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(54) **SUPER-CONCENTRATED DILUTABLE MANUAL DISHWASHING DETERGENT COMPOSITION**

(57) The present invention relates to concentrates to be diluted with water for hard surface cleaning purposes, in particular manual dishwashing purposes, comprising at least one electrolyte salt in an amount of about 0.05

to about 10 wt.-%. The present invention further relates to the use thereof as well as to a method of preparation, which comprises diluting the concentrate with water.

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Description

[0001] The present invention relates to concentrates to be diluted with water for hard surface cleaning purposes, in particular manual dishwashing purposes, comprising at least one electrolyte salt in an amount of about 0.05 to about 10 wt.-%. The present invention further relates to the use thereof as well as to a method of preparation, which comprises diluting the concentrate with water.

[0002] To minimize packaging, storage and transport costs, many products in the homecare sector are now offered as concentrates, which contain a higher level of washing- and cleaning-active ingredients than conventional products. The concentrates are either used by the consumer directly for washing or cleaning, in which case a lower quantity corresponding to the concentration is required, or they are first diluted with a specified quantity of water and only then applied like a conventional product. In a number of countries, particularly countries in which the majority of people has low income, concentrates are offered, which, after dilution with water, are used by the consumer in the same way as conventional hand dishwashing detergents. Washing and cleaning compositions provided in the form of concentrates thus constitute an excellent solution for low-income consumers seeking financial leniency, since the production, packaging, transport and storage of concentrates is less costly compared to conventional product forms.

[0003] For exactly those reasons, concentrates are also appealing to sustainability-driven consumers, who make the reduction of emission at least one of their priorities when making shopping decisions.

[0004] However, in addition to any of the aforementioned advantages that can be associated with concentrates, a respective product must nonetheless fulfill a complex profile of requirements in order to find acceptance with consumers. In other words, in addition to the primary washing and cleaning effect as well as transport and storage stability, consumers expect not only an attractive appearance, a pleasant fragrance and good skin compatibility, but also, in particular, easy handling and dosing. For this reason, in a number of applications, such as manual dishwashing or the cleaning of other hard surfaces, consumers prefer products with an increased viscosity (compared to conventional, i.e. non-concentrated liquid products), which can be dosed more accurately and run more slowly on inclined and, in particular, vertical surfaces, i.e. act longer on the surface to be cleaned.

[0005] However, if the diluted concentrate is to have a sufficiently increased viscosity, this usually means that the viscosity of the undiluted concentrate is still much higher and, accordingly, that the handling properties and solubility of the concentrate are hardly or no longer acceptable.

[0006] Even though a plethora of liquid cleaning compositions in the form of concentrates is known in the art and widely marketed, the need for improved compositions, which one the hand are easily flowable in concentrated form and on the other hand readily self-thicken upon dilution with water to a degree that is perceived as both functional and easy-to-handle by the consumer, remains.

[0007] This objective has been solved by the present inventors, who have surprisingly found that the addition of at least one electrolyte salt in a certain amount provides for the desired properties in terms of viscosity of the concentrated and diluted product form.

[0008] Therefore, in a first aspect, the present invention relates to a liquid composition, particularly a manual dishwashing detergent composition, said composition being a concentrate to be diluted with water while maintaining or increasing viscosity, characterized in that it comprises at least one electrolyte salt selected from the group consisting of alkali metal salts and/or alkaline earth metal salts of an inorganic acid, preferably an inorganic acid selected from the group consisting of the hydrohalic acids, nitric acid and sulfuric acid, more particularly the chlorides and sulfates in an amount of about 0.05 to about 10 wt.-%, preferably about 0.5 to about 5 wt.-%, based on the total weight of the liquid composition.

[0009] The present invention further relates to the use of a liquid composition as disclosed herein for the cleaning of hard surfaces, particularly for the manual cleaning of dishes, and to the use of a liquid composition as disclosed herein for the preparation of a dilute aqueous hard surface cleaning composition, particularly for the preparation of a dilute manual dishwashing detergent composition.

[0010] In yet another aspect, the present invention also relates to a method for the preparation of a dilute aqueous hard surface cleaning composition, particularly a dilute manual dishwashing detergent composition, characterized in that a liquid composition as disclosed herein is diluted with about 1 to about 8 parts, preferably about 1.5 to about 7 parts, more preferably about 2 to about 7 parts, particularly about 2 to about 4 parts of water, based on the volume of the liquid composition.

[0011] Preferred embodiments are set out in the dependent claims.

[0012] When wt.-% values are given, they are based on the total weight of the liquid composition, except explicitly stated otherwise. Numerical ranges given in the format "from x to y" include the above values. When multiple preferred numerical ranges are given in this format, it is understood that all ranges resulting from the combination of the various endpoints are also included.

[0013] "About", as used herein in relation to a numerical value, means said value $\pm 10\%$, preferably $\pm 5\%$.

[0014] The term "liquid", as used herein, refers to compounds or mixtures of compounds that are flowable and pourable

at room temperature (about 15 °C to about 25 °C).

[0015] In the present specification, the terms "a" and "an" and "at least one" are the same as the term "one or more" and can be employed interchangeably.

[0016] "One or more", as used herein, relates to at least one and comprises 1, 2, 3, 4, 5, 6, 7, 8, 9 or more of the referenced species. Similarly, "at least one," as used herein, includes but is not limited to 1, 2, 3, 4, 5, 6, and more. With respect to an ingredient, it refers to the type of ingredient and not to the absolute number of molecules. "At least one surfactant" thus means, for example, at least one type of surfactant, meaning that one type of surfactant or a mixture of several different surfactants may be meant. Together with weight indications, the indication refers to all compounds of the indicated type contained in the composition/mixture, i.e. that the composition does not contain any further compounds of this type beyond the indicated amount of the corresponding compounds.

[0017] Where reference is made herein to molar masses, this information always refers to the number-average molar mass M_n , unless explicitly stated otherwise. The number average molar mass can be determined, for example, by gel permeation chromatography (GPC) according to DIN 55672-1:2007-08 with THF as eluent. The weight average molecular weight M_w can also be determined by GPC as described for M_n .

[0018] Whenever alkaline earth metals are mentioned in the following as counterions for monovalent anions, this means that the alkaline earth metal is naturally present only in half the amount of substance-sufficient for charge balance - as the anion.

[0019] In the context of the present invention, fatty acids or fatty alcohols or derivatives thereof - unless otherwise indicated - are representative of branched or unbranched carboxylic acids or alcohols or derivatives thereof preferably having 6 to 22 carbon atoms. The former are preferred for ecological reasons, in particular because of their vegetable basis as being based on renewable raw materials, without, however, limiting the teaching according to the invention to them. In particular, the oxo-alcohols obtainable, for example, according to the ROELEN oxo-synthesis or their derivatives can also be used accordingly.

[0020] INCI means that the following or preceding name is a name according to the International Dictionary of Cosmetic Ingredients of The Cosmetic, Toiletry, and Fragrance Association (CTFA). The indication CAS means that the following sequence of numbers is a designation of the Chemical Abstracts Service.

[0021] The liquid compositions according to the present invention may be referred to as "homecare compositions" or "household cleaners". Household cleaners within the meaning of the present invention are, for example, cleaning agents for cleaning hard surfaces, such as window cleaners, bath cleaners, WC cleaners or dishwashing detergents, including hand dishwashing detergents and dishwashing detergents for machine use. Particularly preferably, the liquid compositions disclosed herein are manual dishwashing detergent compositions.

[0022] According to the present invention, the liquid compositions are in the form of concentrates to be diluted with water while maintaining or increasing their viscosity.

[0023] Viscosity maintenance in the sense of the teaching according to the invention also includes a decrease in viscosity which is not significant for the user, i.e. a decrease in the viscosity value determined as described below by not more than 50 %, preferably not more than 30 %, in particular not more than 10 % and particularly preferably not more than 5 %.

Electrolyte Salts

[0024] The liquid compositions of the present invention comprise at least one electrolyte salt. Electrolyte salts in the context of the present invention are salts which break up into their ionic constituents in the water-based composition according to the invention. Preferred salts are the salts, more particularly alkali metal and/or alkaline earth metal salts, of an inorganic acid, preferably an inorganic acid from the group consisting of the hydrohalic acids, nitric acid and sulfuric acid, more particularly the chlorides and sulfates. According to various embodiments, the at least one electrolyte salt is selected from the group consisting of alkali metal salts, preferably from the group consisting of alkali metal chlorides and sulfates, more preferably from the group consisting of alkali chlorides, particularly from the group consisting of NaCl and KCl, and mixtures thereof. Another suitable electrolyte salt is magnesium sulfate, more particularly the $MgSO_4 \cdot 7H_2O$ also known as Epsom salt and occurring as the mineral epsomite. According to the invention, an electrolyte salt may also be used in the form of its corresponding acid/base pair, for example hydrochloric acid and sodium hydroxide instead of sodium chloride.

[0025] According to the present invention, the electrolyte salt is present in an amount of about 0.05 to about 10 wt.-%, preferably about 0.5 to about 5 wt.-%, for instance, but without limitation, in an amount of about 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5, 2, 3, 4 or 5 wt.-%, based on the total weight of the liquid composition.

Surfactants

[0026] The liquid composition according to the present invention preferably further comprises at least one detergent

surfactant. In various embodiments, the liquid composition comprises at least one surfactant, preferably at least two surfactants, selected from the group consisting of anionic surfactants, nonionic surfactants and amphoteric surfactants.

[0027] The composition according to the invention preferably contains surfactants in a total quantity of normally 0.5 to 80 wt.-%, preferably 1 to 70 wt.-%, more preferably 5 to 60 wt.-%, most preferably 10 to 50 wt.-% and, in one most particularly preferred embodiment, 10 to 40 wt.-%, for example 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35 or 40 wt.-% or a range created by the combination of two amounts from the aforementioned list.

Anionic Surfactants

[0028] The anionic surfactants, which may be used in accordance with the invention, include aliphatic sulfates, such as fatty alcohol sulfates and fatty alcohol ether sulfates, dialkyl ether sulfates, monoglyceride sulfates and aliphatic sulfonates such as alkane sulfonates, olefin sulfonates, ether sulfonates, n-alkyl ether sulfonates, ester sulfonates and lignin sulfonates. Also useful in the context of the present invention are alkyl benzene sulfonates, fatty acid cyanamides, sulfosuccinic acid esters, fatty acid isethionates, acylaminoalkane sulfonates (fatty acid taurides), fatty acid sarcosinates, ether carboxylic acids and alkyl (ether) phosphates.

[0029] Suitable anionic surfactants also include anionic gemini surfactants with a diphenyl oxide basic structure, two sulfonate groups and an alkyl group on one or both benzene rings corresponding to the formula



in which R is an alkyl group containing, for example, 6, 10, 12 or 16 carbon atoms and R' stands for R or H (Dowfax® Dry Hydrotrope Powder containing C₁₆ alkyl group(s); INCI: Sodium Hexyldiphenyl Ether Sulfonate, Disodium Decyl Phenyl Ether Disulfonate, Disodium Lauryl Phenyl Ether Disulfonate, Disodium Cetyl Phenyl Ether Disulfonate) and fluorinated anionic surfactants, more particularly perfluorinated alkyl sulfonates, such as ammonium C_{9/10} perfluoroalkyl sulfonate (Fluorad® FC 120) and perfluoro-octane sulfonic acid potassium salt (Fluorad® FC 95).

Alkyl Ether Sulfates

[0030] Alkyl ether sulfates (fatty alcohol ether sulfates, INCI Alkyl Ether Sulfates) are products of sulfation reactions on alkoxyated alcohols. Alkoxyated alcohols are generally understood by the expert to be the reaction products of alkylene oxide, preferably ethylene oxide, with alcohols -in the context of the invention preferably with relatively long-chain alcohols, i.e. with aliphatic straight-chain or single- or multiple-branch, acyclic or cyclic, saturated or mono- or polyunsaturated, preferably straight-chain, acyclic saturated alcohols containing 6 to 22, preferably 8 to 18, more preferably 10 to 16 and most preferably 12 to 14 carbon atoms. Depending on the reaction conditions, a complex mixture of addition products with different degrees of ethoxylation is generally formed from n moles ethylene oxide and one mole alcohol (n = 1 to 30, preferably 1 to 20, more preferably 1 to 10 and most preferably 1 to 5). Another embodiment of the alkoxylation consists in using mixtures of the alkylene oxides, preferably a mixture of ethylene oxide and propylene oxide. Fatty alcohols with low degrees of ethoxylation, i.e. with 1 to 4 ethylene oxide units (EO), more particularly 1 to 2 EO, for example 1.3 EO, such as Na C₁₂₋₁₄ fatty alcohol+1.3 EO sulfate, are most particularly preferred for the purposes of the invention.

[0031] The alkyl ether sulfates (as well as other anionic surfactants) are normally used in the form of alkali metal, alkaline earth metal and/or mono-, di- or trialkanolammonium salts and/or in the form of the corresponding acids to be neutralized with the corresponding alkali metal hydroxide, alkaline earth metal hydroxide and/or mono-, di or trialkanolamine. Preferred alkali metals are potassium and in particular sodium, preferred alkaline earth metals are calcium and in particular magnesium and preferred alkanolamines are mono-, di- or triethanolamine. The sodium salts are particularly preferred.

Alkyl Sulfonates

[0032] The alkyl sulfonates (INCI Sulfonic Acids) normally contain an aliphatic, straight-chain or single- or multiple-branch, acyclic or cyclic, saturated or mono- or polyunsaturated, preferably branched, acyclic, saturated alkyl group containing 6 to 22, preferably 9 to 20, more preferably 11 to 18 and most preferably 13 to 17 carbon atoms. Accordingly, suitable alkyl sulfonates are the saturated alkane sulfonates, the unsaturated olefin sulfonates and the ether sulfonates (formally derived from the alkoxyated alcohols on which the alkyl ether sulfates are also based) where terminal ester sulfonates (n-ether sulfonates) with the sulfonate function attached to the polyether chain and internal ester sulfonates (i-ester sulfonates) with the sulfonate function attached to the alkyl group. According to the invention, the alkane sulfonates, more particularly alkane sulfonates with a branched, preferably secondary, alkyl group, for example the secondary alkanesulfonate sec. Na C₁₃₋₁₇ alkane sulfonate (INCI Sodium C₁₄₋₁₇ Alkyl Sec. Sulfonate), are preferred.

[0033] The alkyl ether sulfates and alkyl sulfonates as well as other anionic surfactants are normally used in the form of alkali metal, alkaline earth metal and/or mono-, di- or trialkanolammonium salts and/or in the form of the corresponding acids to be neutralized with the corresponding alkali metal hydroxide, alkaline earth metal hydroxide and/or mono-, di or trialkanolamine. Preferred alkali metals are potassium and in particular sodium, preferred alkaline earth metals are calcium and in particular magnesium and preferred alkanolamines are mono-, di- or triethanolamine. The sodium salts are particularly preferred.

Anionic Sulfosuccinic Acid Surfactants

[0034] Particularly preferred anionic surfactants are the anionic sulfosuccinic acid surfactants sulfosuccinates, sulfosuccinamates and sulfosuccinamides, more particularly sulfosuccinates and sulfosuccinamates and most preferably sulfosuccinates. The sulfosuccinates are the salts of the mono- and diesters of sulfosuccinic acid $\text{HOOCCH}(\text{SO}_3\text{H})\text{CH}_2\text{COOH}$ while the sulfosuccinamates are understood to be the salts of the monoamides of sulfosuccinic acid and the sulfosuccinamides are understood to be the salts of the diamides of sulfosuccinic acid. A detailed description of these known anionic surfactants is provided by A. Domsch and B. Irrgang in *Anionic Surfactants: Organic Chemistry* (edited by H. W. Stache; Surfactant Science Series; Volume 56; ISBN 0-8247-9394-2; Marcel Dekker, Inc., New York 1996, pages 501-549).

[0035] The salts are preferably alkali metal salts, ammonium salts and mono-, di- and trialkanolammonium salts, for example mono-, di- and triethanolammonium salts, more particularly lithium, sodium, potassium and ammonium salts, more preferably sodium and ammonium salts and most preferably sodium salts.

[0036] In the sulfosuccinates, one or both carboxyl groups of the sulfosuccinic acid is/are preferably esterified with one or two identical or different unbranched, branched, saturated or unsaturated, acyclic or cyclic, optionally alkoxyated alcohols containing 4 to 22, preferably 6 to 20, more preferably 8 to 18, most preferably 10 to 16 and, in one most particularly preferred embodiment, 12 to 14 carbon atoms. Particular preference is attributed to the esters of unbranched and/or saturated and/or acyclic and/or alkoxyated alcohols, more particularly unbranched saturated fatty alcohols and/or unbranched saturated fatty alcohols alkoxyated with ethylene and/or propylene oxide, preferably ethylene oxide, with a degree of alkoxylation of 1 to 20, preferably 1 to 15, more preferably 1 to 10, most preferably 1 to 6 and, in one most particularly preferred embodiment, 1 to 4. According to the invention, the monoesters are preferably the diesters. A particularly preferred sulfosuccinate is sulfosuccinic acid lauryl polyglycol ester disodium salt (lauryl-EO-sulfosuccinate, disodium salt, INCI Disodium Laureth Sulfosuccinate) which is commercially obtainable, for example, as Tego® Sulfosuccinat F30 (Goldschmidt) with a sulfosuccinate content of 30% by weight.

[0037] In the sulfosuccinamates or sulfosuccinamides, one or both carboxyl groups of the sulfosuccinic acid preferably form a carboxylic acid amide with a primary or secondary amine which carries one or two identical or different, unbranched or branched, saturated or unsaturated, acyclic or cyclic, optionally alkoxyated alkyl groups containing 4 to 22, preferably 6 to 20, more preferably 8 to 18, most preferably 10 to 16 and, in one most particularly preferred embodiment, 12 to 14 carbon atoms. Unbranched and/or saturated and/or acyclic alkyl groups, more particularly unbranched saturated fatty alkyl groups, are particularly preferred.

[0038] Also suitable are, for example, the following sulfosuccinates and sulfosuccinamates referred to by their INCI names which are described in more detail in *International Cosmetic Ingredient Dictionary and Handbook*: Ammonium Dinonyl Sulfosuccinate, Ammonium Lauryl Sulfosuccinate, Diammonium Dimethicone Copolyol Sulfosuccinate, Diammonium Lauramido-MEA Sulfosuccinate, Diammonium Lauryl Sulfosuccinate, Diammonium Oleamido PEG-2 Sulfosuccinate, Diamyl Sodium Sulfosuccinate, Dicapryl Sodium Sulfosuccinate, Dicyclohexyl Sodium Sulfosuccinate, Diheptyl Sodium Sulfosuccinate, Dihexyl Sodium Sulfosuccinate, Diisobutyl Sodium Sulfosuccinate, Dioctyl Sodium Sulfosuccinate, Disodium Cetearyl Sulfosuccinate, Disodium Cocamido MEA-Sulfosuccinate, Disodium Cocamido MIPA-Sulfosuccinate, Disodium Cocamido PEG-3 Sulfosuccinate, Disodium Coco-Glucoside Sulfosuccinate, Disodium Cocoyl Butyl Gluceth-10 Sulfosuccinate, Disodium C_{12-15} Pareth Sulfosuccinate, Disodium Deceth-5 Sulfosuccinate, Disodium Deceth-6 Sulfosuccinate, Disodium Dihydroxyethyl Sulfosuccinylundecylenate, Disodium Dimethicone Copolyol Sulfosuccinate, Disodium Hydrogenated Cottonseed Glyceride Sulfosuccinate, Disodium Isodecyl Sulfosuccinate, Disodium Isostearamido MEA-Sulfosuccinate, Disodium Isostearamido MIPA-Sulfosuccinate, Disodium Isostearyl Sulfosuccinate, Disodium Laneth-5 Sulfosuccinate, Disodium Lauramido MEA-Sulfosuccinate, Disodium Lauramido PEG-2 Sulfosuccinate, Disodium Lauramido PEG-5 Sulfosuccinate, Disodium Laureth-6 Sulfosuccinate, Disodium Laureth-9 Sulfosuccinate, Disodium Laureth-12 Sulfosuccinate, Disodium Lauryl Sulfosuccinate, Disodium Myristamido MEA-Sulfosuccinate, Disodium Nonoxynol-10 Sulfosuccinate, Disodium Oleamido MEA-Sulfosuccinate, Disodium Oleamido MIPA-Sulfosuccinate, Disodium Oleamido PEG-2 Sulfosuccinate, Disodium Oleth-3 Sulfosuccinate, Disodium Oleyl Sulfosuccinate, Disodium Palmitamido PEG-2 Sulfosuccinate, Disodium Palmitoleamido PEG-2 Sulfosuccinate, Disodium PEG-4 Cocamido MIPA-Sulfosuccinate, Disodium PEG-5 Laurylcitrate Sulfosuccinate, Disodium PEG-8 Palm Glycerides Sulfosuccinate, Disodium Ricinoleamido MEA-Sulfosuccinate, Disodium Sitostereth-14 Sulfosuccinate, Disodium Stearamido MEA-Sulfosuccinate, Disodium Stearyl Sulfosuccinamate, Disodium Stearyl Sulfosuccinate, Disodium Tallamido MEA-

Sulfosuccinate, Disodium Tallowamido MEA-Sulfosuccinate, Disodium Tallow Sulfosuccinamate, Disodium Tridecylsulfosuccinate, Disodium Undecylenamido MEA-Sulfosuccinate, Disodium Undecylenamido PEG-2 Sulfosuccinate, Disodium Wheat Germamido MEA-Sulfosuccinate, Disodium Wheat Germamido PEG-2 Sulfosuccinate, Di-TEA-Oleamido PEG-2 Sulfosuccinate, Ditridecyl Sodium Sulfosuccinate, Sodium Bisglycol Ricinosulfosuccinate, Sodium/MEA Laureth-2 Sulfosuccinate and Tetrasodium Dicarboxyethyl Stearyl Sulfosuccinamate. Another suitable sulfosuccinamate is disodium-C₁₆₋₁₈-alkoxypropylene sulfosuccinamate.

[0039] Preferred anionic sulfosuccinic acid surfactants are imidosuccinate, mono-Na-sulfosuccinic acid diisobutyl ester (Monawet[®] MB 45), mono-Na-sulfosuccinic acid dioctyl ester (Monawet[®] MO-84 R2W, Rewopol[®] SB DO 75), mono-Na-sulfosuccinic acid di-tridecyl ester (Monawet[®] MT 70), fatty alcohol polyglycol sulfosuccinate-Na-NH₄ salt (sulfosuccinate, S-2), di-Na-sulfosuccinic acid monO-C₁₂₋₁₄-3EO ester (Texapon[®] SB-3), sodium sulfosuccinic acid diisooctyl ester (Texin[®] DOS 75) and di-Na-sulfosuccinic acid mono-C_{12/18} ester (Texin[®] 128-P), more particularly the mono-Na-sulfosuccinic acid dioctyl ester synergistically co-operating with the ternary surfactant combination according to the invention in regard to drainage and/or drying behavior.

[0040] In various embodiments, the liquid composition comprises at least one anionic surfactant selected from the group consisting of aliphatic sulfates, preferably from the group consisting of fatty alcohol sulfates and fatty alcohol ether sulfates, more preferably from the group consisting of Na C₁₂₋₁₄ fatty alcohol ether sulfate (1-4 EO), preferably Na C₁₂₋₁₄ fatty alcohol ether sulfate (1-2 EO), as herein described above.

[0041] In various embodiments, a liquid composition according to the present invention contains at least one anionic surfactant in an amount of about 1 to about 55 wt.-%, preferably about 2 to about 50 wt.-%, more preferably about 3 to about 45 wt.-%, for instance, but without limitation, in an amount of about 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44 or 45 wt.-%, based on the total weight of the composition.

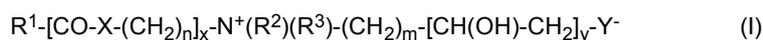
[0042] In various embodiments, the liquid composition comprises least one fatty alcohol ether sulfate, as herein described above, in an amount of about 1 to about 50 wt.-%, preferably about 3 to about 40 wt.-%, more preferably about 5 to about 35 wt.-%, for instance, but without limitation, in an amount of about 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34 or 35 wt.-%, based on the total weight of the composition

Amphoteric Surfactants

[0043] The amphoteric surfactants (zwitterionic surfactants) which may be used in accordance with the invention include betaines, alkyl amidoalkyl amines, alkyl-substituted amino acids, acylated amino acids and biosurfactants.

Betaines

[0044] Betaines suitable for incorporation according to the present invention are the alkyl betaines, the alkylamido-betaines, the imidazolium betaines, the sulfobetaines (INCI Sultaines) and the phosphobetaines and preferably correspond to formula I:



in which

R¹ is a saturated or unsaturated C₆₋₂₂ alkyl group, preferably a C₈₋₁₈ alkyl group and more preferably a saturated C₁₀₋₁₆ alkyl group, for example a saturated C₁₂₋₁₄ alkyl group,

X is NH, NR⁴ with the C₁₋₄ alkyl group R⁴, O or S,

n is a number of 1 to 10, preferably 2 to 5 and more preferably 3,

x is 0 or 1, preferably 1,

R² and R³ independently of one another represent an optionally hydroxysubstituted C₁₋₄ alkyl group such as, for example, a hydroxyethyl group, but especially a methyl group,

m is a number of 1 to 4, more particularly 1, 2 or 3,

y is 0 or 1 and

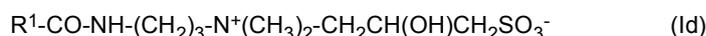
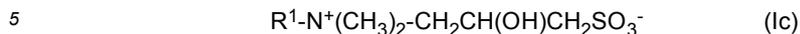
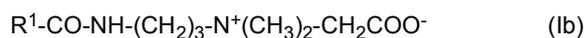
Y is -COO-, -SO₃-, -OPO(OR⁵)O or -P(O)(OR⁵)O, where R⁵ is a hydrogen atom

H or a C₁₋₄ alkyl group.

[0045] The alkyl betaines and alkylamidobetaines, betaines corresponding to formula I with a carboxylate group (Y⁻ = COO⁻), are also known as carbobetaines.

[0046] Preferred amphoteric surfactants are the alkyl betaines corresponding to formula (Ia), the alkylamidobetaines corresponding to formula (Ib), the sulfobetaines corresponding to formula (Ic) and the amidosulfobetaines corresponding to formula (Id):

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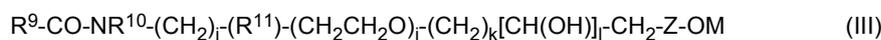
in which R¹ is as defined for formula I.

10 **[0047]** Particularly preferred amphoteric surfactants are the carbobetaines and more particularly the carbobetaines corresponding to formulae (Ia) and (Ib), the alkylamidobetaines corresponding to formula (Ib) being most particularly preferred.

[0048] Examples of suitable betaines and sulfobetaines are the following compounds identified by their INCI names: Almondamidopropyl Betaine, Apricotamidopropyl Betaine, Avocadamidopropyl Betaine, Babassuamidopropyl Betaine, Behenamidopropyl Betaine, Behenyl Betaine, Betaine, Canolamidopropyl Betaine, Capryl/Capramidopropyl Betaine, Carnitine, Cetyl Betaine, Cocamidoethyl Betaine, Cocamidopropyl Betaine, Cocamidopropyl Hydroxysultaine, Coco-Betaine, Coco-Hydroxysultaine, Coco/Oleamidopropyl Betaine, Coco-Sultaine, Decyl Betaine, Dihydroxyethyl Oleyl Glycinate, Dihydroxyethyl Soy Glycinate, Dihydroxyethyl Stearyl Glycinate, Dihydroxyethyl Tallow Glycinate, Dimethicone Propyl PG-Betaine, Erucamidopropyl Hydroxysultaine, Hydrogenated Tallow Betaine, Isostearamidopropyl Betaine, Lauramidopropyl Betaine, Lauryl Betaine, Lauryl Hydroxysultaine, Lauryl Sultaine, Milkamidopropyl Betaine, Minkamidopropyl Betaine, Myristamidopropyl Betaine, Myristyl Betaine, Oleamidopropyl Betaine, Oleamidopropyl Hydroxysultaine, Oleyl Betaine, Olivamidopropyl Betaine, Palmamidopropyl Betaine, Palmitamidopropyl Betaine, Palmitoyl Carnitine, Palm Kernelamidopropyl Betaine, Polytetrafluoroethylene Acetoxypropyl Betaine, Ricinoleamidopropyl Betaine, Sesamidopropyl Betaine, Soyamidopropyl Betaine, Stearamidopropyl Betaine, Stearyl Betaine, Tallowamidopropyl Betaine, Tallowamidopropyl Hydroxysultaine, Tallow Betaine, Tallow Dihydroxyethyl Betaine, Undecylenamidopropyl Betaine und Wheat Germamidopropyl Betaine. A preferred betaine is Cocamidopropyl Betaine (Cocoamidopropylbetaine).

Alkylamido Alkylamines

30 **[0049]** The alkylamido alkylamines (INCI Alkylamido Alkylamines) are amphoteric surfactants corresponding to formula (III):



35 in which

R⁹ is a saturated or unsaturated C₆₋₂₂ alkyl group, preferably a C₈₋₁₈ alkyl group and more preferably a saturated C₁₀₋₁₆ alkyl group, for example a saturated C₁₂₋₁₄ alkyl group,

R¹⁰ is a hydrogen atom H or a C₁₋₄ alkyl group, preferably H,

i is a number of 1 to 10, preferably 2 to 5, more preferably 2 or 3,

40 R¹¹ is a hydrogen atom H or CH₂COOM (for M, see below),

j is a number of 1 to 4, preferably 1 or 2, more preferably 1,

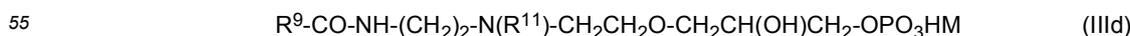
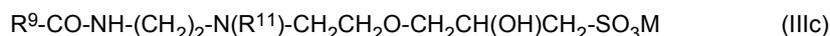
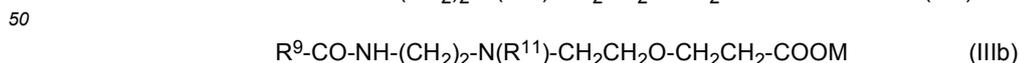
k is a number of 0 to 4, preferably 0 or 1,

l is 0 or 1, k being 1 where l is 1,

Z is CO, SO₂, OPO(OR¹²) or P(O)(OR¹²) where R¹² is a C₁₋₄ alkyl group or M (see below) and

45 M is a hydrogen atom, an alkali metal, an alkaline earth metal or a protonated alkanolamine, for example protonated mono-, di- or triethanolamine.

[0050] Preferred representatives correspond to formulae IIIa to IIId:



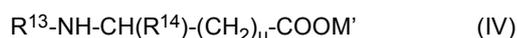
in which R¹¹ and M are as defined for formula (III).

[0051] Examples of alkylamido alkylamines are the following compounds identified by their INCI names: Cocoam-

phodipropionic Acid, Cocobetainamido Amphopropionate, DEA-Cocoamphodipropionate, Disodium Caproamphodi-
 acetate, Disodium Caproamphodipropionate, Disodium Capryloamphodiacetate, Disodium Capryloamphodipropionate,
 Disodium Cocoamphocarboxyethylhydroxypropylsulfonate, Disodium Cocoamphodiacetate, Disodium Cocoamphodi-
 propionate, Disodium Isostearoamphodiacetate, Disodium Isostearoamphodipropionate, Disodium Laureth-5 Car-
 boxyamphodiacetate, Disodium Lauroamphodiacetate, Disodium Lauroamphodipropionate, Disodium Oleoamphodipro-
 pionate, Disodium PPG-2-Isodeceth-7 Carboxyamphodiacetate, Disodium Stearoamphodiacetate, Disodium Tallowam-
 phodiacetate, Disodium Wheatgermamphodiacetate, Lauroamphodipropionic Acid, Quaternium-85, Sodium Caproam-
 phoacetate, Sodium Caproamphohydroxypropylsulfonate, Sodium Caproamphopropionate, Sodium Capryloamphoac-
 etate, Sodium Capryloamphohydroxypropylsulfonate, Sodium Capryloamphopropionate, Sodium Cocoamphoacetate,
 Sodium Cocoamphohydroxypropylsulfonate, Sodium Cocoamphopropionate, Sodium Cornamphopropionate, Sodium
 Isostearoamphoacetate, Sodium Isostearoamphopropionate, Sodium Lauroamphoacetate, Sodium Lauroamphohydrox-
 ypropylsulfonate, Sodium Lauroampho PG-Acetate Phosphate, Sodium Lauroamphopropionate, Sodium Myristoam-
 phoacetate, Sodium Oleoamphoacetate, Sodium Oleoamphohydroxypropylsulfonate, Sodium Oleoamphopropionate,
 Sodium Ricinoleoamphoacetate, Sodium Stearoamphoacetate, Sodium Stearoamphohydroxypropylsulfonate, Sodium
 Stearoamphopropionate, Sodium Tallamphopropionate, Sodium Tallowamphoacetate, Sodium Undecylenoamphoac-
 etate, Sodium Undecylenoamphopropionate, Sodium Wheat Germamphoacetate und Trisodium Lauroampho PG-Acetate
 Chloride Phosphate.

Alkyl-Substituted Amino Acids

[0052] According to the invention, preferred alkyl-substituted amino acids (INCI: Alkyl-Substituted Amino Acids) are
 monoalkyl-substituted amino acids corresponding to formula (IV):



in which

R¹³ is a saturated or unsaturated C₆₋₂₂ alkyl group, preferably a C₈₋₁₈ alkyl group and more preferably a saturated C₁₀₋₁₆
 alkyl group, for example a saturated C₁₂₋₁₄ alkyl group,

R¹⁴ is a hydrogen atom H or a C₁₋₄ alkyl group, preferably H,

u is a number of 1 to 4, preferably 0 or 1, more preferably 1, and

M' is a hydrogen atom, an alkali metal, an alkaline earth metal or a protonated alkanolamine, for example protonated
 mono-, di- or triethanolamine, alkyl-substituted imino acids corresponding to formula (V):



in which

R¹⁵ is a saturated or unsaturated C₆₋₂₂ alkyl group, preferably a C₈₋₁₈ alkyl group and more preferably a saturated C₁₀₋₁₆
 alkyl group, for example a saturated C₁₂₋₁₄ alkyl group,

v is a number of 1 to 5, preferably 2 or 3, more preferably 2, and

M'' is a hydrogen atom, an alkali metal, an alkaline earth metal or a protonated alkanolamine, for example protonated
 mono-, di- or triethanolamine; M'' in the two carboxy groups may have the same meaning or two different meanings, for
 example may be hydrogen and sodium or just sodium, and mono- or dialkyl-substituted natural amino acids corresponding
 to formula (VI):



in which

R¹⁶ is a saturated or unsaturated C₆₋₂₂ alkyl group, preferably a C₈₋₁₈ alkyl group and more preferably a saturated C₁₀₋₁₆
 alkyl group, for example a saturated C₁₂₋₁₄ alkyl group,

R¹⁷ is a hydrogen atom or an optionally hydroxy- or amine-substituted C₁₋₄ alkyl group, for example a methyl, ethyl,
 hydroxyethyl or aminopropyl group,

R¹⁸ is the residue of one of the 20 natural α-amino acids H₂NCH(R¹⁸)COOH and

M'' is a hydrogen atom, an alkali metal, an alkaline earth metal or a protonated alkanolamine, for example protonated
 mono-, di- or triethanolamine.

[0053] Particularly preferred alkyl-substituted amino acids are the aminopropionates corresponding to formula (IVa):



in which R¹³ and M¹ have the same meanings as in formula (IV).

Examples of alkyl-substituted amino acids are the following compounds identified by their INCI names: Aminopropyl Laurylglutamine, Cocaminobutyric Acid, Cocaminopropionic Acid, DEA-Lauraminopropionate, Disodium Cocaminopropyl Iminodiacetate, Disodium Dicarboxyethyl Cocopropylenediamine, Disodium Lauriminodipropionate, Disodium Steariminodipropionate, Disodium Tallowiminodipropionate, Lauraminopropionic Acid, Lauryl Aminopropylglycine, Lauryl Diethylenediaminoglycine, Myristaminopropionic Acid, Sodium C12-15 Alkoxypropyl Iminodipropionate, Sodium Cocaminopropionate, Sodium Lauraminopropionate, Sodium Lauriminodipropionate, Sodium Lauroyl Methylaminopropionate, TEA-Lauraminopropionate und TEA-Myristamino-propionate.

10 *Acylated Amino Acids*

[0054] Acylated amino acids are amino acids, more particularly the 20 natural α -amino acids, which carry the acyl group R¹⁹CO of a saturated or unsaturated fatty acid R¹⁹COOH at the amino nitrogen atom (R¹⁹ being a saturated or unsaturated C₆₋₂₂ alkyl group, preferably a C₈₋₁₈ alkyl group and more preferably a saturated C₁₀₋₁₆ alkyl group, for example a saturated C₁₂₋₁₄ alkyl group). The acylated amino acids may also be used in the form of an alkali metal salt, an alkaline earth metal salt or alkanolammonium salt, for example mono-, di- or triethanolamine. Examples of acylated amino acids are the acyl derivatives known collectively by the INCI name of Amino Acids, for example Sodium Cocoyl Glutamate, Lauroyl Glutamic Acid, Capryloyl Glycine oder Myristoyl Methylalanine.

[0055] In various embodiments, the liquid composition of the present invention comprises at least one amphoteric surfactant selected from the group consisting of alkyl betaines, alkylamidobetaines, imidazolium betaines, sulfobetaines, phosphobetaines, alkyl amidoalkyl amines, alkyl-substituted amino acids, acylated amino acids and biosurfactants, preferably from the group consisting of alkylamidobetaines.

[0056] In various embodiments, a liquid composition according to the present invention contains at least one amphoteric surfactant in an amount of about 1 to about 35 wt.-%, preferably about 2 to about 30 wt.-%, more preferably about 3 to about 25 wt.-%, for instance, but without limitation, in an amount of about 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24 or 25 wt.-%, based on the total weight of the composition.

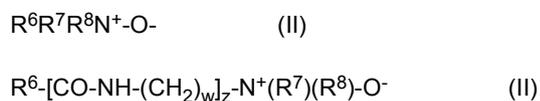
[0057] In various embodiments, a liquid composition according to the present invention contains at least one betaine in an amount of about 1 to about 30 wt.-%, preferably about 2 to about 25 wt.-%, more preferably about 3 to about 20 wt.-%, for instance, but without limitation, in an amount of about 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 or 20 wt.-%, based on the total weight of the composition.

Nonionic Surfactants

[0058] Nonionic surfactants in the context of the invention are alkoxyates, such as polyglycol ethers, fatty alcohol polyglycol ethers, alkyl phenol polyglycol ethers, end-capped polyglycol ethers, mixed ethers and hydroxy mixed ethers and fatty acid polyglycol esters. Block polymers of ethylene oxide and propylene oxide and fatty acid alkanolamides and fatty acid polyglycol ethers are also suitable. Important classes of nonionic surfactants according to the invention are also the amine oxides and the sugar surfactants, more particularly the alkyl polyglucosides.

40 *Amine Oxides*

[0059] According to the invention, suitable amine oxides include alkyl amine oxides, more particularly alkyl dimethyl amine oxides, alkylamidoamine oxides and alkoxyalkyl amine oxides. Preferred amine oxides correspond to formula II:



in which

R⁶ is a saturated or unsaturated C₆₋₂₂ alkyl group, preferably a C₈₋₁₈ alkyl group, more preferably a saturated C₁₀₋₁₆ alkyl group, for example a saturated C₁₂₋₁₄ alkyl group which, in the alkylamidoamine oxides, is attached to the nitrogen atom via a carbonylamidoalkylene group -CO-NH-(CH₂)_z- and, in the alkoxyalkyl amine oxides, via an oxa-alkylene group -O-(CH₂)_z- where z is a number of 1 to 10, preferably 2 to 5 and more preferably 3, R⁷ and R⁸ independently of one another represent an optionally hydroxysubstituted C₁₋₄ alkyl group such as, for example, a hydroxyethyl group, more particularly a methyl group.

[0060] Examples of suitable amine oxides are the following compounds identified by their INCI names: Almondamidopropylamine Oxide, Babassuamidopropylamine Oxide, Behenamine Oxide, Cocamidopropyl Amine Oxide, Cocamidopropylamine Oxide, Cocamine Oxide, Coco-Morpholine Oxide, Decylamine Oxide, Decyltetradecylamine Oxide, Di-

aminopyrimidine Oxide, Dihydroxyethyl C₈₋₁₀ Alkoxypropylamine Oxide, Dihydroxyethyl C₉₋₁₁ Alkoxypropylamine Oxide, Dihydroxyethyl C₁₂₋₁₅ Alkoxypropylamine Oxide, Dihydroxyethyl Cocamine Oxide, Dihydroxyethyl Lauramine Oxide, Dihydroxyethyl Stearamine Oxide, Dihydroxyethyl Tallowamine Oxide, Hydrogenated Palm Kernel Amine Oxide, Hydrogenated Tallowamine Oxide, Hydroxyethyl Hydroxypropyl C₁₂₋₁₅ Alkoxypropylamine Oxide, Isostearamidopropylamine Oxide, Isostearamidopropyl Morpholine Oxide, Lauramidopropylamine Oxide, Lauramine Oxide, Methyl Morpholine Oxide, Milkamidopropyl Amine Oxide, Minkamidopropylamine Oxide, Myristamidopropylamine Oxide, Myristamine Oxide, Myristyl/Cetyl Amine Oxide, Oleamidopropylamine Oxide, Oleamine Oxide, Olivamidopropylamine Oxide, Palmitamidopropylamine Oxide, Palmitamine Oxide, PEG-3 Lauramine Oxide, Potassium Dihydroxyethyl Cocamine Oxide Phosphate, Potassium Trisphosphonomethylamine Oxide, Sesamidopropylamine Oxide, Soyamidopropylamine Oxide, Stearamido-propylamine Oxide, Stearamine Oxide, Tallowamidopropylamine Oxide, Tallowamine Oxide, Undecylenamidopropylamine Oxide und Wheat Germamidopropylamine Oxide. A preferred amine oxide is, for example, Cocamidopropylamine Oxide (cocoamidopropyl amine oxide).

[0061] In various embodiments, the liquid composition comprises at least one amine oxide in an amount of about 0.1 to about 25 wt.-%, preferably in an amount of about 0.5 to about 15 wt.-%, more preferably in an amount of about 1 to about 7 wt.-%, for instance, but without limitation, in an amount of about 1, 2, 3, 4, 5, 6 or 7 wt.-%, based on the total weight of the composition.

Fatty Alcohol Polyglycol Ethers

[0062] In the context of the invention, fatty alcohol polyglycol ethers are unbranched or branched, saturated or unsaturated C₁₀₋₂₂ alcohols alkoxyated with ethylene oxide (EO) and/or propylene oxide (PO) with a degree of alkoxylation of up to 30, preferably ethoxylated C₁₀₋₁₈ fatty alcohols with a degree of ethoxylation of less than 30, preferably with a degree of ethoxylation of 1 to 20, more preferably 1 to 12, most preferably 1 to 8 and, in one most particularly preferred embodiment, 2 to 5, for example C₁₂₋₁₄ fatty alcohol ethoxylates with 2, 3 or 4 EO or a mixture of the C₁₂₋₁₄ fatty alcohol ethoxylates with 3 and 4 EO in a ratio by weight of 1 to 1 or isotridecyl alcohol ethoxylate with 5, 8 or 12 EO.

Sugar Surfactants

[0063] Sugar surfactants are known surface-active compounds which include, for example, the sugar surfactant classes of alkyl glucose esters, aldobionamides, gluconamides (sugar acid amides), glycerol amides, glycerol glycolipids, polyhydroxyfatty acid amide sugar surfactants (sugar amides) and alkyl polyglycosides described, for example, in WO 97/00609 A1 (Henkel Corporation) and the publications cited therein (pages 4 to 12) to which reference is explicitly made in this regard and of which the disclosure is hereby included in the present application. According to the invention, preferred sugar surfactants are the alkyl polyglycosides and the sugar amides and their derivatives, more particularly their ethers and esters. The ethers are the products of the reaction of one or more, preferably one, sugar hydroxy group with a compound containing one or more hydroxy groups, for example C₁₋₂₂ alcohols or glycols, such as ethylene and/or propylene glycol; the sugar hydroxy group may also carry polyethylene glycol and/or propylene glycol residues. The esters are the reaction products of one or more, preferably one, sugar hydroxy group with a carboxylic acid, more particularly a C₆₋₂₂ fatty acid.

Sugar Amides

[0064] Particularly preferred sugar amides correspond to the formula R¹C(O)N(R²)[Z], where R¹ is a linear or branched, saturated or unsaturated acyl group, preferably a linear unsaturated acyl group, containing 5 to 21, preferably 5 to 17, more preferably 7 to 15 and most preferably 7 to 13 carbon atoms, R² is a linear or branched, saturated or unsaturated alkyl group, preferably a linear unsaturated alkyl group, containing 6 to 22, preferably 6 to 18, more preferably 8 to 16 and most preferably 8 to 14 carbon atoms, a C₁₋₅ alkyl group, more particularly a methyl, ethyl, propyl, isopropyl, n-butyl, isobutyl, tert.butyl or n-pentyl group, or hydrogen and Z is a sugar unit, i.e. a monosaccharide unit. Particularly preferred sugar amides are the amides of glucose, the glucamides, for example lauroyl methyl glucamide.

Alkyl Polyglycosides

[0065] The alkyl polyglycosides (APGs) are particularly preferred sugar surfactants for the purposes of the present invention and preferably correspond to the general formula R¹O(AO)_a[G]_x, where R¹ is a linear or branched, saturated or unsaturated alkyl group containing 6 to 22, preferably 6 to 18 and more preferably 8 to 14 carbon atoms, [G] is a glycosidic sugar unit and x is a number of 1 to 10 and AO stands for an alkyleneoxy group, for example an ethyleneoxy or propyleneoxy group, and a stands for the mean degree of alkoxylation of 0 to 20. The group (AO)_a may also contain various alkyleneoxy units, for example ethyleneoxy or propyleneoxy units, in which case a stands for the mean total

degree of alkoxylation, i.e. the sum of the degree of ethoxylation and the degree of propoxylation. Unless indicated in detail or indicated otherwise in the following, the alkyl groups R¹ of the APGs are linear unsaturated groups with the indicated number of carbon atoms.

[0066] APGs are nonionic surfactants and represent known substances which may be obtained by the relevant methods of preparative organic chemistry. The index x indicates the degree of oligomerization (DP degree), i.e. distribution of mono- and oligoglycosides, and is a number of 1 to 10. Whereas x in a given compound must always be an integer and, above all, may assume a value of 1 to 6, the value x for a certain alkyl oligoglycoside is an analytically determined calculated quantity which is generally a broken number. Alkyl glycosides having an average degree of oligomerization x of 1.1 to 3.0 are preferably used. Alkyl glycosides having a degree of oligomerization of less than 1.7 and, more particularly, between 1.2 and 1.6 are preferred from the applicational point of view. The glycosidic sugar used is preferably xylose but especially glucose.

[0067] The alkyl or alkenyl radical R¹ may be derived from primary alcohols containing 8 to 18 and preferably 8 to 14 carbon atoms. Typical examples are caproic alcohol, caprylic alcohol, capric alcohol and undecyl alcohol and the technical mixtures thereof obtained, for example, in the hydrogenation of technical fatty acid methyl esters or in the hydrogenation of aldehydes from Roelen's oxosynthesis.

[0068] However, the alkyl or alkenyl radical R¹ is preferably derived from lauryl alcohol, myristyl alcohol, cetyl alcohol, palmitoleyl alcohol, stearyl alcohol, isostearyl alcohol or oleyl alcohol and may also be derived from elaidyl alcohol, petroselinyl alcohol, arachyl alcohol, gadoleyl alcohol, behenyl alcohol, erucyl alcohol and technical mixtures thereof.

[0069] Particularly preferred APGs are not alkoxyated (a=0) and correspond to the formula RO[G]_x, in which R again stands for a linear or branched, saturated or unsaturated alkyl group containing 4 to 22 carbon atoms, [G] is a glycosidic sugar, preferably glucose, and x is a number of 1 to 10, preferably 1.1 to 3 and more preferably 1.2 to 1.6. Accordingly, preferred alkyl polyglycosides are, for example, C₈₋₁₀ and a C₁₂₋₁₄ alkyl polyglucoside with a DP degree of 1.4 or 1.5, more particularly C₈₋₁₀ alkyl-1,5-glucoside and C₁₂₋₁₄ alkyl-1,4-glucoside.

[0070] According to various embodiments, the liquid composition comprises at least one nonionic surfactant selected from the group consisting of polyglycol ethers, fatty alcohol polyglycol ethers, alkyl phenol polyglycol ethers, end-capped polyglycol ethers, mixed ethers, hydroxy mixed ethers, fatty acid polyglycol esters, block polymers of ethylene oxide and propylene oxide and fatty acid alkanolamides and fatty acid polyglycol ethers, amine oxides, sugar surfactants, preferably from the group consisting of amine oxides and alkyl polyglucosides.

[0071] In various embodiments, a liquid composition according to the present invention contains at least one nonionic surfactant in an amount of about 1 to about 35 wt.-%, preferably about 2 to about 30 wt.-%, more preferably about 3 to about 25 wt.-%, for instance, but without limitation, in an amount of about 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24 or 25 wt.-%, based on the total weight of the composition.

[0072] In some embodiments, the liquid composition comprises at least one amine oxide, as herein described above, in an amount of about 1 to about 30 wt.-%, preferably about 2 to about 25 wt.-%, more preferably about 3 to about 20 wt.-%, based on the total weight of the composition.

[0073] In various further embodiments, the liquid composition comprises at least one fatty alcohol ether sulfate in an amount of about 1 to about 50 wt.-%, preferably about 3 to about 40 wt.-%, more preferably about 5 to about 35 wt.-%, based on the total weight of the composition; and/or at least one amine oxide in an amount of about 1 to about 30 wt.-%, preferably about 2 to about 25 wt.-%, more preferably about 3 to about 20 wt.-%, based on the total weight of the composition; and/or at least one betaine in an amount of about 1 to about 30 wt.-%, preferably about 2 to about 25 wt.-%, more preferably about 3 to about 20 wt.-%, based on the total weight of the composition.

[0074] It is further preferable that the liquid composition comprises, in addition to any of the aforementioned ingredients, at least one further ingredient, which may improve cleaning performance, stability, aesthetics or other attributes and characteristics of the liquid composition. Thus, in various preferred embodiments, the liquid compositions further comprise at least one additive selected from the group consisting of additional surfactants, additional water-soluble salts, acids, perfumes, solvents, dyes, opacifiers, viscosity regulators, enzymes, corrosion inhibitors, pH-value adjuster, preservatives, UV stabilizers, skin-care substances, or mixtures thereof.

Cationic Surfactants

[0075] The composition according to the invention may additionally contain one or more cationic surfactants (cationic surfactants; INCI Quaternary Ammonium Compounds).

[0076] Preferred cationic surfactants are the quaternary surface-active compounds, more particularly containing an ammonium, sulfonium, phosphonium, iodonium or arsonium group, which are described as antimicrobial agents, for example, in K. H. Wallhäußer's "Praxis der Sterilisation, Desinfektion-Konservierung: Keimidentifizierung-Betriebshygiene" (5th Edition, Stuttgart/New York: Thieme, 1995). By using antimicrobial quaternary ammonium compounds, the composition can be given an antimicrobial effect or any antimicrobial activity already present through other ingredients can be improved.

[0077] Particularly preferred cationic surfactants are quaternary ammonium compounds (QUATS; INCI Quaternary Ammonium Compounds) corresponding to the general formula $(R^I)(R^{II})(R^{III})(R^{IV})N^+X^-$, in which R^I to R^{IV} may be the same or different and represent C_{1-22} alkyl groups, C_{7-28} aralkyl groups or heterocyclic groups, two or - in the case of an aromatic compound, such as pyridine - even three groups together with the nitrogen atom forming the heterocycle, for example a pyridinium or imidazolium compound, and X^- represents halide ions, sulfate ions, hydroxide ions or similar anions. In the interests of optimal antimicrobial activity, at least one of the substituents preferably has a chain length of 8 to 18 and, more preferably, 12 to 16 carbon atoms.

[0078] QUATS can be obtained by reaction of tertiary amines with alkylating agents such as, for example, methyl chloride, benzyl chloride, dimethyl sulfate, dodecyl bromide and also ethylene oxide. The alkylation of tertiary amines with one long alkyl chain and two methyl groups is particularly simple. The quaternization of tertiary amines containing two long chains and one methyl group can also be carried out under mild conditions using methyl chloride. Amines containing three long alkyl chains or hydroxysubstituted alkyl chains lack reactivity and are preferably quaternized with dimethyl sulfate.

[0079] Suitable QUATS are, for example, benzalkonium chloride (N-alkyl-N,N-dimethylbenzyl ammonium chloride, CAS No. 8001-54-5), benzalkon B (m,p-dichlorobenzyl dimethyl- C_{12} -alkyl ammonium chloride, CAS No. 58390-78-6), benzoxonium chloride (benzyl dodecyl-bis-(2-hydroxyethyl)-ammonium chloride), cetrimonium bromide (N-hexadecyl-N,N-trimethyl ammonium bromide, CAS No. 57-09-0), benzetonium chloride (N,N-di-methyl-N-[2-[2-[p-(1,1,3,3-tetramethylbutyl)-phenoxy]-ethoxy]-ethyl]-benzyl ammonium chloride, CAS No. 121-54-0), dialkyl dimethyl ammonium chlorides, such as di-n-decyldimethyl ammonium chloride (CAS No. 7173-51-5-5), didecyldimethyl ammonium bromide (CAS No. 2390-68-3), dioctyl dimethyl ammonium chloride, 1-cetylpyridinium chloride (CAS No. 123-03-5) and thiazoline iodide (CAS No. 15764-48-1) and mixtures thereof. Particularly preferred QUATS are the benzalkonium chlorides containing C_{8-18} alkyl groups, more particularly C_{12-14} alkyl benzyl dimethyl ammonium chloride. A particularly preferred QUAT is cocopentaethoxy methyl ammonium methosulfate (INCI PEG-5 Cocomonium Methosulfate; Rewoquat® CPEM).

[0080] To avoid possible incompatibilities of the cationic surfactants with the anionic surfactants, the cationic surfactant used should be compatible with anionic surfactants or should only be used in very small amounts. In one particular embodiment of the invention, no cationic surfactants are used at all.

Builder

[0081] A detergent, as contemplated herein, may further contain at least one water-soluble and/or water-insoluble, organic and/or inorganic builder.

[0082] The water-soluble organic builder substances include polycarboxylic acids, in particular citric acid and saccharic acids, monomeric and polymeric aminopolycarboxylic acids, in particular methylglycinediacetic acid, nitrotri-acetic acid and ethylenediaminetetraacetic acid and polyaspartic acid, polyphosphonic acids, in particular aminotris(methylenephosphonic acid), ethylenediaminetetrakis(methylenephosphonic acid) and 1-hydroxyethyl-1,1-diphosphonic acid, polymeric hydroxy compounds such as dextrin and polymeric (poly)carboxylic acids, in particular polycarboxylates obtainable by oxidation of polysaccharides or dextrans, polymeric acrylic acids, methacrylic acids, maleic acids and copolymers thereof, which may also contain small proportions of polymerizable substances without carboxylic acid functionality incorporated therein by polymerization. The relative molecular mass of the homopolymers of unsaturated carboxylic acids is in general between about 3,000 and about 200,000, that of the copolymers between about 2,000 and about 200,000, preferably about 30,000 to about 120,000, in each case relative to free acid. One particularly preferred acrylic acid/maleic acid copolymer has a relative molecular mass of about 30,000 to about 100,000. Conventional commercial products are for example Sokalan® CP 5, CP 10 and PA 30 from BASF. Suitable, albeit less preferred, compounds of this class are copolymers of acrylic acid or methacrylic acid with vinyl ethers, such as vinyl methyl ethers, vinyl esters, ethylene, propylene and styrene, the acid fraction of which amounts to at least 50 wt. %. Terpolymers containing as monomers two unsaturated acids and/or the salts thereof and, as third monomer, vinyl alcohol and/or a esterified vinyl alcohol or a carbohydrate may also be used as water-soluble organic builder substances. The first acidic monomer or the salt thereof is derived from a monoethylenically unsaturated C3-C8-carboxylic acid and preferably from a C3-C4-monocarboxylic acid, in particular from (meth)acrylic acid. The second acidic monomer or the salt thereof may be a derivative of a C4-C8-dicarboxylic acid, maleic acid being particularly preferred, and/or a derivative of an allylsulfonic acid, which is substituted in position 2 with an alkyl or aryl residue. Such polymers generally have a relative molecular mass of between about 1,000 and about 200,000. Further preferred copolymers are those, which comprise acrolein and acrylic acid/acrylic acid salts or vinyl acetate as monomers. The organic builder substances may be used, in particular for producing liquid products, in the form of aqueous solutions, preferably in the form of about 30 to about 50 wt. % aqueous solutions. All the stated acids are generally used in the form of the water-soluble salts, in particular the alkali metal salts, thereof.

[0083] Such organic builder substances may, if desired, be present in quantities of up to 40 wt.-%, in particular of up to 25 wt.-% and preferably of about 1 wt.-% to about 8 wt.-%. Quantities close to the stated upper limit are preferably used in pasty or liquid, in particular water-containing detergent formulations as contemplated herein.

[0084] Water-soluble inorganic builder materials, which may in particular be considered, are alkali metal silicates, alkali metal carbonates and alkali metal phosphates, which may be present in the form of the alkaline, neutral or acidic sodium or potassium salts thereof. Examples of these are trisodium phosphate, tetrasodium diphosphate, disodium dihydrogendiphosphate, pentasodium triphosphate, "sodium hexametaphosphate", oligomeric trisodium phosphate with degrees of oligomerization of 5 to 1000, in particular 5 to 50, and the corresponding potassium salts or mixtures of sodium and potassium salts. Water-insoluble, water-dispersible inorganic builder materials which are used are in particular crystalline or amorphous alkali metal aluminosilicates, in quantities of up to 50 wt. %, preferably of no more than 40 wt. % and, in liquid products, in particular from about 1 wt. % to about 5 wt. %. Preferred such materials are crystalline sodium aluminosilicates of detergent grade, in particular zeolite A, P and optionally X, alone or in mixtures, for example in the form of a co-crystallization product of zeolites A and X (Vegobond® AX, a commercial product of Condea Augusta S.p.A.). Quantities close to the stated upper limit are preferably used in solid, particulate products. Suitable aluminosilicates in particular comprise no particles with a grain size of above 30 µm and preferably consist to an extent of at least 80 wt.-% of particles with a size below 10 µm. Their calcium binding capacity, which may be determined as stated in German patent DE 24 12 837, is generally in the range from 100 to 200 mg of CaO per gram.

[0085] Suitable substitutes or partial substitutes for the described aluminosilicates are crystalline alkali metal silicates, which may be present alone or mixed with amorphous silicates. The alkali metal silicates usable as builders in the products as contemplated herein preferably have a molar ratio of alkali metal oxide to SiO₂ of below 0.95, in particular of about 1:1.1 to about 1:12 and may be in amorphous or crystalline form. Preferred alkali metal silicates are sodium silicates, in particular amorphous sodium silicates, with an Na₂O:SiO₂ molar ratio of 1:2 to 1:2.8. Those with an Na₂O:SiO₂ molar ratio of about 1:1.9 to about 1:2.8 may be produced in accordance with the method of European patent application EP 0 425 427. Preferably used crystalline silicates, which may be present alone or mixed with amorphous silicates, are crystalline phyllosilicates of the general formula Na₂Si_xO_{2x+1}·y H₂O, in which x, or "modulus", is a number from about 1.9 to about 22, in particular about 1.9 to about 4 and y is a number from 0 to about 33 and preferred values for x are 2, 3 or 4. Preferred crystalline phyllosilicates are those in which x in the stated general formula assumes the values 2 or 3.

[0086] In particular, both β- and δ-sodium disilicates (Na₂Si₂O₅·y H₂O) are preferred. Virtually anhydrous crystalline alkali metal silicates of the above-stated general formula in which x means a number from about 1.9 to about 2.1, which are produced from amorphous alkali metal silicates, may be used in detergents as contemplated herein. A crystalline sodium phyllosilicate with a modulus of about 2 to about 3, as may be produced from sand and soda, is used in a further preferred embodiment of detergents as contemplated herein. Crystalline layered silicates of the above-stated formula (I) are commercially available from Clariant GmbH under the trade name Na-SKS, for example Na-SKS-1 (Na₂Si₂₂O₄₅·xH₂O, kenyaite), Na-SKS-2 (Na₂Si₁₄O₂₉·xH₂O, magadiite), Na-SKS-3 (Na₂Si₈O₁₇·xH₂O) or Na-SKS-4 (Na₂Si₄O₉·xH₂O, makatite). Suitable representatives of these are primarily Na-SKS-5 (α-Na₂Si₂O₅), Na-SKS-7 (β-Na₂Si₂O₅, natrosilite), Na-SKS-9 (NaHSi₂O₅·3H₂O), Na-SKS-10 (NaHSi₂O₅·3H₂O, kanemite), Na-SKS-11 (t-Na₂Si₂O₅) and Na-SKS-13 (NaHSi₂O₅), but in particular Na-SKS-6 (δ-Na₂Si₂O₅). In a preferred development of detergents as contemplated herein, a granular compound is used which is prepared from crystalline phyllosilicate and citrate, from crystalline phyllosilicate and above-stated (co)polymeric polycarboxylic acid, or from alkali metal silicate and alkali metal carbonate, as is commercially available for example under the name Nabion® 15.

[0087] Builder substances may be present in detergent formulations as contemplated herein in quantities of up to 20 wt.-%, in particular of about 1 wt.-% to about 15 wt.-%, based on the total weight of the composition.

Skin care substances

[0088] The skin care substance may be a compound or mixture of compounds and may preferably be hydrophobic, liquid or solid and must be compatible with the other ingredients of the composition. The skin care compound may be selected, for instance, from:

- a) waxes such as carnauba, spermaceti, beeswax, lanolin, derivatives thereof as well as their mixtures;
- b) plant extracts, for example vegetal oils such as avocado oil, olive oil, palm oil, palm nut oil, rape seed oil, linseed oil, soya oil, peanut oil, coriander oil, castor oil, poppy-seed oil, coconut oil, pumpkin seed oil, wheat germ oil, sesame oil, sunflower oil, almond oil, macadamia nut oil, apricot nut oil, hazel nut oil, jojoba oil or canola oil, chamomile, aloe vera or also green tea extract or plankton extract as well as mixtures thereof;
- c) higher fatty acids such as lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, oleic acid, linoleic acid, linolenic acid, isostearic acid or polyunsaturated fatty acids;
- d) higher fatty alcohols such as lauryl alcohol, cetyl alcohol, stearyl alcohol, oleyl alcohol, behenyl alcohol or 2-hexadecanol;
- e) esters, such as cetyl octanoate, lauryl lactate, myristyl lactate, cetyl lactate, isopropyl myristate, myristyl myristate, isopropyl palmitate, isopropyl adipate, butyl stearate, decyl oleate, cholesterol isostearate, glycerol monostearate, glycerol distearate, glycerol tristearate, alkyl lactate, alkyl citrate or alkyl tartrate;

- f) hydrocarbons such as paraffins, mineral oils, squalane or squalene;
- g) lipids;
- h) vitamins such as vitamin A, C or E or vitamin alkyl esters;
- i) phospholipids;
- 5 j) sun protection agents such as octyl methoxycinnamate and butyl methoxybenzoylmethane;
- k) silicone oils such as linear or cyclic polydimethylsiloxanes, amino-, alkyl-, alkylaryl- or aryl-substituted silicone oils; and
- l) mixtures thereof.

10 **[0089]** Skin care substances may be present in the compositions according to the present invention in quantities of up to 5 wt.-%, in particular of about 0.1 wt.-% to about 4 wt.-%, based on the total weight of the composition.

[0090] In various embodiments, the composition comprises a perfume. Suitable perfume oils may comprise individual fragrant compounds, for example synthetic products of the ester, ether, aldehyde, ketone, alcohol, and hydrocarbon type. Fragrant compounds of the ester type are, for example, benzyl acetate, phenoxyethyl isobutyrate, p-tert-butylcyclohexyl acetate, linalyl acetate, dimethylbenzyl carbonyl acetate (DMBCA), phenylethyl acetate, benzyl acetate, ethylmethylphenyl glycinate, allylcyclohexyl propionate, styryl propionate, benzyl salicylate, cyclohexyl salicylate, floramate, melusate and jasmecyclate. The ethers include, for example, benzyl ethyl ether and ambroxan; the aldehydes include, for example, the linear alkanals containing 8 to 18 carbon atoms, citral, citronellal, citronellyloxyacetaldehyde, cyclamen aldehyde, lilyal and bourgeonal; the ketones include, for example, the ionones, isomethyl ionone and methyl cedryl ketone; the alcohols include anethol, citronellol, eugenol, geraniol, linalool, phenylethyl alcohol and terpineol and the hydrocarbons include, for example the terpenes, such as limonene and pinene. However, mixtures of various fragrances, which together produce an attractive fragrant note of the resulting perfume oil, are preferably used.

[0091] The perfume oils may also contain natural mixtures of fragrances, as are obtainable from vegetal sources, for example pine, citrus, jasmine, patchouli, rose or ylang-ylang oil. Also suitable are e.g. muscatel sage oil, chamomile oil, clove oil, melissa oil, mint oil, cinnamon leaf oil, lime blossom oil, juniper berry oil, vetiver oil, olibanum oil, galbanum oil and laudanum oil and orange blossom oil, neroli oil, orange peel oil and sandalwood oil.

[0092] Exemplary long-lasting fragrances may be selected from essential oils, such as angelica root oil, aniseed oil, arnica flowers oil, basil oil, bay oil, bergamot oil, champax blossom oil, silver fir oil, silver fir cone oil, elemi oil, eucalyptus oil, fennel oil, pine needle oil, galbanum oil, geranium oil, ginger grass oil, guaiacum wood oil, Indian wood oil, helichrysum oil, ho oil, ginger oil, iris oil, cajuput oil, sweet flag oil, chamomile oil, camphor oil, Canoga oil, cardamom oil, cassia oil, Scotch fir oil, copaiba balsam oil, coriander oil, spearmint oil, caraway oil, cumin oil, lavender oil, lemon grass oil, limette oil, mandarin oil, melissa oil, amber seed oil, myrrh oil, clove oil, neroli oil, niaouli oil, olibanum oil, orange oil, organum oil, Palma Rosa oil, patchouli oil, Peru balsam oil, petit grain oil, pepper oil, peppermint oil, pimento oil, pine oil, rose oil, rosemary oil, sandalwood oil, celery seed oil, lavender spike oil, Japanese anise oil, turpentine oil, thuja oil, thyme oil, verbena oil, vetiver oil, juniper berry oil, wormwood oil, wintergreen oil, ylang-ylang oil, ysoop oil, cinnamon oil, cinnamon leaf oil and cypress oil. However, in the context of the present invention, the higher boiling or solid fragrances of natural or synthetic origin can be advantageously used as long-lasting fragrances or mixtures of fragrances. These compounds include for example the following compounds and their mixtures: ambrettolide, amyl cinnamaldehyde, anethol, anisaldehyde, anis alcohol, anisole, methyl anthranilate, acetophenone, benzyl acetone, benzaldehyde, ethyl benzoate, benzophenone, benzyl alcohol, borneol, bornyl acetate, bromostyrene, n-decyl aldehyde, n-dodecyl aldehyde, eugenol, eugenol methyl ether, eucalyptol, farnesol, fenchone, fenchyl acetate, geranyl acetate, geranyl formate, heliotropin, methyl heptyne carboxylate, heptaldehyde, hydroquinone dimethyl ether, hydroxycinnamaldehyde, hydroxycinnamyl alcohol, indole, irone, isoeugenol, isoeugenol methyl ether, isosafrol, jasmone, camphor, carvacrol, carvone, p-cresol methyl ether, coumarone, p-methoxyacetophenone, methyl n-amyl ketone, methyl anthranilic acid methyl ester, p-methylacetophenone, methyl chavicol, p-methylquinoline, methyl naphthyl ketone, methyl n-nonyl acetaldehyde, methyl n-nonyl ketone, muscone, naphthol ethyl ether, naphthol methyl ether, nerol, nitrobenzene, n-nonyl aldehyde, nonyl alcohol, n-octyl aldehyde, p-oxyacetophenone, pentadecanolide, phenyl ethyl alcohol, phenyl acetaldehyde dimethyl acetal, phenylacetic acid, pulegone, safrol, isoamyl salicylate, methyl salicylate, hexyl salicylate, cyclohexyl salicylate, santalol, scatol, terpineol, thymine, thymol, undecalactone, vanillin, veratrum aldehyde, cinnamaldehyde, cinnamyl alcohol, cinnamic acid, ethyl cinnamate, benzyl cinnamate. In the context of the present invention, the advantageously utilizable fragrances of higher volatility particularly include the lower boiling fragrances of natural or synthetic origin that can be used alone or in mixtures. Exemplary fragrances of higher volatility are alkyl isothiocyanates (alkyl mustard oils), butanedione, limonene, linalool, linalyl acetate and linalyl propionate, menthol, menthone, phellandrene, phenylacetaldehyde, terpinyl acetate, citral, citronellal.

55 **[0093]** In order to achieve an aroma therapeutic effect, essential oils may be used as the benefit agent. Exemplary essential oils are angelica fine (angelica archangelica), aniseed (pimpinella anisum), benzoe siam (styrax tokinensis), cabreuva (myrcarpus fastigiatus), cajeput (melaleuca leucadendron), cistrose (cistrus ladaniferus), copaiba-balsam (copaifera reticulata), costic root (saussurea discolor), silver fir needle (abies alba), elemi (canarium luzonicum), fennel

(foeniculum dulce) pine-needle (picea abies), geranium (pelargonium graveolens), ho-leaves (cinnamomum camphora), immortals (straw flower), helichrysum ang., ginger, perforate St. John's wort (hypericum perforatum), jojoba, German chamomile (matricaria recutita), chamomile oil blue (matricaria chamomilla), Roman chamomile (anthemis nobilis), wild chamomile (ormensis multicaulis), carrot (daucus carota), knee pine (pinus mugho), lavender (lavendula hybrida), litsea cubeba (may chang), manuca (leptospermum scoparium), balm mint (melissa officinalis), pine tree (pinus pinaster), myrrh (commiphora molmol), myrtle (myrtus communis), neem (azadirachta), niaouli (mqv) melaleuca quin. viridiflora, palmarosa (cymbopogon martini), patchouli (pogostemon patschuli), perubalsam (myroxylon balsamum var. pereirae), raventsara aromatica, rose wood (aniba rosae odora), sage (salvia officinalis), horsetail (equisetaceae), yarrow (achillea millefolia), narrow leaf plantain (plantago lanceolata), styrax (liquidambar orientalis), tagetes (marigold) tagetes patula, tea tree (melaleuca alternifolia), tolubalsam (myroxylon balsamum l.), virginia-ceder (juniperus virginiana), frankincense (olibanum) (boswellia carteri), and silver fir (abies alba).

[0094] The amount of perfume in the compositions according to the present invention may be up to 5 wt.-%, in particular about 0.01 wt.-% to about 5 wt.-%, more preferably about 0.1 to about 4 wt.-%, based on the total weight of the composition.

15 Solvents

[0095] The water content of the liquid composition according to the invention may be in the range of about 5 to 40 wt.-%, preferably about 7 to 35 wt.-%, more preferably about 10 to 25 wt.-%, based on the total weight of the liquid composition. The composition according to the invention may advantageously contain one or more water-soluble organic solvents in a quantity of typically 0.1 to 15 wt.-%, preferably 1 to 12 wt.-%, more preferably 1 to 10 wt.-%, based on the total weight of the composition.

[0096] In the context of the teaching according to the invention, the solvent is used in particular as a hydrotropic agent, a viscosity adjuster and/or low-temperature stabilizer according to requirements. It has a solubilizing effect, particularly on surfactants and electrolytes, perfumes and dyes, and thus contributes to their incorporation, prevents the formation of liquid crystalline phases and contributes to the formation of clear products. The viscosity of the composition according to the invention decreases with increasing solvent content. However, too much solvent can produce a fall in viscosity. Finally, the cold cloud and clear point of the composition according to the invention decreases with increasing solvent content. Suitable solvents are, for example, saturated or unsaturated, preferably saturated, branched or unbranched C₁₋₂₀ hydrocarbons, preferably C₂₋₁₅ hydrocarbons, containing at least one hydroxy group and optionally one or more ether functions C-O-C, i.e. oxygen atoms interrupting the carbon atom chain.

[0097] Preferred solvents are the C₂₋₆ alkylene glycols and poly-C₂₋₃-alkylene glycol ethers, optionally etherified on one side with a C₁₋₆ alkanol, containing on average 1 to 9 identical or different, preferably identical, alkylene glycol groups per molecule and the C₁₋₆ alcohols, preferably ethanol, n-propanol or isopropanol, more particularly ethanol.

[0098] Examples of solvents are the following compounds identified by their INCI names: Alcohol (Ethanol), Buteth-3, Butoxydiglycol, Butoxyethanol, Butoxyisopropanol, Butoxypropanol, n-Butyl Alcohol, t-Butyl Alcohol, Butylene Glycol, Butyloctanol, Diethylene Glycol, Dimethoxydiglycol, Dimethyl Ether, Dipropylene Glycol, Ethoxydiglycol, Ethoxyethanol, Ethyl Hexanediol, Glycol, Hexanediol, 1,2,6-Hexanetriol, Hexyl Alcohol, Hexylene Glycol, Isobutoxypropanol, Isopentyl-di-ol, Isopropyl Alcohol (isoPropanol), 3-Methoxybutanol, Methoxydiglycol, Methoxyethanol, Methoxyisopropanol, Methoxymethylbutanol, Methoxy PEG-10, Methylal, Methyl Alcohol, Methyl Hexyl Ether, Methylpropanediol, Neopentyl Glycol, PEG-4, PEG-6, PEG-7, PEG-8, PEG-9, PEG-6 Methyl Ether, Pentylene Glycol, PPG-7, PPG-2-Buteth-3, PPG-2 Butyl Ether, PPG-3 Butyl Ether, PPG-2 Methyl Ether, PPG-3 Methyl Ether, PPG-2 Propyl Ether, Propanediol, Propyl Alcohol (n-Propanol), Propylene Glycol, Propylene Glycol Butyl Ether, Propylene Glycol Propyl Ether, Tetrahydrofurfuryl Alcohol, Trimethylhexanol.

[0099] Particularly preferred solvents are the poly-C₂₋₃-alkylene glycol ethers etherified on one side with a C₁₋₆ alkanol and containing on average 1 to 9 and preferably 2 to 3 ethylene or propylene glycol groups, for example PPG-2 Methyl Ether (dipropylene glycol monomethyl ether). Most particularly preferred solvents are the C₂₋₃ alcohols ethanol, n-propanol and/or isopropanol, more particularly ethanol.

[0100] Besides the solvents described above, suitable solubilizers, particularly for perfume and dyes, are, for example, alkanolamines and alkyl benzene sulfonates containing 1 to 3 carbon atoms in the alkyl chain.

50 Viscosity

[0101] The viscosity favorable for the composition according to the invention (at 20° C and at a shear rate of 30 s⁻¹, as measured with a Brookfield LV DV 11 viscosimeter, spindle 25) is in the range from about 10 to about 2,000 mPa-s, preferably about 50 to about 1,000 mPa-s, in particular about 100 to about 1200 mPa-s (instead of 1000 mPas), more preferably about 200 to about 1000 mPa-s.

[0102] After dilution of the liquid composition with, based on the volume of the liquid composition, about 1 to about 8 parts, preferably about 1.5 to about 7 parts, more preferably about 2 to about 7 parts, particularly about 2 to about 4

parts of water, the diluted composition preferably has a viscosity (at 20° C and at a shear rate of 30 s⁻¹, as measured with a Brookfield LV DV 11 viscosimeter, spindle 25) of about 30 to about 100,000 mPa·s, preferably about 50 to about 90,000 mPa·s, in particular about 100 to about 60,00 mPa·s, most preferably about 500 to about 55,000 mPa·s, such as, or instance but without limitation, about 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1,000, 1,100, 1,200, 1,300, 1,400, 1,500, 2,000, 2,500, 3,000, 3,500, 4,000, 4,500, 5,000, 5,500, 6,000, 6,500, 7,000, 7,500, 8,000, 8,500, 9,000, 9,500, 10,000, 11,000, 12,000, 13,000, 14,000, 15,000, 16,000, 17,000, 18,000, 19,000, 20,000, 25,000, 30,000, 35,000, 40,000, 45,000 or 50,000 mPa·s.

Polymeric Thickeners

[0103] Polymeric thickeners in the context of the present invention are the polycarboxylates with a thickening effect as polyelectrolytes, preferably homopolymers and copolymers of acrylic acid, more particularly acrylic acid copolymers, such as acrylic acid/methacrylic acid copolymers, and the polysaccharides, more particularly heteropolysaccharides, and other typical thickening polymers.

[0104] Suitable polysaccharides or heteropolysaccharides are the polysaccharide gums, for example gum arabic, agar, alginates, carrageenans and their salts, guar, guaran, tragacanth, geilan, ramsan, dextran or xanthan and their derivatives, e.g. propoxylated guar, as well as their mixtures. Other polysaccharide thickeners, such as starches or cellulose derivatives, can be used alternatively, but preferably in addition to a polysaccharide gum, for example starches of various origins and starch derivatives, e.g. hydroxyethyl starch, starch phosphate esters or starch acetates, or carboxymethyl cellulose or its sodium salt, methyl, ethyl, hydroxyethyl, hydroxypropyl, hydroxypropyl methyl or hydroxyethyl methyl cellulose or cellulose acetate.

[0105] A particularly preferred polymeric thickener is the microbial anionic heteropolysaccharide xanthan gum which is produced by *Xanthomonas campestris* and a few other species under aerobic conditions and which has a molecular weight of 2 to 15×10⁶. This polymer is obtainable from Kelco, for example, under the name of Keltrol[®], for example as the cream-colored powder Keltrol[®] T (transparent) or the white granules Keltrol[®] RD (readily dispersible).

[0106] Acrylic acid polymers suitable as polymeric thickeners are, for example, the high molecular weight homopolymers of acrylic acid crosslinked with a polyalkenyl polyether, more particularly an allyl ether of sucrose, pentaerythritol or propylene (INCI Carbomer), which are also known as carboxyvinyl polymers. Polyacrylic acids such as these are obtainable inter alia from B.F. Goodrich under the name of Carbopol[®], for example Carbopol[®] 940 (molecular weight ca. 4,000,000 g/mol), Carbopol[®] 941 (molecular weight ca. 1,250,000 g/mol) or Carbopol[®] 934 (molecular weight ca. 3,000,000 g/mol).

[0107] However, particularly suitable polymeric thickeners are the following acrylic acid copolymers: (i) copolymers of two or more monomers from the group of acrylic acid, methacrylic acid and their simple esters preferably formed with C₁₋₄ alkanols (INCI Acrylates Copolymer), which include for example the copolymers of methacrylic acid, butyl acrylate and methyl methacrylate (CAS 250235-69-2) or of butyl acrylate and methyl methacrylate (CAS 25852-37-3) and which are obtainable, for example, from Rohm & Haas under the names of Aculyn[®] and Acusol[®], for example the anionic non-associative polymers Aculyn[®] 33 (crosslinked), Acusol[®] 810 and Acusol[®] 830 (CAS 25852-37-3); (ii) crosslinked high molecular weight acrylic acid copolymers which include, for example, the copolymers of C₁₀₋₃₀ alkyl acrylates-crosslinked with an allyl ether of sucrose or pentaerythritol-with one or more monomers from the group of acrylic acid, methacrylic acid and their simple esters preferably formed with C₁₋₄ alkanols (INCI Acrylates/C10-30 Alkyl Acrylate Crosspolymer) and which are obtainable, for example, from B.F. Goodrich under the name of Carbopol[®], for example the hydrophobicized Carbopol[®] ETD 2623 and Carbopol[®] 1382 (INCI Acrylates/C10-30 Alkyl Acrylate Crosspolymer) and Carbopol[®] AQUA 30 (formerly Carbopol[®] EX 473).

[0108] The polymeric thickener content is normally not more than 8% by weight, preferably between 0.1 and 7% by weight, more preferably between 0.5 and 6% by weight, most preferably between 1 and 5% by weight and, in one most particularly preferred embodiment, between 1.5 and 4% by weight. In various embodiments, however, the compositions according to the present invention are free from polymeric thickeners, and preferably do not contain any thickeners at all, as the thickening effect is brought about by the presence of the at least one electrolyte salt in the amounts provided herein.

[0109] In one preferred embodiment of the invention, however, the composition is free from polymeric thickeners.

Dicarboxylic Acid (Salts)

[0110] In order to stabilize the liquid composition according to the invention, particularly where it has a high surfactant content, one or more dicarboxylic acids and/or salts thereof, more particularly a composition of Na salts of adipic acid, succinic acid and glutaric acid commercially obtainable, for example, as Sokalan[®] DSC, may be added, advantageously in quantities of 0.1 to 8% by weight, preferably in quantities of 0.5 to 7% by weight, more preferably in quantities of 1.3 to 6% by weight and most preferably in quantities of 2 to 4% by weight.

[0111] A change in the content of dicarboxylic acid (salt), more particularly in quantities above 2% by weight, can contribute to a clear solution of the ingredients. The viscosity of the mixture can also be influenced within certain limits by this component. In addition, this component influences the solubility of the mixture. In a particularly preferred embodiment, the component in question is used where the surfactant content is high, more particularly above 30% by weight. However, if their presence is not essential, the composition according to the invention is preferably free from dicarboxylic acids (salts).

Auxiliaries and Additives

[0112] In addition, one or more other typical auxiliaries and additives, particularly in manual dishwashing detergents and cleaners for hard surfaces, more particularly builders, UV stabilizers, pearlizers (INCI Opacifying Agents; for example glycol distearate, for example Cutina® AGS of Henkel AG & Co. KGaA or mixtures containing it, for example the Euperlans® of Henkel KGaA), dyes, corrosion inhibitors, preservatives (for example the technical 2-bromo-2-nitropropane-1,3-diol also known as Bronopol (CAS 52-51-7) which is commercially obtainable from Boots as Boots Bronopol BT) may be present in the compositions according to the invention in quantities of normally not more than 5% by weight, preferably 0.1 to 3 wt.-%.

pH-value

[0113] The pH-value of the of the compositions according to the invention may be adjusted with typical pH adjusters, for example acids, such as mineral acids or citric acid, and/or alkalis, such as sodium or potassium hydroxide, a pH in the range from 6.0 to 9, preferably in the range from 6.5 to 8.5 and more particularly in the range from 6.8 to 8.5 being preferred.

[0114] In order to adjust and/or stabilize the pH-value, the composition according to the invention may contain one or more buffers (INCI Buffering Agents) in quantities of typically 0.001 to 5% by weight, preferably 0.005 to 3% by weight, more preferably 0.01 to 2% by weight, most preferably 0.05 to 1% by weight and, in one most particularly preferred embodiment, 0.1 to 0.5% by weight, for example 0.2% by weight. Buffers which are also complexing agents or even chelators (INCI Chelating Agents) are preferred. Particularly preferred buffers are citric acid or the citrates, more particularly the sodium and potassium citrates, for example trisodium citrate *2 H₂O and tripotassium citrate *H₂O.

Production

[0115] The composition according to the invention may be prepared by stirring the individual constituents together in any order. The addition sequence is not crucial to the production of the composition. Water, surfactants and optionally others of the ingredients mentioned above are preferably stirred together. If perfume and/or dye is/are used, they are subsequently added to the solution obtained. The pH value is then adjusted as described above.

[0116] In a further aspect, the present invention relates to the use of a liquid composition, as herein described above, for the cleaning of hard surfaces, as herein defined, particularly for manual dishwashing applications.

[0117] In a still further aspect, the present invention also relates to the use of a liquid composition, as herein described above, for the preparation of a dilute aqueous hard surface cleaning composition, particularly for the preparation of a dilute manual dishwashing detergent composition.

[0118] Consequently, in yet another aspect, the present invention furthermore relates to a method for the preparation of a dilute aqueous hard surface cleaning composition, particularly a dilute manual dishwashing detergent composition, characterized in that a liquid composition as herein disclosed and described is diluted with about 1 to about 8 parts, preferably about 1.5 to about 7 parts, more preferably about 2 to about 7 parts, particularly about 2 to about 4 parts of water, based on the volume of the liquid composition.

[0119] All embodiments disclosed herein in relation to the liquid compositions apply similarly to the methods and uses of the invention and *vice versa*.

[0120] The following examples are given to illustrate the present invention. Because these examples are given for illustrative purposes only, the invention should not be deemed limited thereto.

Examples

[0121]

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Table 1

Ingredients	Liquid composition Example 1	Liquid composition Example 2	Liquid composition Example 3	Liquid composition Example 4
NaCl	1.50		3,75	
KCl		1.50		3,75
GLDA	2.87	2.87	2.87	2.87
Potassium acetate (70 % solution)	0.87	0.87	1.16	1.16
Phenoxyethanol	0.90	0.90	0.90	0.90
Biocide	0.20	0.20	0.20	0.20
Perfume oil	0.75	0.75	1.00	1.00
Amine oxide	19.49	19.49	19.49	19.49
Citric acid	0.52	0.52	0.52	0.52
FAEOS-Na C12-14 2EO	33.42	33.42	33.42	33.42
Cocoamidopropyl betaine	19.06	19.06	19.06	19.06
Dye	0.92	0.92	1.22	1.22
Ethanol			1.00	1.00
Enzyme (Amylase: Amplify 12L)	0.30	0.30	0.40	0.40
Enzyme (Protease: Novozym HET Ultra 1000ML)	0.60	0.60	0.80	0.80
Water	ad 100	ad 100	ad 100	ad 100
pH of concentrate	7.8	7.8	7.8	7.8
Viscosity of concentrate [mPa·s]	670	610	848	530
Viscosity of dilute (concentrate:water = 1:2)	99,100	61,100	31,100	31,700
Viscosity of dilute (concentrate:water = 1:3)	1,170	1,760	46,700	29,100
Viscosity of dilute (concentrate:water = 1:3.5)	95	170	2,150	4,260
Viscosity of dilute (concentrate:water = 1:4)	55	70	645	1,310

[0122] Amounts of ingredients given in wt.-%, based on the total weight of the liquid composition.

[0123] Each of liquid composition Examples 1-4 was prepared by first mixing the electrolyte salt(s), GLDA, potassium acetate, phenoxyethanol, biocide, perfume, and amine oxide with about 30-90 wt.-% of the total water content in the final concentrate composition. The pH of the resultant mixture was adjusted to be in the range of about 7.6-9.7 by adding citric acid, after which the fatty alcohol ether sulfates, the betaine, the dye and ethanol, insofar present, was added.

Insofar necessary, the pH of the resultant mixture was adjusted to be in the range of about 7.8-7.9 by adding citric acid, after which the enzymes were added. In a last step, the remainder of the water portion was added to obtain the desired amount of concentrate.

[0124] Viscosities were measured at 20 °C, 3 rpm, Spindle 31, Brookfield DV2T.

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Claims

- 10 1. A liquid composition, particularly a manual dishwashing detergent composition, said composition being a concentrate to be diluted with water while maintaining or increasing viscosity, **characterized in that** it comprises at least one electrolyte salt selected from the group consisting of alkali metal salts and/or alkaline earth metal salts of an inorganic acid, preferably an inorganic acid selected from the group consisting of the hydrohalic acids, nitric acid and sulfuric acid, more particularly the chlorides and sulfates in an amount of about 0.05 to about 10 wt.-%, preferably about 0.5 to about 5 wt.-%, based on the total weight of the liquid composition.
- 15 2. The liquid composition according to claim 1, wherein the at least one electrolyte salt is selected from the group consisting of alkali metal salts, preferably from the group consisting of alkali metal chlorides and sulfates, more preferably from the group consisting of alkali chlorides, particularly from the group consisting of NaCl and KCl, and mixtures thereof.
- 20 3. The liquid composition according to claim 1 or claim 2, wherein the concentrate is to be diluted with about 1 to about 8 parts, preferably about 1.5 to about 7 parts, more preferably about 2 to about 7 parts, particularly about 2 to about 4 parts of water, based on the volume of the liquid composition.
- 25 4. The liquid composition according to any one of claims 1 to 3, further comprising at least one surfactant, preferably at least two surfactants, selected from the group consisting of anionic surfactants, nonionic surfactants and amphoteric surfactants.
- 30 5. The liquid composition according to any one of claims 1 to 4, comprising at least one anionic surfactant selected from the group consisting of aliphatic sulfates, preferably from the group consisting of fatty alcohol sulfates and fatty alcohol ether sulfates, more preferably from the group consisting of Na C₁₂₋₁₄ fatty alcohol ether sulfate (1-4 EO), preferably Na C₁₂₋₁₄ fatty alcohol ether sulfate (1-2 EO).
- 35 6. The liquid composition according to any one of claims 1 to 5, comprising at least one nonionic surfactant selected from the group consisting of polyglycol ethers, fatty alcohol polyglycol ethers, alkyl phenol polyglycol ethers, end-capped polyglycol ethers, mixed ethers, hydroxy mixed ethers, fatty acid polyglycol esters, block polymers of ethylene oxide and propylene oxide and fatty acid alkanolamides and fatty acid polyglycol ethers, amine oxides, sugar surfactants, preferably from the group consisting of amine oxides and alkyl polyglucosides.
- 40 7. The liquid composition according to any one of claims 1 to 6, comprising at least one amphoteric surfactant selected from the group consisting of alkyl betaines, alkylamidobetaines, imidazolium betaines, sulfobetaines, phosphobetaines, alkyl amidoalkyl amines, alkyl-substituted amino acids, acylated amino acids and biosurfactants, preferably from the group consisting of alkylamidobetaines.
- 45 8. The liquid composition according to any one of claims 1 to 7, comprising
- at least one fatty alcohol ether sulfate in an amount of about 1 to about 50 wt.-%, preferably about 3 to about 40 wt.-%, more preferably about 5 to about 35 wt.-%, based on the total weight of the composition; and/or
 - at least one amine oxide in an amount of about 1 to about 30 wt.-%, preferably about 2 to about 25 wt.-%,

50 - more preferably about 3 to about 20 wt.-%, based on the total weight of the composition; and/or

 - at least one betaine in an amount of about 1 to about 30 wt.-%, preferably about 2 to about 25 wt.-%, more preferably about 3 to about 20 wt.-%, based on the total weight of the composition.
- 55 9. The liquid composition according to any one of claims 1 to 8, further comprising at least one additive selected from the group consisting of additional surfactants, additional water-soluble salts, acids, perfumes, solvents, dyes, opacifiers, viscosity regulators, enzymes, corrosion inhibitors, pH-value adjuster, preservatives, UV stabilizers, skin-care substances, or mixtures thereof.

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10. The liquid composition according to any one of claims 1 to 9, wherein a total of about 1 to about 70 wt.-%, preferably about 1.5 to about 60 wt.-%, more preferably about 1.5 to about 50 wt.-% of surfactants are present, based on the total weight of the composition.

5 11. The liquid composition according to any one of claims 1 to 10, wherein, at 20 °C and a shear rate of 30 s⁻¹, it has a viscosity of about 10 to about 2,000 mPa·s, preferably about 50 to about 1,000 mPa·s, in particular about 100 to about 1200 mPa·s, more preferably about 200 to about 1000 mPa·s, and after dilution with, based on the volume of the liquid composition, about 1 to about 8 parts, preferably about 1.5 to about 7 parts, more preferably about 2 to about 7 parts, particularly about 2 to about 4 parts of water, a viscosity of about 30 to about 100,000 mPa·s, preferably about 50 to about 90,000 mPa·s, in particular about 100 to about 60,00 mPa·s, most preferably about 500 to about 55,000 mPa·s.

10 12. Use of a liquid composition according to any one of claims 1 to 11 for cleaning hard surfaces, particularly for manual dishwashing.

15 13. Use of a liquid composition according to any one of claims 1 to 11 for the preparation of a dilute aqueous hard surface cleaning composition, particularly for the preparation of a dilute manual dishwashing detergent composition.

20 14. Method for the preparation of a dilute aqueous hard surface cleaning composition, particularly a dilute manual dishwashing detergent composition, **characterized in that** a liquid composition according to any one of claims 1 to 11 is diluted with about 1 to about 8 parts, preferably about 1.5 to about 7 parts, more preferably about 2 to about 7 parts, particularly about 2 to about 4 parts of water, based on the volume of the liquid composition.

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EUROPEAN SEARCH REPORT

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