl group,

X^- = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid,

r = independently represent an integer ranging from 1 to 6,

(b) ≥ 0 wt.-% to ≤ 35 wt.-% of a water-soluble alkali base and/or earth alkali base,

(c) > 0 wt.-% to ≤ 25 wt.-%, preferably ≥ 5 wt.-% to ≤ 22 wt.-% and more preferred ≥ 10 wt.-% to ≤ 20 wt.-% of at least one alkali and/or earth alkali salt,

(d) ≥ 0 wt.-% to ≤ 35 wt.-% of at least one organic acid,

(e) ≥ 0 wt.-% to ≤ 35 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 25 wt.-%, further preferred ≥ 0.1 wt.-% to ≤ 20 wt.-%, furthermore preferred ≥ 0.5 wt.-% to ≤ 18 wt.-% and also preferred ≥ 10 wt.-% to ≤ 15 wt.-% water;

(f) ≥ 0 wt.-% to ≤ 15 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 10 wt.-% and more preferred ≥ 0.2 wt.-% to ≤ 5 wt.-% of at least one antifoam agent; wherein

the amount of all components of the solid composition is selected such that the total weight is 100 wt.-%.

(a) Mono-, di- and/or polyamines

According to the present invention dialkylamines, trialkylamines, alkyldiamines and/or alkyltriamines can be preferred, selected from the group comprising cocopropylenediamine, oleyldipropylenetriamine, tallowdipropylenetriamine, oleylpropylenediamine, tallow-dipropylenetriamine, oleyltripropylenetetramine, N-3-aminopropyl-N-dodecyl-1,3-propane-diamine and/or a salt with X^- thereof.

The anion X^- can be selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid.

Suitable organic acids can be selected from the group comprising acetic acid, formic acid, propionic acid, citric acid, i.e., 2-hydroxy-1,2,3-propanetricarboxylic acid, lactic acid, tartaric acid, glycolic acid, salicylic acid, fumaric acid, malic acid, itaconic acid, ascorbic acid, succinic acid and benzoic acid. Particularly preferred are acetic acid, propionic acid and/or formic acid. Most preferred is acetic acid.

Most preferred amines include cocopropylenediamine, N-3-aminopropyl-N-dodecyl-1,3-propanediamine and tallowdipropylenetriamine and a salt with X^- thereof.

According to the present invention the amines of the general formula given above could be presented in a mixture of different alkylamines.

According to the present invention the amines and/or salts thereof of the general formula (a) given above can be used in solutions to provide a reduction of pathogenic germs and a disinfecting and antimicrobial effect.

Further, the amines and/or salts of the general formula (a) given above can be used in solutions as lubricants.

(b) Alkali base and/or earth alkali base

According to the invention, the alkali and/or earth alkali base can be selected from the group comprising sodium, potassium, lithium, magnesium and/or calcium. In a preferred embodiment, the salt is an alkali hydroxide, more preferred NaOH and/or KOH. Most preferred is KOH, because KOH forms with acetic acid potassium acetate. For example,

potassium acetate can remarkably increase the water solubility and/or dissolution characteristics of the solid composition of the present invention.

(c) Alkali and/or earth alkali salt

According to the invention, the kation of the alkali and/or earth alkali salt can be selected from the group comprising sodium, potassium, lithium, magnesium and/or calcium. In a preferred embodiment the salt is an alkali salt, more preferred a potassium salt. Most preferred is the salt potassium acetate, because this salt remarkably increases the water solubility or dissolution characteristics of the solid composition of the present invention.

(d) Organic acid

The solid composition of the present invention includes at least one organic acid. Suitable organic acid and/or mixture of organic acids is/are selected from the group comprising acetic acid, formic acid, propionic acid, citric acid, i.e., 2-hydroxy-1,2,3-propanetricarboxylic acid, lactic acid, tartaric acid, glycolic acid, salicylic acid, fumaric acid, malic acid, itaconic acid, ascorbic acid, succinic acid and benzoic acid. Particularly preferred are acetic acid, propionic acid and/or formic acid. Most preferred is acetic acid. The acid may be added as diluted solution, e.g. as 80% diluted solution, to the mixture to make the solid composition of the present invention.

(e) Water

The solid composition according to the present invention can contain water. For example, components of the solid composition such as salt and/or acid can comprise water and/or water of crystallisation. Water can be added to a mixture of the components of the solid composition to reach a total of 100 wt.-% (percent by weight), based on the total weight of the solid composition. The water content can be in the range of ≥ 0 wt.-% to ≤ 25 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 20 wt.-%, further preferred ≥ 0.1 wt.-% to ≤ 15 wt.-%, furthermore preferred ≥ 0.5 wt.-% to ≤ 10 wt.-% and also preferred ≥ 1 wt.-% to ≤ 5 wt.-%.

(f) Antifoam agent

The solid composition of the present invention can comprise an additive like an antifoam agent. The antifoam agent is preferably selected from the variety of antifoams such as those of the silicon type and/or polypropylene glycol type. Antifoam agents can be selected from the group comprising silicones and/or other defoamers like defoaming surfactants.

Suitable silicone based antifoam agents have a silicone compound as the active component. These are delivered as oil or a water based emulsion. The silicone compound consists

preferably of an hydrophobic silica dispersed in a silicone oil. The silicone compound might also contain silicone glycols and other modified silicone fluids.

Suitable ethylene glycol (EO) and/or propylene glycol (PO) based antifoam agents contain polyethylene glycol and polypropylene glycol copolymers. They are delivered as oils, water solutions, or water based emulsions. EO/PO copolymers normally have good dispersing properties

It can be preferred that the antifoam agent is of the silicon type and polypropylene glycol type. In particular preferred is treated-amorphous silica. Preferred treated-amorphous silica is available under the trademark DOW CORNING® 544 Antifoam Compound from the company DOW.

A more preferred embodiment of the present invention is a composition comprising a mixture of (a) protonated-alkylamine, (c) salt and (d) organic acid in an amount effective to provide after dissolution with water a concentrated solution or a ready-to-use solution having a pH of equal or higher 7 up to lower or equal 13. Such solid composition has an improved effect with regard to solubility.

A most preferred embodiment of the present invention is a composition comprises of a mixture of (a) protonated-alkylamine, (c) salt, (e) water and (f) antifoam agent and the amount of (d) organic acid is selected so that all amine-groups of the (a) alkylamine are theoretically protonated or the (d) organic acid is added in a slight excess thereof. Such solid compositions have a more improved effect with regard to solubility.

In a further embodiment of the invention the solid composition according to the invention may comprise additional adjuvants or auxiliary agents such as amphoteric surfactants, perfumes, kationic- or anionic- tensides, builders like inorganic phosphates and/or zeolithe.

Auxiliaries may be present in an amount of ≥ 0 wt.-% to ≤ 10 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 5 wt.-% and more preferred ≥ 0.5 wt.-% to ≤ 2 wt.-%, based on the total amount of the solid composition. All possible additives listed may be used either individually or in the form of mixtures to solve the problem addressed by the invention.

Amphoteric surfactant/s may be used to support the formation of a clear and stable ready-to-use solution. The Amphoteric surfactant/s may be selected from the group comprising of sodium 3-[2-carboxyethyl(dodecyl)amino]propanoate respectively sodium laurimino-

dipropionate, Isotridecaanol or Trideceth-10, fatty alcohol alkoxylate, Alkylethercarboxylic acid, and/or disodium cocoamphodiacetate. Preferred is sodium lauriminodipropionate.

Another object of the present invention is directed to a method of manufacture of a solid composition of the present invention.

A solid composition of the present invention can be obtained by mixing:

(a) at least one alkylamine of mono-, di- and/or polyamines selected from the group of:

$R\text{-}NH\text{-}(CH_2)_r\text{-}NH_2$ (1a)

$R\text{-}NH\text{-}(CH_2)_r\text{-}N^+H_3\ X^-$ (1b)

$R\text{-}N^+H_2\text{-}(CH_2)_r\text{-}N^+H_3 2X^-$ (1c),

$R\text{-}NH\text{-}[(CH_2)r\text{-}NH]_y\text{-}(CH_2)_m\text{-}NH_2$ (2a)

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y(CH_2)_m\text{-}NH_2\ (H{+}X^-)_n$ (2b)

$R_2\text{-}NY$ (3a)

$R_2\text{-}NY_2^+X^-$ (3b)

wherein,

R = a linear or branched alkyl residue with 6 to 22 C atoms,

Y = independently represents hydrogen or a methyl group,

X^- = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid,

m, r, y = independently represent an integer ranging from 1 to 6,

n = an integer ranging from 1 to 2+y,

(b) ≥ 0 wt.-% of a water-soluble alkali base and/or earth alkali base,

(c) ≥ 0 wt.-% of an alkali and/or earth alkali salt of an organic acid,

(d) ≥ 0 wt.-% of an organic acid,

(e) ≥ 0 wt.-% of water, and

(f) ≥ 0 wt.-% of antifoam agent.

Preferably, all amine-groups of the (a) alkylamine can be theoretically protonated and/or (d) organic acid can be added in an excess thereof.

Such solid compositions may have a more improved effect with regard to solubility.

Preferably, the process of manufacture a solid composition comprises the steps of mixing:

(a) 5 wt.-% to 75 wt.-%, preferably 10 wt.-% to 50 wt.-% and more preferred 15 wt.-% to 35 wt.-% of at least one alkylamine of mono-, di- and/or polyamines selected from the group of:

$R\text{-}NH\text{-}(CH_2)r\text{-}NH_2$ (1a)

$R\text{-}NH\text{-}(CH_2)_r\text{-}N^+H_3\ X^-$ (1b)

$R\text{-}N^+H_2\text{-}(CH_2)_r\text{-}N^+H_3 2X^-$ (1c),

$R\text{-}NH\text{-}[(CH_2)r\text{-}NH]_y\text{-}(CH_2)_m\text{-}NH_2$ (2a)

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y(CH_2)_m\text{-}NH_2\ (H+X^-)_n$ (2b)

$R_2\text{-}NY$ (3a)

$R_2\text{-}NY_2^+X^-$ (3b)

wherein,

R = a linear or branched alkyl residue with 6 to 22 C atoms,

Y = independently represents hydrogen or a methyl group,

X^- = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid,

m, r, y = independently represent an integer ranging from 1 to 6,

n = an integer ranging from 1 to 2+y,

(b) ≥ 0 wt.-% of a water-soluble alkali base and/or earth alkali base,

(c) ≥ 0 wt.-% to ≤ 60 wt.-%, preferably ≥ 5 wt.-% to ≤ 55 wt.-% and more preferred ≥ 10 wt.-% to ≤ 50 wt.-% of at least one alkali and/or earth alkali salt,

(d) ≥ 2 wt.-% to ≤ 40 wt.-%, preferably ≥ 3 wt.-% to ≤ 38 wt.-% and more preferred ≥ 5 wt.-% to ≤ 35 wt.-% of at least one organic acid,

(e) ≥ 0 wt.-% to ≤ 35 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 25 wt.-%, further preferred ≥ 0.1 wt.-% to ≤ 20 wt.-%, furthermore preferred ≥ 0.5 wt.-% to ≤ 18 wt.-% and also preferred ≥ 10 wt.-% to ≤ 15 wt.-% water,

(f) ≥ 0 wt.-% to ≤ 15 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 10 wt.-% and more preferred ≥ 0.2 wt.-% to ≤ 5 wt.-% antifoam agent; and the amount of all components of the solid composition is selected such that the total weight is 100 wt.-%.

All components that can be used in that process of manufacture are already defined for the solid composition of the present invention.

In more detail, the process of manufacture of a solid composition of the present invention comprises a method including the steps of:

i) Melting the (a) alkylamine,

ii) Adding water to a mixing vessel and setting the temperature at ≥ 60° C to < 100° C,

iii) Adding the (c) salt to the mixing vessel;
iv) Adding the melted (a) alkylamine to the mixing vessel,
v) Adding optional (e) water to the mixing vessel,
vi) Adding optional (f) antifoam to the mixing vessel,
vii) Adding (d) organic acid to the mixing vessel,
viii) Mixing the components, preferably mixing until a homogeneous mixture is obtained,
ix) Cooling down the obtained mixture to form the solid composition.

The sequence of adding the components to obtain the mixture can be altered in the process of manufacture.

Another object of the present invention is directed to a concentrated solution as well as to a ready-to-use solution.

The concentrated solution can be diluted further to obtain the ready-to-use solution. An advantage of the solid composition is, that the handling of a solid composition of the present invention is safer compared to the concentrated solution. In a first step, the solid composition can be placed into a container. In a second step, the solid composition can be dissolved to a concentrated solution by adding water into the container. In a third step, the concentrated solution can be diluted to a ready-to-use solution by adding water. However, the solid composition can be directly diluted in a container to a ready-to-use solution.

A preferred embodiment of the present invention is a concentrated solution as well as a ready-to-use aqueous solution obtained from the solid composition of the present invention.

The concentrated aqueous solution of the present invention needs to be diluted further with water before it can be used as a cleaning agent, disinfection agent and/or as a lubricant. However, the amount of water added to the solid composition can differ with respect to its purpose of use.

A preferred embodiment of a concentrated solution according to the present invention comprises the components (a), (c) to (f) of the solid composition of the invention in an amount of:

(a) ≥ 0.9 wt.-% to ≤ 13.5 wt.-%, preferably ≥ 1.7 wt.-% to ≤ 8.8 wt.-% and more preferred ≥ 2.6 wt.-% to ≤ 6.2 wt.-% of at least one alkylamine of mono-, di- and/or polyamines,
(c) ≥ 0.8 wt.-% to ≤ 10.5 wt.-%, preferably ≥ 1.7 wt.-% to ≤ 10.0 wt.-% and more preferred ≥ 2.6 wt.-% to ≤ 8.8 wt.-% of at least one alkali and/or earth alkali salt,

(d) ≥ 0 wt.-% to ≤ 10.6 wt.-%, preferably ≥ 0.8 wt.-% to ≤ 8.8 wt.-% and more preferred ≥ 1.7 wt.-% to ≤ 8.0 wt.-% of at least one organic acid,

(e) ≥ 20 wt.-% to ≤ 99.99 wt.-%, preferably ≥ 50 wt.-% to ≤ 95 wt.-% and more preferred ≥ 80 wt.-% to ≤ 87 wt.-% of water;

(f) ≥ 0 wt.-% to ≤ 2.6 wt.-%, preferably ≥ 0.02 wt.-% to ≤ 1.7 wt.-% and more preferred ≥ 0.03 wt.-% to ≤ 0.9 wt.-% of at least one antifoam agent; and the amount of all components of the concentrated solution is selected such that the total weight is 100 wt.-%.

It is clear for an expert that the components mentioned above form in solution anions and cations. Thus, the components (a) of alkylamine of mono-, di- and/or polyamines are at least partly protonated by (d) the organic acid in the ready-to-use solution.

The ready-to-use aqueous solution of the present invention can be used as a cleaning agent, disinfection agent and/or lubricant.

A preferred embodiment of a ready-to-use solution according to the present invention comprises the components (a), (c) to (f) of the solid composition of the invention in an amount of:

(a) ≥ 0.0001 wt.-% to ≤ 13.5 wt.-%, preferably ≥ 0.0005 wt.-% to ≤ 8.8 wt.-% and more preferred ≥ 0.005 wt.-% to ≤ 6.2 wt.-% of at least one alkylamine of mono-, di- and/or polyamines,

(c) ≥ 0.0001 wt.-% to ≤ 10.5 wt.-%, preferably ≥ 0.0005 wt.-% to ≤ 10.0 wt.-% and more preferred ≥ 0.005 wt.-% to ≤ 8.8 wt.-% of at least one alkali and/or earth alkali salt,

(d) ≥ 0 wt.-% to ≤ 10.6 wt.-%, preferably ≥ 0.0005 wt.-% to ≤ 8.8 wt.-% and more preferred ≥ 0.003 wt.-% to ≤ 8.0 wt.-% of at least one organic acid,

(e) ≥ 20 wt.-% to ≤ 99.99 wt.-%, preferably ≥ 50 wt.-% to ≤ 95 wt.-% and more preferred ≥ 80 wt.-% to ≤ 87 wt.-% of water

(f) ≥ 0 wt.-% to ≤ 2.6 wt.-%, preferably ≥ 0.00005 wt.-% to ≤ 1.7 wt.-% and more preferred ≥ 0.0001 wt.-% to ≤ 0.9 wt.-% of at least one antifoam agent; and the amount of all components of the ready-to-use solution is selected such that the total weight is 100 wt.-%.

It is clear for an expert that the components mentioned above form anions in solution and cations. Thus, the components (a) of alkylamine of mono-, di- and/or polyamines are at least partly protonated by (d) the organic acid in the ready-to-use solution.

It can be preferred that the solid composition, the concentrated solution and/or the aqueous ready-to-use solution of the present invention are essentially free of peroxides and/or peracids components and preferably free of peroxides and peracids.

In the context of the invention, the term "essentially free of peroxides, peracids " refers to a solid composition, a concentrated solution and/or a ready-to-use solution that is produced without the intentional inclusion of any peroxide and/or peracid containing and/or forming components and preferably free of peroxides and peracids containing and/or forming components.

In one embodiment of the present invention, the solid composition, a concentrated solution and/or a ready-to-use solution may contain ≤ 0.5 percent by weight of peracid containing components, even less than about 0.1 percent by weight peracid containing components, based on the total weight of the solid composition, of the total weight concentrated solution or the total weight of the ready-to-use solution. Nevertheless, most preferred is a solid composition, a concentrated solution and/or ready-to-use solution that is free of any peroxide and/or peracid and preferably free of peroxides and peracids.

In more detail, a concentrated solution can be obtained from a solid composition of the present invention by a method including the steps of:

(i) Positioning a solid composition according to the invention in a product dispensing chamber that is connected to a water source,

(ii) Preparing a concentrated solution by dispensing water into the dispensing chamber to dissolve the solid composition, preferably completely dissolving the solid composition in the dispensing chamber.

Further, the method can comprise the additional steps of:

(iii) Flushing-out said concentrated solution, preferably step-wise,

(iv) Dissolving said concentrated solution by adding additional water to obtain a ready-to-use solution,

(v) Transmitting the ready-to-use solution to the place of operation.

A ready-to-use solution can be obtained from a solid composition of the present invention by a method including the steps of:

(i) Positioning a solid composition according to the invention in a product dispensing chamber that is connected to a water source,

(ii) Preparing a ready-to-use solution by dispensing water into the dispensing chamber to dissolve the solid composition, preferably completely dissolving the solid composition in the dispensing chamber

(iii) Flushing-out said ready-to-use solution, preferably step-wise,

(iv) Transmitting said ready-to-use solution to the place of operation.

Preferably, a ready-to-use solution can be obtained from a solid composition of the present invention by a method including the steps of:

(i) Positioning at least one solid composition in a product dispensing chamber that is connected to a water source,

(ii) Obtaining a concentrated solution by dispensing water into the dispensing chamber to dissolve the solid composition, preferably completely dissolving the solid composition in the dispensing chamber,

(iii) Flushing-out the concentrated solution, preferably step-wise, and

(iv) Diluting said concentrated solution to a ready-to-use solution for use at least at the place of operation.

The dispensing chamber may receive at least one or more solid compositions, preferably in a molded solid form. It can be preferred that the water in the dispensing chamber is recirculated for completely dissolving the solid composition of the invention to obtain a concentrated solution and/or a ready-to-use solution. However, it is preferred to provide a concentrated solution in said container.

It is obvious that the advantages of the solid composition according to cleaning and disinfection effects as well as lubricating can be obtained when the solid composition is dissolved in water as necessary for the devices to be cleaned, disinfected and/or lubricated.

The solid composition can be dissolved in service water, deionized water or such like at a sufficient proportion to obtain the concentrated solution and/or diluted ready-to-use solution set forth above.

According to a preferred embodiment, the dispensing chamber may have the size for receiving at least one solid composition with a total weight of 50 g to 100 Kg, preferably 1 Kg to 50 Kg and further preferred 2 Kg to 5 Kg and more preferred 3 Kg to 4 Kg. Then, water is added, preferably step-wise to dissolve the solid composition.

Accordingly, a ready-to-use solution can be obtained by diluting the solid composition according to the invention with water in a ratio of 1 : 3 to 1 : 3000, preferably in a ratio of 1 : 100 to 1 : 1000 for disinfection and cleaning purposes and preferably 1:20 to 1:1000 for lubricating purposes. Most preferred 1 : 150 to 1 : 500 for disinfection and cleaning and 1 : 150 to 1 : 600 for lubricating purposes. For disinfecting purposes a concentrated solution

obtained from the solid composition will be further diluted at the time of use, e.g. in a milking robot.

For a ready-to-use solution it can be further preferred that the solid composition is dissolved in water in a ratio of 1 : 200 to 1 : 3000, preferably 1:50 to 1:2000 and more preferred 1 : 10 to 1 : 1000 for lubricating purposes.

For example, the concentration of the solid composition of the invention in the ready-to-use solution can be ≥ 1.0 to ≤ 1.5 g of solid composition dissolved in ≥ 250 g to ≤ 2000 g water (water hardness 0-32°dh).

In order to provide a cleaning, disinfection and/or lubricant concentrated solution it may be preferred that about 1 Kg of solid composition is solved in about 2 liter to 10 liter, preferably 3 liter to 5 liter water.

In order to provide a cleaning and disinfection ready-to-use solution it may be preferred that about 1 Kg of solid composition is dissolved in about 2 liter to 500 liter, preferably 100 liter to 300 liter water.

In order to provide a lubricant solution it may be preferred that about 1 Kg of solid composition is dissolved in about 100 liter to 3000 liter, preferably 500 liter to 2000 liter water.

The amount of concentrated solution and/or ready-to-use solution that is flushed-out from the dispensing chamber can be regulated. Depending on the desired need the concentrated solution and/or ready-to-use solution can be flushed-out at once or portion-wise. Preferably, a concentrated solution is flushed-out from the dispensing chamber and is subsequently diluted to the ready-to-use solution. Instead of flushed-out the concentrated solution and/or ready-to-use solution can be sprayed.

In case of spraying portion-wise, for example 15 liter of a concentrated solution and/or a ready-to-use solution, the spraying cycle takes place for about 4 h to 5 h and spraying is for 1 min to 2 min and stop for 20 sec to 30 sec before repeating the process.
Preferably, the temperature of the concentrated solution and/or the ready-to-use solution may remains constant and is at least > 0° C.

The solid composition of the present invention forms after complete dissolution with water a ready-to-use solution, which is stable and clear at 45° C and preferably at 5°C. Preferably, the concentrated aqueous solution is stable and clear in the range of 5°C to 45° C.

The term “stable” means that the concentrated solution and/or the ready-to-use solution does not show a phase separation for a time period of at least 48 hours, preferably of at least 1 week at a temperature of 35° C and preferably at a temperature of 5°C for lubrication application. For other applications even at 0° C a stable concentrated solution and/or ready-to-use solution can be achieved.

The term “clear” means that the concentrated solution and/or ready-to-use solution appears transparent for a user. Preferably, the concentrated solution and/or ready-to-use solution of the present invention has a water-like appearance.

Water like appearance means that the concentrated solution and/or ready-to-use solution seems to be transparent viewed by a user, is not opal and shows practically no or no dispersed particles for a time period of at least 48 hour, preferably of at least 1 week at temperature of 23° C and preferably at 5°C.

Viewed by a user means, that the concentrated solution and/or ready-to-use solution is observed with the user eyes without any further optical instrument.

Further, the clearness as well as transparency of a concentrated solution and/or a ready-to-use solution can be measured at 7°C by the photometer of Dr. Lange NEPHLA Photometer. Using this method the term “clear” can be defined as lower or equal 2 FNU whereby FNU is a DIN EN 27027 or ISO 7027 calibration with Formazin-DIN.

Still an object of the invention is directed to the use of the solid composition, the concentrated solution and/or the ready-to-use solution.

The solid composition, the concentrated solution and/or the ready-to-use solution can be used for cleaning and disinfecting of beverage, foodstuff and other residues containing and/or contacting facilities.

In particular, the solid composition, the concentrated solution and/or the ready-to-use solution can be used for cleaning and disinfection of food and/or beverage container, medical instruments, hard surfaces and/or soft surfaces as well as a lubricant.

The lubricant can be used in the food and beverage industry, especially in automatic chain and belt lubricating installations. In particular, the ready-to-use solution obtained from the solid composition and/or the concentrated solution can be used for lubricating chain belts and/or filling facilities for containers receiving beverages, foodstuffs or other materials whereby the containers are conveyed on conveying devices and brought into contact with an aqueous ready-to-use solution of a solid composition according to the invention. The grade of aqueous dilution of the lubricant composition may differ with respect to the materials of the band-conveyor systems to be lubrified, such as stainless steel and/or plastic or there like.

The conveying devices and/or the devices connected thereto can be cleaned and/or disinfected at preselected time intervals and without interrupting the filling and conveying operation by using the solution for cleaning and/or disinfecting as well as lubricated, wherein the ready-to-use solution differs in concentration from the lubricant ready-to-use solution. For example, a concentrated solution of the present invention can be used as at least one source and depending of its place of use the ready-to-use solution can then be individually diluted to its desired concentration.

It may be preferred that the ready-to-use solution is a cleaning, disinfection agent and lubricant at once. With other words, the ready-to-use solution may provide a cleaning, disinfection and lubrication effect at the same time. However, the solid composition according to the invention with all advantages for storage, transport and hazardous can also be used as lubricating agent only.

Most preferred is the use of the solid composition, the concentrated solution and/or the ready-to-use solution for cleaning and disinfecting of milk containing and/or contacting facilities, such as present on a dairy plant, for example a milking device comprising milk vessel and/or milking robots.

A milking device can be cleaned and disinfected by providing a concentrated solution from a solid composition of the present invention. For example, a solid composition of the present invention of 3.2 kg can be placed in a dispensing container. Into the container about 15 l water is added and recirculated to completely dissolve said solid capsule. The water to dissolve the solid composition of the present invention is used in a closed loop. The solid capsule is dissolved in water for a cycle of 1 min to 2 min. Then, the water is flushed-out and returned through a spraying-nozzle with stop intervals of 20 sec to 30 sec, whereby the

temperature of the water remains constant and is at least ≥ 5 °C. The recirculation of the concentrated solution ensures that the solution remains homogeneous.

A suitable product dispenser is SOLVEXX CUBE available from ECOLAB®.

The concentrated solution can be further diluted in the application apparatus, such as milking device or milking robot, to obtain the ready-to-use solution.

Preferably, the ready-to-use solution can be used to clean and/or disinfect the teat brushes of a milking robot.

The present invention may be better understood with reference to the following examples. These examples are intended to be representative of specific embodiments of the invention, and are not intended as limiting the scope of the invention.

Examples

1. Solid compositions according to the invention

Table 1

Ingredient	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Potassium acetate	45	44	46	48	48	48	8.5	0
Potassium hydroxide (50%)	-	-	-	-	-	-	-	37.5
Cocopropylenediamine	25	25	25	25	-	25	50	-
Tallowdipropylenetriamine	-	-	-	-	-	-	-	24.5
N-3-aminopropyl-N-dodecyl-1,3-propanediamine	----	----	---	---	25	---	----	----
Acetic acid (80%)	14	14	14	14	14	---	28	37.5
Formic acid	-	-	-	-	-	14	-	-
Antifoam (Silicon antifoam 544)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Amphoteric surfactant sodium lauriminodipropionate	4.5	4.5	4.5	---	---	---	----	----
Water	11	12	10	12.5	12.5	12.5	13	0

The given data are in weight percent based on the total amount.

According to examples 1 - 7 potassium acetate is used and in example 8 potassium hydroxide (50%) and acetic acid (80%) is used that forms potassium acetate.

2. Concentrated solution according to the invention

Table 2

Solid composition of table 1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Added water in liter	3.2kg in 15l water	3.2kg in 15l water	3.2kg in 15l water	3.2kg in 15l water	3.2kg in 15l water	3.2kg in 15l water	3.2kg in 30l water	3.2kg in 15l water

The added water is the amount of water added to the solid compositions 1 to 8 mentioned in table 1 to obtain the ready-to-use solution.

3. Ready-to-use lubricant solution according to the invention

Table 3

Solid composition of table 1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Added water in liter	100g in 15l water	100g in 15l water	100g in 15l water	100g in 15l water	100g in 15l water	100g in 15l water	100g in 30l water	100g in 15l water

The added water is the amount of water added to the solid compositions 1 to 8 mentioned in table 1 to obtain the ready-to-use lubricant solution.

4. Ready-to-use cleaning and disinfection solution according to the invention

Table 4

Solid composition of table 1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Added water in liter	3.2kg in 250l water	3.2kg in 250l water	3.2kg in 250l water	3.2kg in 250l water	3.2kg in 250l water	3.2kg in 250l water	3.2kg in 500l water	3.2kg in 250l water

The added water is the amount of water added to the solid compositions 1 to 8 mentioned in table 1 to obtain the ready-to-use solution.

1. Quantitative analysis of microorganisms

Determination of microorganisms (CFU/ml) on a used teat brushes of a milking robot.

Teat brushes of a milking robot in use are cleaned with a solution of the present invention (see examples 1 and 2 of table 5) and a test solution containing peroxyacetic acid instead of amine (see example 3 of table 5). Thereafter, the treated brushes are collected each and washed in a vessel containing 200 ml of an inactivator solution (buffered dist. water containing 3 wt.-% Tween80, 0.3 wt.-% lecithin, 0.1 wt.-% histidine, 0.5 wt.-% Na-thiosulfate). A 1 ml probe of the remaining inactivator solution is placed on a culture media. i.e. agar-plate and incubated for 7 days at 30°C (standard agar).

Table 5

No.	Ready-to-use composition	Aerobe bacteria [CFU/ml]	Yeast / mould fungus [CFU/ml]
1	cocopropylenediamine 100 ppm 0.018 Gew.-% potassium acetate 0.0056 Gew.-% acetic acid (80%) 0.0002 Gew.-% antifoam (silicon antifoam 544) 0.0018 Gew.-% sodium lauriminodipropionate ad 100 Gew.-% water	1.5×10^4	4 (yeast)
2	cocopropylenediamine 50 ppm 0.009 Gew.-% potassium acetate 0.0028 Gew.-% acetic acid (80%) 0.0001 Gew.-% antifoam (silicon antifoam 544) 0.0009 Gew.-% sodium laurimino dipropionate ad 100 Gew.-% water	8.0×10^4	2.0×10^1 (yeast)
3	POAA 200 ppm 0.1 Gew.-% Hydrogen Peroxide 0.04 Gew.-% acetic acid (80%)	8.0×10^5	4×10^3 (yeast)

	0.005 Gew.-% phosphonic acid 0.02 Gew.-% POAA 0.005 Gew.-% alkylbenzene sulfonic acid Ad 100 Gew.-% water		

POAA stands for peroxyacetic acid. The concentration in ppm means the total concentration of cocopropylenediamine and the in situ produced POAA in the ready-to-use solution, based on the total amount of said solution.

Table 5 clearly shows that a minor concentration of amine (ppm) has an improved disinfection effect compared to a ready-to-use solution containing POAA.

Conclusion

The solid composition and the ready to use composition provide improved cleaning, disinfecting and lubrication properties and show much lower skin irritation and significant reduced pungent odor compared to concentrated liquid or solid peroxyacid comprising compositions. Additionally the solid technology is an economic way of handling chemistry in form of lower packaging volumes, transport volumes and storage.

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. 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. However, it should be understood that many variations and modifications may be made while remaining within the spirit and scope of the invention.

Claims:

1. A solid composition, for use for cleaning, disinfecting and/or lubrication agent, comprising:

(a) at least one alkylamine of mono-, di- and/or polyamines selected from the group of:

$R\text{-}NH\text{-}(CH_2)_r\text{-}NH_2$ (1a)

$R\text{-}NH\text{-}(CH_2)_r\text{-}N^+H_3\ X^-$ (1b)

$R\text{-}N^+H_2\text{-}(CH_2)_r\text{-}N^+H_3 2X^-$ (1c),

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y\text{-}(CH_2)_m\text{-}NH_2$ (2a)

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y(CH_2)_m\text{-}NH_2\ (H+X^-)_n$ (2b)

$R_2\text{-}NY$ (3a)

$R_2\text{-}NY_2^+X^-$ (3b)

wherein,

R = a linear or branched alkyl residue with 6 to 22 C atoms,

Y = independently represents hydrogen or a methyl group,

X^- = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid,

m, r, y = independently represent an integer ranging from 1 to 6,

n = an integer ranging from 1 to 2+y,

(b) ≥ 0 wt.-% to ≤ 35 wt.-% of at least one water-soluble alkali base and/or earth alkali base,

(c) at least one alkali and/or earth alkali salt of an organic acid,

(d) ≥ 0 wt.-% of an organic acid;

(e) ≥ 0 wt.-% water; and

the amount of all components of the solid composition is selected such that the total weight is 100 wt.-%.

2. The composition of claim 1, comprising:

(a) ≥ 5 wt.-% to ≤ 75 wt.-%, preferably ≥ 10 wt.-% to ≤ 50 wt.-% and more preferred ≥ 15 wt.-% to ≤ 35 wt.-% of at least one alkylamine of mono-, di- and/or polyamines selected from the group of:

$R\text{-}NH\text{-}(CH_2)_r\text{-}NH_2$ (1a)

$R\text{-}NH\text{-}(CH_2)_r\text{-}N^+H_3\ X^-$ (1b)

$R\text{-}N^+H_2\text{-}(CH_2)_r\text{-}N^+H_3 2X^-$ (1c),

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y\text{-}(CH_2)_m\text{-}NH_2$ (2a)

$R\text{-}NH\text{-}[(CH_2)_r\text{-}NH]_y(CH_2)_m\text{-}NH_2\ (H+X^-)_n$ (2b)

$R_2\text{-}NY$ (3a)

$R_2\text{-}NY_2^+X^-$ (3b)

wherein,

R = a linear or branched alkyl residue with 6 to 22 C atoms,

Y = independently represents hydrogen or a methyl group,

X^- = an equivalent of an anion, selected from the group comprising an amidosulfonate, nitrate, halide, sulfate, hydrogen carbonate, carbonate, phosphate, hydroxide, carboxylate, and/or organic acid,

m, r, y = independently represent an integer ranging from 1 to 6,

n = an integer ranging from 1 to 2+y,

(b) ≥ 0 wt.-% to ≤ 20 wt.-% of a water-soluble alkali base and/or earth alkali base,

(c) > 0 wt.-% to ≤ 60 wt.-%, preferably ≥ 5 wt.-% to ≤ 55 wt.-% and more preferred ≥ 10 wt.-% to ≤ 50 wt.-% of at least one alkali and/or earth alkali salt,

(d) ≥ 0 wt.-% to ≤ 35 wt.-% of at least one organic acid,

(e) ≥ 0 wt.-% to ≤ 35 wt.-%, preferably ≥ 0.05 wt.-% to ≤ 25 wt.-%, further preferred ≥ 0.1 wt.-% to ≤ 20 wt.-%, furthermore preferred ≥ 0.5 wt.-% to ≤ 18 wt.-% and also preferred ≥ 10 wt.-% to ≤ 15 wt.-% water,

(f) ≥ 0 wt.-% to ≤ 15 wt.-%, preferably ≥ 0.1 wt.-% to ≤ 10 wt.-% and more preferred ≥ 0.2 wt.-% to ≤ 5 wt.-% of at least one antifoam agent; wherein

the amount of all components of the solid composition is selected such that the total weight is 100 wt.-%.

3. The composition of claim 1 or 2, wherein ≥ 90% to ≤ 100%, preferably ≥ 94 % to ≤ 100 %, also preferred ≥ 96 % to ≤ 100 % and more preferred ≥ 98% to ≤ 100% of all (a) alkylamine is protonated.

4. The composition according to any foregoing claim, wherein the alkylamine is a dialkylamine and/or trialkylamine and/or an alkyldiamine and/or an alkyltriamine selected from the group consisting of cocopropylenediamine, oleyldipropylenetriamine, tallow dipropylene triamine, oleylpropylenediamine, tallowdipropylenetriamine, oleyltripropylene tetramine, N-3-aminopropyl-N-dodecyl-1,3-propanediamine.

5. The composition according to any foregoing claim, wherein the kation of the salt and /or the salts is selected from the group consisting of sodium, potassium, lithium, magnesium and/or calcium.

6. The composition according to any foregoing claim, wherein the organic acid is selected from the group comprising acetic acid, formic acid, propionic acid, citric acid, lactic acid,

tartaric acid, glycolic acid, salicylic acid, fumaric acid, malic acid, itaconic acid, ascorbic acid, succinic acid and/or benzoic acid.

7. The composition according to any foregoing claim, wherein the composition comprises an antifoam agent selected from the group of silicon type and/or polypropylene glycol type.

8. The composition according to any foregoing claim, wherein the composition comprises adjuvants or auxiliary agents selected from the group comprising amphoteric surfactants, perfumes, kationic tensides or anionic tensides, builders like inorganic phosphates and/or zeolithe.

9. A concentrated solution or ready-to-use solution for use for a cleaning agent, disinfecting agent and/or lubricant comprising the compounds of the solid composition according to any foregoing claim, wherein said aqueous solution is produced by dissolving the solid composition according to any foregoing claim with water providing a concentrated solution or a ready-to-use solution.

10. A concentrated solution or ready-to-use solution according to claim 9, wherein the concentrated solution or the ready-to-use solution is clear at ≥ 5° C to ≤ 23° C.

11. A concentrated solution according to claim 9 or 10 comprising the components (a) to (f) of claims 1 to 8, in an amount of:
    (a) ≥ 0.9 wt.-% to ≤ 13.5 wt.-%, preferably ≥ 1.7 wt.-% to ≤ 8.8 wt.-% and more preferred ≥ 2.6 wt.-% to ≤ 6.2 wt.-% of at least one alkylamine of mono-, di- and/or polyamines,
    (c) ≥ 0.8 wt.-% to ≤ 10.5 wt.-%, preferably ≥ 1.7 wt.-% to ≤ 10.0 wt.-% and more preferred ≥ 2.6 wt.-% to ≤ 8.8 wt.-% of at least one alkali and/or earth alkali salt,
    (d) ≥ 0 wt.-% to ≤ 10.6 wt.-%, preferably ≥ 0.8 wt.-% to ≤ 8.8 wt.-% and more preferred ≥ 1.7 wt.-% to ≤ 8.0 wt.-% of at least one organic acid,
    (e) ≥ 20 wt.-% to ≤ 99.99 wt.-%, preferably ≥ 50 wt.-% to ≤ 95 wt.-% and more preferred ≥ 80 wt.-% to ≤ 87 wt.-% of water,
    (f) ≥ 0 wt.-% to ≤ 2.6 wt.-%, preferably ≥ 0.02 wt.-% to ≤ 1.7 wt.-% and more preferred ≥ 0.03 wt.-% to ≤ 0.9 wt.-% of at least one antifoam agent; and

    the amount of all components of the concentrated solution is selected such that the total weight is 100 wt.-%.

12. A ready-to-use solution according to claim 9 or 10 comprising the components (a) to (f) of claims 1 to 8, in an amount of:

(a) ≥ 0.0001 wt.-% to ≤ 13.5 wt.-%, preferably ≥ 0.0005 wt.-% to ≤ 8.8 wt.-% and more preferred ≥ 0.005 wt.-% to ≤ 6.2 wt.-% of at least one alkylamine of mono-, di- and/or polyamines,

(c) ≥ 0.0001 wt.-% to ≤ 10.5 wt.-%, preferably ≥ 0.0005 wt.-% to ≤ 10.0 wt.-% and more preferred ≥ 0.005 wt.-% to ≤ 8.8 wt.-% of at least one alkali and/or earth alkali salt,

(d) ≥ 0 wt.-% to ≤ 10.6 wt.-%, preferably ≥ 0.0005 wt.-% to ≤ 8.8 wt.-% and more preferred ≥ 0.003 wt.-% to ≤ 8.0 wt.-% of at least one organic acid,

(e) ≥ 20 wt.-% to ≤ 99.99 wt.-%, preferably ≥ 50 wt.-% to ≤ 95 wt.-% and more preferred ≥ 80 wt.-% to ≤ 87 wt.-% of water,

(f) ≥ 0 wt.-% to ≤ 2.6 wt.-%, preferably ≥ 0.00005 wt.-% to ≤ 1.7 wt.-% and more preferred ≥ 0.0001 wt.-% to ≤ 0.9 wt.-% of at least one antifoam agent; and the amount of all components of the ready-to-use solution is selected such that the total weight is 100 wt.-%.

13. A ready-to-use solution according to claims 9 to 12, wherein the solid composition is dissolved in water in a ratio of 1 : 3 to 1 : 3000, preferably in a ratio of 1 : 100 to 1 : 1000 for disinfection and cleaning purposes; or the solid composition is dissolved in water in a ratio of 1:20 to 1:1000, preferably 1 : 150 to 1 : 600 for lubricating purposes.

14. The method of manufacture of the solid composition of claims 1 to 8 including the steps:

i) Melting the (a) alkylamine,

ii) Adding water to a mixing vessel and setting the temperature at ≥ 60° C to < 100° C,

iii) Adding the (c) salt to the mixing vessel;

iv) Adding the melted (a) alkylamine to the mixing vessel,

v) Adding (d) organic acid to the mixing vessel,

vi) Adding optional (e) water to the mixing vessel,

vii) Adding optional (f) antifoam to the mixing vessel,

viii) Mixing the components, preferably mixing until a homogeneous mixture is obtained,

ix) Cooling down the obtained mixture to form the solid composition.

15. The method of manufacture of the ready-to-use solution of claims 9 to 13 including the steps:

(i) Positioning at least one solid composition in a product dispensing chamber that is connected to a water source,

(ii) Obtaining a concentrated solution by dispensing water into the dispensing chamber to dissolve the solid composition, preferably completely dissolving the solid composition in the dispensing chamber,

(iii) Flushing-out the concentrated solution, preferably step-wise, and

(iv) Diluting said concentrated solution to a ready-to-use solution for use at least at the place of operation.

16. Use of a solid composition according to claims 1 to 8 and/or the concentrated solution according to claims 9 to 13 and/or the ready to use solution according to claims 9 to 13 for cleaning and disinfection of food, beverage, container, medical instruments, hard surfaces and/or soft surfaces, preferably as a lubricant for chain belts, filling facilities for containers receiving beverages and/or foodstuffs and most preferred for milk containing and/or contacting facilities, milking device comprising milk vessel and/or milking robots.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/060438

A. CLASSIFICATION OF SUBJECT MATTER
INV. C11D11/00 C11D3/30 C11D1/40 C11D1/62 C11D3/20
C11D3/00 C10M173/02 C10M105/00 C10M105/60 C11D7/32
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C11D C10M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98/53033 A1 (HENKEL ECOLAB GMBH & CO OHG [DE]; KLUSCHANZOFF HARALD [DE]; SAUTER JOA) 26 November 1998 (1998-11-26)	9-13,16
A	claims examples page 8, paragraph 2 - page 12, paragraph 2 page 14, last paragraph - page 16, paragraph 1	1-8,14

X	WO 2006/020608 A2 (DELAVAL HOLDING AB [US]; AHMED FAHIM U [US]; TRAISTARU N CAMELIA [US]) 23 February 2006 (2006-02-23) the whole document	9-13,16

A	WO 91/10514 A1 (HENKEL KGAA [DE]) 25 July 1991 (1991-07-25) the whole document	1-16

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 April 2011	20/04/2011

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/060438

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9853033 A1	26-11-1998	AU 7765798 A	11-12-1998
		DE 19721602 A1	26-11-1998
		ZA 9804374 A	22-11-1999
WO 2006020608 A2	23-02-2006	AU 2005272935 A1	23-02-2006
		BR PI0513333 A	06-05-2008
		CA 2576999 A1	23-02-2006
		CN 101031634 A	05-09-2007
		EP 1791941 A2	06-06-2007
		JP 2008510033 T	03-04-2008
		NZ 553326 A	26-11-2010
		RU 2374313 C2	27-11-2009
		US 2008015134 A1	17-01-2008
		US 2006035808 A1	16-02-2006
WO 9110514 A1	25-07-1991	AT 121321 T	15-05-1995
		DE 4000982 A1	18-07-1991
		DE 59105274 D1	24-05-1995
		DK 0511269 T3	04-09-1995
		EP 0511269 A1	04-11-1992
		ES 2071294 T3	16-06-1995