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(54) **NONIONIC CELLULOSE ETHER AS SOIL REMOVAL BOOSTER IN HARD SURFACE CLEANING**

(57) The present invention relates to a liquid composition for the cleaning of hard surfaces, said composition comprising, at least one nonionic surfactant and/or at least one anionic surfactant as well as comprising a nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methyl cellulose and hydroxyethyl methyl cellulose or combinations thereof, wherein the liquid composition preferably has a pH value of from 5 to 13, and a method for its preparation. The present invention further relates to the use of a nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methyl cellulose and hydroxyethyl methyl cellulose for improving the soil removal capacity of hard surface cleaning compositions.

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Description

[0001] In liquid cleaning compositions, especially hard surface cleaning compositions, nonionic cellulose ethers are in general used as thickening agents for regulating the viscosity of the liquid cleaning compositions.

[0002] Even though a plethora of liquid cleaning compositions is known in the art, the need for improved or alternative compositions which show excellent or even improved soil cleaning characteristics always exists.

[0003] This object has been solved by the present inventors who have surprisingly found that the addition of at least one specific nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methyl cellulose, and hydroxyethyl methyl cellulose or combinations thereof improves the soil removal capacity of hard surface cleaning compositions, especially having a pH-value of from 5 to 13.

[0004] Therefore, the present invention relates to a liquid composition for the cleaning of hard surfaces, in the following also referred to as "the composition" or "the liquid composition", said composition comprising at least one nonionic surfactant and/or at least one anionic surfactant as well as comprising a nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methyl cellulose and hydroxyethyl methyl cellulose or combinations thereof, wherein the liquid composition has a pH value of from 5 to 13 and a method for its preparation.

[0005] The present invention further relates to the use of a nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose and hydroxypropyl methyl cellulose and hydroxyethyl methyl cellulose or combinations thereof for improving the soil removal capacity of hard surface cleaning compositions.

[0006] Preferred embodiments are set out in the dependent claims.

[0007] When wt.-% values are given, they are based on the total weight of the liquid composition, except explicitly stated otherwise.

[0008] The liquid compositions according to the present invention comprise at least one nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methyl cellulose, and hydroxyethyl methyl cellulose or combinations thereof.

[0009] The methyl cellulose and hydroxypropyl methylcellulose compounds are manufactured by heating cellulose fibers with caustic solution which in turn is treated with methyl chloride, yielding the methyl ether of cellulose. Methyl cellulose is made using only methyl chloride. For hydroxypropyl methylcellulose, propylene oxide is used in addition to methyl chloride to obtain hydroxypropyl substitution on the anhydroglucose units. This substituent group, $-OCH_2CH(OH)-CH_3$, contains a secondary hydroxyl on the number two carbon. The number of substituent groups on the anhydroglucose units influences the solubility properties of the cellulose ether. In preferred embodiments, the methyl celluloses and hydroxypropyl methylcelluloses have a sufficient degree of methoxyl or methoxyl/hydroxypropyl substitution to cause them to be water-soluble. Methyl cellulose and hydroxypropyl methylcellulose are commercially available in a number of viscosity grades from Dow Chemical as their METHOCCEL trademark series. Particularly preferred is methyl cellulose commercially available under the tradenames Methocel 40-101, Methocel 40-100 and Methocel 40-202.

[0010] Hydroxyethyl cellulose is manufactured similarly to methyl cellulose. However, ethylene oxide is used instead of methylene chloride. Hydroxyethyl cellulose is commercially available in a number of viscosity grades from Dow Chemical as their CELLOSIZETM trademark series and from Ashland under the Natrosol trademark. Particularly preferred is CELLOSIZETM HEC and Natrosol.

[0011] The hydroxyethyl methylcellulose is manufactured similarly to hydroxypropyl methylcellulose. However, ethylene oxide is used in addition to methyl chloride to obtain hydroxyethyl substitution on the anhydroglucose units. Hydroxyethyl methylcellulose is commercially available in a number of viscosity grades from Dow Chemical as their WALOCETM trademark series. Particularly preferred is the hydroxyethyl methyl cellulose ether commercially available under the tradename MW 40000 PFV.

[0012] Generally, the viscosity of the above mentioned specific nonionic cellulose ether ranges from 100 to 100,000, preferably from 4,000 to 75,000 mPas for a 2% aqueous solution at 20° C, measured via Haake Rotovisko RV 550 viscometers at a constant shear rate of $D = 2.55 \text{ 1/s}$.

[0013] The composition according to the invention preferably contains the nonionic cellulose ethers in a total quantity of 0.05 to 5 wt.-%, more preferably 0.5 to 1 wt.-%, based on the total weight of the composition, whereby one or more of the specifically mentioned nonionic cellulose ethers can be present. In a further preferred embodiment one compound selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methyl cellulose, and hydroxyethyl methyl cellulose is present in 0.05 to 5 wt.-%, more preferably 0.5 to 1 wt.-%, based on the total weight of the composition.

[0014] The composition according to the invention preferably contains surfactants in a total quantity of normally 0.1 to 60% by weight, preferably 0.5 to 50% by weight, more preferably 0.75 to 20% by weight, most preferably 1 to 10% by weight and, in one most particularly preferred embodiment, 1 to 5% by weight, for example 1, 2, 3, 4 or 5% by weight or a range created by the combination of two amounts from the before-mentioned list.

[0015] The liquid composition according to the present invention further comprises at least one nonionic surfactant and/or at least one anionic surfactant. In a particularly preferred embodiment, the composition comprises at least one nonionic surfactant, more preferably the composition further comprises a fatty alcohol polyglycol ether. The composition

may further comprise a cationic or amphoteric surfactant or mixtures thereof.

[0016] In a preferred embodiment alkyl ether sulfates, alkyl sulfonates and amphoteric surfactants, are further contained to improve cleaning performance, drainage behavior and/or drying behavior.

[0017] The composition according to the present invention preferably contains at least one anionic surfactant, preferably comprising an alkyl ether sulfate, an alkyl sulfonate or combinations thereof.

Nonionic Surfactants

[0018] The composition according to the invention may contain one or more nonionic surfactants in a quantity of typically 0.001 to 5% by weight, preferably 0.01 to 4% by weight, more preferably 0.1 to 3% by weight, most preferably 0.2 to 2% by weight and, in one most particularly preferred embodiment, 0.5 to 1.5% by weight, for example 1 % by weight.

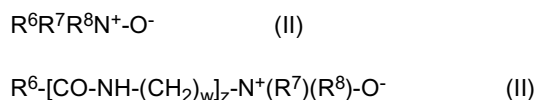
[0019] Nonionic surfactants in the context of the invention are alkoxylates, such as polyglycol ethers, fatty alcohol polyglycol ethers, alkyl phenol polyglycol ethers, end-capped polyglycol ethers, mixed ethers and hydroxy mixed ethers and fatty acid polyglycol esters. Block polymers of ethylene oxide 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.

Fatty Alcohol Polyglycol Ethers

[0020] In the context of the invention, fatty alcohol polyglycol ethers are unbranched or branched, saturated or unsaturated C₁₀₋₂₂ alcohols alkoxylated 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.

Amine Oxides

[0021] 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.

[0022] 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, Diaminopyrimidine 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).

Sugar Surfactants

[0023] 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 C_{1-22} 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 C_{6-22} fatty acid.

Sugar Amides

[0024] Particularly preferred sugar amides correspond to the formula $R^1C(O)N(R'')[Z]$, where R^1 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, R'' 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 C_{1-5} 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

[0025] The alkyl polyglycosides (APGs) are particularly preferred sugar surfactants for the purposes of the present invention and preferably correspond to the general formula $R^1O(AO)_a[G]_x$, where R^1 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 R^1 of the APGs are linear unsaturated groups with the indicated number of carbon atoms.

[0026] 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.

[0027] The alkyl or alkenyl radical R^1 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.

[0028] However, the alkyl or alkenyl radical R^1 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.

[0029] 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, C_{8-10} and a C_{12-14} alkyl polyglucoside with a DP degree of 1.4 or 1.5, more particularly C_{8-10} alkyl-1,5-glucoside and C_{12-14} alkyl-1,4-glucoside.

Anionic surfactants

[0030] The alkyl ether sulfates and alkyl sulfonates and the 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 trikanolamine. 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 Ether Sulfates

[0031] 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.

[0032] The composition according to the invention can contain one or more alkyl ether sulfates in a quantity of-typically- 0.1 to 50% by weight, preferably 0.5 to 20% by weight, more preferably more than 1 to 15% by weight, most preferably 2 to 10% by weight and, in one most particularly preferred embodiment, 2.5 to 8% by weight.

Alkyl Sulfonates

[0033] 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.

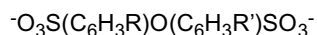
[0034] The composition according to the invention preferably contains one or more alkyl sulfonates in a quantity of - typically - 0.1 to less than 30% by weight, preferably 1 to 20% by weight, more preferably 2 to less than 14% by weight, most preferably 3 to 10% by weight and, in one most particularly preferred embodiment, 4 to 8% by weight.

Other Anionic Surfactants

[0035] The composition according to the invention may contain one or more anionic surfactants in a quantity of typically 0.001 to 5% by weight, preferably 0.01 to 4% by weight, more preferably 0.1 to 3% by weight, most preferably 0.2 to 2% by weight and, in one most particularly preferred embodiment, 0.5 to 1.5% by weight, for example 1 % by weight.

[0036] Suitable anionic surfactants in addition to the abovementioned ones are, in particular, aliphatic sulfates, such as fatty alcohol sulfates, monoglyceride sulfates and ester sulfonates (sulfofatty acid esters), lignin sulfonates, alkyl benzene sulfonates, fatty acid cyanamides, anionic sulfosuccinic acid surfactants, fatty acid isethionates, acylaminoalkane sulfonates (fatty acid taurides), fatty acid sarcosinates, ether carboxylic acids and alkyl (ether) phosphates.

[0037] 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).

5 Anionic Sulfosuccinic Acid Surfactants

[0038] 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

[0039] 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.

[0040] 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 preferable to 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.

[0041] 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.

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 C₁₂₋₁₅ 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 Sulfosuccinate, Disodium Stearyl Sulfosuccinate, Disodium Tallamido MEA-Sulfosuccinate, Disodium Tallowamido MEA-Sulfosuccinate, Disodium Tallow Sulfosuccinate, 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.

[0042] 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.

[0043] In one particular embodiment, the composition according to the invention contains one or more sulfosuccinates, sulfosuccinamates and/or sulfosuccinamides, preferably sulfosuccinates and/or sulfosuccinamates, more preferably sulfosuccinates, in a quantity of typically 0.001 to 5% by weight, preferably 0.01 to 4% by weight, more preferably 0.1 to 3% by weight, most preferably 0.2 to 2% by weight and, in one most particularly preferred embodiment, 0.5 to 1.5% by weight, for example 1% by weight.

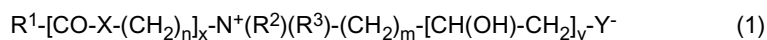
Amphoteric Surfactants

[0044] 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, of which the betaines are preferred for the purposes of the invention.

[0045] The composition according to the invention preferably contains one or more amphoteric surfactants in a quantity of typically 0.1 to 20% by weight, preferably 1 to 15% by weight, more preferably 2 to 12% by weight, most preferably 3 to 10% by weight and, in one most particularly preferred embodiment, 4 to 8% by weight.

Betaines

[0046] Suitable betaines are the alkyl betaines, the alkylamidobetaines, the imidazolinium 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,

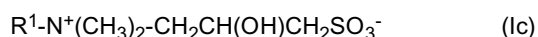
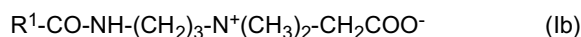
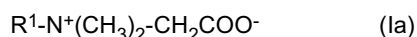
y is 0 or 1 and

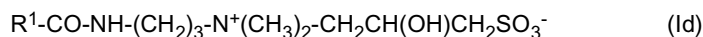
Y is -COO⁻, -SO₃⁻, -OPO(OR⁵)O or -P(O)(OR⁵)O, where R⁵ is a hydrogen atom

H or a C₁₋₄ alkyl group.

[0047] The alkyl betaines and alkylamidobetaines, betaines corresponding to formula I with a carboxylate group (Y⁻ = COO⁻), are also known as carbobetaines.

[0048] 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):





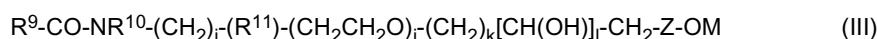
in which R¹ is as defined for formula I.

[0049] 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.

[0050] 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, Lauramido-propyl 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 Acetoxypromyl 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

[0051] The alkylamido alkylamines (INCI Alkylamido Alkylamines) are amphoteric surfactants corresponding to formula (III):



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,

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,

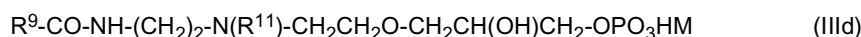
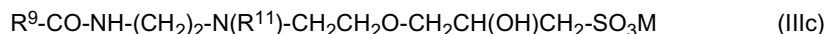
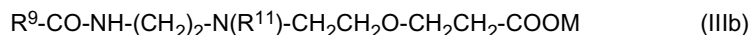
k is a number of 0 to 4, preferably 0 or 1,

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

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

[0052] Preferred representatives correspond to formulae IIIa to IIId:



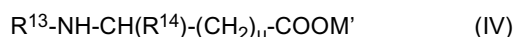
in which R¹¹ and M are as defined for formula (III).

[0053] Examples of alkylamido alkylamines are the following compounds identified by their INCI names: Cocoamphodipropionic Acid, Cocobetainamido Amphopropionate, DEA-Cocoamphodipropionate, Disodium Caproamphodiacetate, Disodium Caproamphodipropionate, Disodium Capryloamphodiacetate, Disodium Capryloamphodipropionate, Disodium Cocoamphocarboxyethylhydroxypropylsulfonate, Disodium Cocoamphodiacetate, Disodium Cocoamphodipropionate, Disodium Isostearoamphodiacetate, Disodium Isostearoamphodipropionate, Disodium Laureth-5 Car-

boxyamphodiacetate, Disodium Lauroamphodiacetate, Disodium Lauroamphodipropionate, Disodium Oleoamphodipropionate, Disodium PPG-2-Isodeceth-7 Carboxyamphodiacetate, Disodium Stearoamphodiacetate, Disodium Tallowamphodiacetate, Disodium Wheatgermamphodiacetate, Lauroamphodipropionic Acid, Quaternium-85, Sodium Caproamphoacetate, Sodium Caproamphohydroxypropylsulfonate, Sodium Caproamphopropionate, Sodium Capryloamphoacetate, Sodium Capryloamphohydroxypropylsulfonate, Sodium Capryloamphopropionate, Sodium Cocoamphoacetate, Sodium Cocoamphohydroxypropylsulfonate, Sodium Cocoamphopropionate, Sodium Cornamphopropionate, Sodium Isostearoamphoacetate, Sodium Isostearoamphopropionate, Sodium Lauroamphoacetate, Sodium Lauroamphohydroxypropylsulfonate, Sodium Lauroampho PG-Acetate Phosphate, Sodium Lauroamphopropionate, Sodium Myristoamphoacetate, Sodium Oleoamphoacetate, Sodium Oleoamphohydroxypropylsulfonate, Sodium Oleoamphopropionate, Sodium Ricinoleoamphoacetate, Sodium Stearoamphoacetate, Sodium Stearoamphohydroxypropylsulfonate, Sodium Stearoamphopropionate, Sodium Tallamphopropionate, Sodium Tallowamphoacetate, Sodium Undecylenoamphoacetate, Sodium Undecylenoamphopropionate, Sodium Wheat Germamphoacetate und Trisodium Lauroampho PG-Acetate Chloride Phosphate.

Alkyl-Substituted Amino Acids

[0054] 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

R^{13} is a saturated or unsaturated C_{6-22} alkyl group, preferably a C_{8-18} alkyl group and more preferably a saturated C_{10-16} alkyl group, for example a saturated C_{12-14} alkyl group,
 R^{14} is a hydrogen atom H or a C_{1-4} 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

R^{15} is a saturated or unsaturated C_{6-22} alkyl group, preferably a C_{8-18} alkyl group and more preferably a saturated C_{10-16} alkyl group, for example a saturated C_{12-14} 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

R^{16} is a saturated or unsaturated C_{6-22} alkyl group, preferably a C_{8-18} alkyl group and more preferably a saturated C_{10-16} alkyl group, for example a saturated C_{12-14} alkyl group,
 R^{17} is a hydrogen atom or an optionally hydroxy- or amine-substituted C_{1-4} alkyl group, for example a methyl, ethyl, hydroxyethyl or aminopropyl group,
 R^{18} is the residue of one of the 20 natural α -amino acids $H_2NCH(R^{18})COOH$ and
 M'' is a hydrogen atom, an alkali metal, an alkaline earth metal or a protonated alkanolamine, for example protonated mono-, di- or triethanolamine.

[0055] Particularly preferred alkyl-substituted amino acids are the aminopropionates corresponding to formula (IVa):



in which R^{13} and M' have the same meanings as in formula (IV).

[0056] 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-Myristaminopropionate.

Acylated Amino Acids

[0057] Acylated amino acids are amino acids, more particularly the 20 natural α -amino acids, which carry the acyl group $R^{19}\text{CO}$ of a saturated or unsaturated fatty acid $R^{19}\text{COOH}$ at the amino nitrogen atom (R^{19} being a saturated or unsaturated C_{6-22} alkyl group, preferably a C_{8-18} alkyl group and more preferably a saturated C_{10-16} alkyl group, for example a saturated C_{12-14} 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 Methylaniline.

Amphoteric Surfactant Combinations

[0058] One particular embodiment of the invention is characterized by the use of two or more different amphoteric surfactants, more particularly a combination of binary amphoteric surfactants.

[0059] The combination of amphoteric surfactants preferably contains at least one betaine, more particularly at least one alkylamidobetaine and most preferably cocoamidopropylbetaine. In addition, the combination of amphoteric surfactants preferably contains at least one amphoteric surfactant from the group consisting of sodium carboxyethyl cocophosphoethylimidazoline (Phosphoteric® TC-6), $C_{8/10}$ -amidopropyl betaine (INCI Capryl/Capramidopropyl Betaine; Tego® Betaine 810), N-2-hydroxyethyl-N-carboxymethyl fatty acid amidoethylamine Na (Rewoteric® AMV) and N-capryl/capramidoethyl-N-ethylether propionate Na (Rewoteric® AMVSF) and the betaine 3-(3-cocoamido-propyl)-dimethylammonium-2-hydroxypropanesulfonat (INCI Sultaine; Rewoteric® AM CAS) and the alkylamidoalkylamine N-[N'(N"-2-hydroxyethyl-N"-carboxyethylaminoethyl)-acetic acid amido]-N,N-dimethyl-N-cocoammoniumbetaine (Rewoteric® QAM 50), more particularly together with cocoamidopropylbetaine.

[0060] In another particular embodiment, the composition according to the invention contains one or more amphoteric surfactants in a quantity of 8 to 20 % by weight. In yet another particular embodiment, the composition according to the invention contains one or more amphoteric surfactants in a quantity of between 0.1 to 2% by weight.

Cationic Surfactants

[0061] The composition according to the invention may additionally contain one or more cationic surfactants (cationic surfactants; INCI Quaternary Ammonium Compounds) in a quantity of typically 0.001 to 5% by weight, preferably 0.01 to 4% by weight, more preferably 0.1 to 3% by weight, most preferably 0.2 to 2% by weight and, in one most particularly preferred embodiment, 0.5 to 1.5% by weight, for example 1% by weight.

[0062] 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.

[0063] 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 imidazolinium 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.

[0064] 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.

[0065] 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-C₁₂-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 C₈₋₁₈ alkyl groups, more particularly C₁₂₋₁₄ alkyl benzyl dimethyl ammonium chloride. A particularly preferred QUAT is cocopentaethoxy methyl ammonium methosulfate (INCI PEG-5 Cocomonium Methosulfate; Rewoquat® CPEM).

[0066] 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.

Solvents

[0067] The water content of the water-based composition according to the invention is normally 30 to 99.8% by weight, preferably 50 to 99% by weight, more preferably 65 to 95% by weight and most preferably 75 to 90% by weight. The composition according to the invention may advantageously contain one or more water-soluble organic solvents in a quantity of typically 0.1 to 30% by weight, preferably 1 to 20% by weight, more preferably 2 to 15% by weight, most preferably 4 to 12% by weight and, in one most particularly preferred embodiment, 6 to 10% by weight.

[0068] 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.

[0069] 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. 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, Isopentyldiol, Isopropyl Alcohol (iso-Propanol), 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. 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. 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.

Additives

[0070] In order to further improve its drainage and/or drying behavior, the composition according to the invention may contain one or more additives from the group of polymers and builders in a quantity of typically 0.001 to 5% by weight, preferably 0.01 to 4% by weight, more preferably 0.1 to 3% by weight, most preferably 0.2 to 2% by weight and, in one most particularly preferred embodiment, 0.5 to 1.5% by weight, for example 1% by weight.

[0071] The content of surface-active additives should preferably be selected so that the total surfactant content lies within the quantity ranges mentioned above.

[0072] Some of the additives mentioned in the following are accompanied (in brackets) by one or more trade names under which the particular additive is commercially obtainable.

[0073] Polymers suitable as additives are, in particular, maleic acid/acrylic acid copolymer Na salt (Sokalan® CP 5), modified polyacrylic acid Na salt (Sokalan® CP 10), modified polycarboxylate Na salt (Sokalan® HP 25), polyalkylene oxide, modified heptamethyl trisiloxane (Silwet® L-77), polyalkylene oxide, modified heptamethyl trisiloxane (Silwet® L-7608), polyether siloxanes (copolymers of polymethyl siloxanes with ethylene oxide/propylene oxide segments (polyether blocks), preferably water-soluble linear polyether siloxanes with terminal polyether blocks, such as Tegopren® 5840, Tegopren® 5843, Tegopren® 5847, Tegopren® 5851, Tegopren® 5863 and Tegopren® 5878).

[0074] Builders suitable as additives are, in particular, polyaspartic acid Na salt, ethylene diamine triacetate cocoalkyl acetamide (Rewopol® CHT 12), methyl glycine diacetic acid tri-Na-salt (Trilon® ES 9964) and acetophosphonic acid (Turpinal® SL). Mixtures with surface-active or polymeric additives show synergisms in the case of Monawet® MO-84 R2W, Tegopren® 5843 and Tegopren® 5863. However, the use of the Tegopren types 5843 and 5863 is not advised where the compositions according to the invention are used on hard surfaces of glass, particularly glass tableware, because these silicone surfactants can be absorbed onto glass.

Viscosity

[0075] 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 10 to 5,000 mPas, preferably in the range from 50 to 2,000 mPa s, more preferably in the range from 100 to 1,000 mPa s, most preferably in the range from 150 to 700 mPas and, in one most particularly preferred embodiment, in the range from 200 to 500 mPa s, for example 300 to 400 mPa s. To this end, the viscosity of the composition according to the invention can be increased by thickeners, particularly where the composition has a low surfactant content, and/or reduced by solvents, particularly where the composition has a high surfactant content.

Thickeners

[0076] For thickening, the composition according to the invention may additionally contain one or more electrolyte salts and/or one or more polymeric thickeners, different from nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methylcellulose and hydroxyethyl methylcellulose.

Electrolyte Salts

[0077] 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. A particularly preferred electrolyte salt is magnesium sulfate, more particularly the MgSO₄·7H₂O 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.

[0078] The electrolyte salt content is normally not more than 8% by weight, preferably between 0.1 and 6% by weight, more preferably between 0.2 and 4% by weight, most preferably between 0.3 and 2% by weight and, in one most particularly preferred embodiment, between 0.5 and 1% by weight, for example 0.7% by weight.

Polymeric Thickeners

[0079] 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.

[0080] Suitable polysaccharides and heteropolysaccharides are the polysaccharide gums, for example gum arabic, agar, alginates, carrageens and salts thereof, guar, guaran, tragacanth, gellan, ramsan, dextran or xanthan and derivatives thereof, for example propoxylated guar, and mixtures thereof. Other polysaccharide thickeners, such as starches or cellulose derivatives, may be used alternatively, but preferably additionally to a polysaccharide gum, for example starches of varying origin and starch derivatives, for example hydroxyethyl starch, starch phosphate esters and starch acetates or cellulose acetate.

[0081] 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 15×10^6 . 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).

[0082] 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).

[0083] 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 Aculyne® and Acusol®, for example the anionic non-associative polymers Aculyne® 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 hydrophobized Carbopol® ETD 2623 and Carbopol® 1382 (INCI Acrylates/C10-30 Alkyl Acrylate Crosspolymer) and Carbopol® AQUA 30 (formerly Carbopol® EX 473).

[0084] 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, for example between 2 and 2.5% by weight.

[0085] In one preferred embodiment of the invention, however, the composition is free from further polymeric thickeners, different from a nonionic cellulose ether selected from methylcellulose, hydroxypropyl methylcellulose and hydroxyethyl methylcellulose or combinations thereof.

Dicarboxylic Acid (Salts)

[0086] In order to stabilize the 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.

[0087] 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

[0088] In addition, one or more other typical auxiliaries and additives, particularly in manual dishwashing detergents and cleaners for hard surfaces, more particularly UV stabilizers, perfume, pearlizers (INCI Opacifying Agents; for example glycol distearate, for example Cutina® AGS of Henkel AG & Co. KGaA or mixtures containing it, for example the Eu-perlans® 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) and skin-feel-improving or skin-care additives (for example dermatologically active substances, such as vitamin A, vitamin B2, vitamin B12, vitamin C, vitamin E, D-panthenol, sericerin, collagen partial hydrolyzate, various vegetable protein

partial hydrolyzates, protein hydrolyzate/fatty acid condensates, liposomes, cholesterol, vegetable and animal oils such as, for example, lecithin, soybean oil, etc., plant extracts such as, for example, aloe vera, azulene, hamamelis extracts, algal extracts, etc., allantoin, AHA complexes), 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

[0089] 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 5 to 13, preferably in the range from 7 to 12 and more particularly in the range from 9 to 11 being preferred.

[0090] 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

[0091] 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.

Examples:

[0092] A standard hard surface cleaning composition (Comparative Example 1) has been compared in view of its dirt removal capacity according to the standard IPP methodology with two compositions according to the present invention.

[0093] The hard surface cleaning composition and the Examples 1 to 3 of the present invention contained (all numeric values are amount in wt.-%, based on the total composition:

Compounds	Comparative Example 1	Example 1	Example 2	Example 3
Fatty alcohol	0.5	0.5	0.5	0.5
Sodium dodecylbenzene sulfonate	0.820	0.820	0.820	0.820
Dodecylbenzene sulfonic acid	0.768	0.768	0.768	0.768
NaOH	0.1460	0.1460	0.1460	0.1460
Sodium carbonate	0.10	0.10	0.10	0.10
Citric acid	0.110	0.110	0.110	0.110
Preservative	0.015	0.015	0.015	0.015
Perfume	0.4	0.4	0.4	0.4
Dye	0.00051	0.00051	0.00051	0.00051
HEMC	-	0.6	-	-
HPMC	-	-	0.6	-
HEC	-	-	-	0.6
Water	added to 100 wt.-%	added to 100 wt.-%	added to 100 wt.-%	added to 100 wt.-%

[0094] The three inventive compositions (Examples 1 to 3) were the same as the standard hard surface cleaning composition (Comparative Example 1) but further comprising 0.6 wt.-% of Walocel MW 40000 PV (hydroxyethyl methyl

cellulose; Example 1), 0.6 wt.-% Methocel 40-101 (hydroxy propyl methylcellulose; Example 2), or 0.6 wt.-% Natrosol (hydroxyethyl cellulose; Example 3).

[0095] The standard IPP methodology is based on the method published in 1986 as IPP quality standards in the journal "Seife-Ole-Fette-Wachse", 112th volume, number 10, pages 371-372.

[0096] The test dirt which was used is a mixture. For the preparation 102 g Myritol 318, 240 g Nytex and 216 g gasoline 80/110 (=36%) are put in a 1000 ml wide-mouth screw-top jar and stirred for 1 min. 42 g soot (special black 4; 7%) were slowly added (everything was done under a fume hood). The weight of the mixture was determined. Then the mixture was stirred for 60 minutes at 2000 rpm. The mixture was topped up with gasoline in order to reach the weight determined before the stirring step. Again, stirring the final mixture for 15s. The mixture is stored in a sealed jar at room temperature, after 7 days the mixture is ready for use. 2g is used per one dirt carrier for the soiling.

Production of the dirt carriers

Reagents:

Adhesive Adhesin J1626-21 (Henkel)

Devices

[0097] White PVC foil ENOVA, 50 x 1.30 m (Benecke GmbH)
Cardboard strips (554 x 39 mm): Hansa board 400g/m², smooth on one side, white, without barrier layer (Stora (former Feldmühle AG), Düsseldorf, DE)
Work surface (PVC, 1000 x 500 x 5 mm)
Foil cutter
Paint roller for radiators for spreading the adhesive
Felt-tip marker, red (Edding 500)

Production of the dirt carriers

[0098] The start and end sheets of every foil roll (each 1 to 2 m) was not used to produce the strips but used to condition the brushes (see below). The adhesive was diluted with 30 g of demineralized water per 1000 g adhesive to improve brushability.

[0099] Cut foil sheets with dimensions of app. 650 x 300 x 400 mm were used. The foil was placed on the work surface with the smooth side down (this will later be soiled). The smooth side was determined by use of the felt-tip marker, as the coloration is richer on the smooth side. The paint roller was then used to apply the adhesive in a thin coating. Then seven cardboard strips with app. 1 mm clearance between each other (the smooth white side facing the foil). Air bubbles were pressed out by vigorous wiping with a pulp bale in the lengthwise direction of the strips. Remaining bubbles disappeared with the drying of the adhesive within 24 hours. The edges of the foil protruding beyond the edges of the plate were cut off with a foil cutter.

Soiling of the dirt carrier:

[0100] The dirt carrier plate (foil facing upwards) is covered with the template, making soiling possible in the lengthwise direction of 260 mm and of the entire 280 mm width.

Priming

[0101] The corresponding amount of soiling was coarsely spread on the dirt carrier. In a first step, after the coarse distribution over the entire surface, the dirt was spread in a lengthwise direction of the strips from the upper left to the upper right. The brush was moved to the left side and a second track drawn overlapping the first. This was continued until the lower right corner was reached. In a second step, the dirt was further worked in by guiding the brush from the upper left to the lower left and back again along the same track. It was proceeded track-by-track with overlapping until the brush strokes end in the upper right. The third step was identical to the first step. In a fourth step, the dirt was worked in from top to bottom. The brush was guided in single tracks overlapping from left to right. After soiling the foil between the individual strips was separated using a foil cutter.

[0102] The strips were then hung on a frame to be air-dried. The drying time was 1 hour.

Preparation of cleaning sponges

[0103] Polyester sponge BULPREN S28/190 black (Euroform), 90x45x30 mm. The sponges were soaked in tap water shortly before use.

Cleaning process

Reagents:

[0104] Soiled cardboard strips, prepared test solutions

Devices:

[0105] Mops that can be purchased as washability and abrasion tester 494 from Erichsen GmbH (DE).

Brass guide rail for the sponge cart, 554 mm in length, milled.

Closed sponge cart which picks up the sponge from below with weight attachment (820g). The weight ensures even rolling of the sponge cart during wiping.

Device for squeezing the sponges

Glass measuring cup with handle (6 ml and 10 ml) for fluid cleaners

Disposable syringe for viscous products.

[0106] For the cleaning, the soiled cardboard strips were laid into the guide rails of the wiping device. The moist squeezed sponge was laid into the sponge holder of the cart which lies on the top side. Depending on the type of test dirt and the concentration of the test product to be investigated, the appropriate quantity was dosed into the disposable syringe using a measuring cup with a handle.

[0107] 2 x 10 ml of the respective composition. 10 ml each were applied to the sponge lying in the cart and to the test strip, distributing it over the soiled area. The cart was turned around so that the sponge rests on the strip in the guide rail and weighs it down. When turning around, it was ensured that possible dripping liquid lands on the strip. Then the wiping process was started. The standard process was to wipe back and forth 10 times. The strip was removed from the rail and rinsed thoroughly at 20°C with flowing tap water (before rinsing the water was run for at least 10 minutes). The strip was guided diagonally downwards (angle app. 45°) under the water jet so that the jet rinsed the dirt from top to bottom. The strips were hung to dry on a suitable frame for 1 h. A suitable standard was used for very series of measurements.

[0108] Whiteness was measured with a Konica-Minolta Chroma Meter CR-400. Measuring parameters were with color system Y and standard illuminant D65 without UV. The measurement was taken against a white standard: clean, untreated dirt carrier strips corresponding to 100 % RV (cleaning capacity)

7 measured values each were determined from the 3 cleaned strips of a test specimen and corresponding average values and their standard deviations obtained.

[0109] Example 1 showed superior dirt removal capacity (13.5 % improvement compared to Comparative Example 1).

[0110] Example 2 showed superior dirt removal capacity (14 % improvement compared to Comparative Example 1).

[0111] This finding is surprising since until now for nonionic cellulose ethers only their excellent thickening capacity has been described.

Claims

1. A liquid composition for the cleaning of hard surfaces, said composition comprising at least one nonionic surfactant and/or at least one anionic surfactant as well as comprising a nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methylcellulose and hydroxyethyl methylcellulose or combinations thereof, wherein the liquid composition preferably has a pH value of from 5 to 13.

2. The liquid composition according to claim 1, wherein the at least one nonionic cellulose ether comprises methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methylcellulose or a combination thereof, preferably methyl cellulose.

3. The liquid composition according to claim 2, wherein the methyl cellulose is present in 0.05 to 5 wt.-%, preferably 0.5 to 1 wt.-%, based on the total weight of the liquid composition.

4. The liquid composition according to claim 1, wherein the at least one nonionic cellulose ether comprises hydrox-

yethyl methylcellulose.

5 **5.** The liquid composition according to claim 4, wherein the hydroxyethyl methylcellulose ether is present in 0.05 to 5 wt.-%, preferably 0.5 to 1 wt.-% based on the total weight of the liquid composition.

6. The liquid composition according to any one of claims 1 to 5, further comprising a cationic or amphoteric surfactant or a mixture thereof.

10 **7.** The liquid composition according to any one of claims 1 to 6, further comprising an additive selected from perfumes, solvents, water soluble salts, acids, opacifiers, viscosity regulators, enzymes, corrosion inhibitors, pH value adjuster or mixtures thereof.

8. The liquid composition according to any one of claims 1 to 7, wherein the anionic surfactant is selected from alkyl ether sulfates and alkyl sulfonates or mixtures thereof.

15 **8.** Method for preparing the liquid composition according to any one of claims 1 to 7, comprising the steps:

 i) mixing the ingredients and

 ii) adjusting the pH value of the composition obtained in step i) by adding pH value adjusters and/or buffers.

20 **9.** Use of a nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methylcellulose and hydroxyethyl methylcellulose or combinations thereof for improving the soil removal capacity of hard surface cleaning compositions.

25 **10.** The use according to claim 9, wherein the soil removal is improved by at least 10% compared to a similar composition which does not comprise a nonionic cellulose ether selected from methyl cellulose, hydroxyethyl cellulose, hydroxypropyl methylcellulose and hydroxyethyl methylcellulose or combinations thereof.



EUROPEAN SEARCH REPORT

Application Number
EP 17 18 5637

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