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(54) **CLEANING PRODUCT AND RELATED SYNTHESIS PROCESS**

REINIGUNGSPRODUKT UND ENTSPRECHENDES SYNTHESEVERFAHREN

PRODUIT DE NETTOYAGE ET PROCÉDÉ DE SYNTHÈSE ASSOCIÉ

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Description

[0001] The present invention relates to a cleaning product, characterized by a nanometric micellar composition.

[0002] In particular, the present invention refers to a cleaning product based on natural substances, which is therefore ecological, easily biodegradable and allows its use in safe conditions for the user.

[0003] Even more particularly, the present invention relates to a very effective cleaning product in removing any type of dirt from any type of surface.

[0004] The present invention also relates to the synthesis process of said cleaning product.

[0005] The chemical process of saponification carried out in order to break down fatty molecules is known from the state of the art, using basic chemical substances, i.e. hydroxides of alkali metals such as NaOH or KOH, which react with the glycerides in aqueous solution, hydrolyzing them. The salt (sodium or potassium) of the aliphatic fatty acid, i.e. the soap, and the glycerol are obtained from the saponification reaction.

[0006] Soap is a molecule characterized by an amphipathic structure, i.e. by a hydrophobic tail and a negatively ionized hydrophilic head, which allows dirt to be removed by lowering the surface tension between washing water and fat molecule. When the soap molecules come into contact with water and dirt, they arrange themselves circularly in a "micelle" shape, with the hydrophobic tails facing inwards and the hydrophilic heads facing outwards. This special arrangement allows the tails to trap the dirt inside them, which is emulsified and dragged away by washing water. Soaps are therefore salts of fatty acids with at least 12 carbon atoms that act as surfactants.

[0007] A surfactant is an amphipathic molecule, therefore characterized by a nonpolar tail and a polar head, or vice versa, which in solution, once the critical micellar concentration has been reached, arranges itself together with other surfactant molecules in such a way as to form micelles. The surfactants are effective against dirt, as they act by lowering the surface tension between the fat molecules and water, thus increasing the wettability of the fat molecules, facilitating their removal together with washing water. Based on the possessed electrostatic charge, surfactants can be anionic, non-ionic, cationic or amphoteric.

[0008] Anionic surfactants have a negative electrostatic charge and are mainly used in laundry products, hand dishwashing and household cleaning products. They have a high foaming power and a high cleaning power on all types of dirt. Compounds such as alkylbenzenesulphonates, alkylsulfates, alkylethoxysulphates and alcoholethoxysulphates belong to this class.

[0009] Non-ionic surfactants have no electrostatic charge, and for this reason, they are less toxic to humans. They are used above all in laundry products, for washing dishes in the machine and in washing aids: they remove most types of dirt with a particularly strong action on greasy dirt. Compounds such as ethoxylated alcohols and alkylamine oxides belong to this class.

[0010] Cationic surfactants have a positive electrostatic charge and have been used mainly in fabric softeners, but also in other laundry detergents. For example, quaternary ammonium salts belong to this class.

[0011] Finally, amphoteric surfactants are able to take a different electrostatic charge depending on the type of solution in which they are found, and are mainly used in dish cleaning products. Betaines and alkylamino-oxides belong to this class.

[0012] It is known that the shape of micellar structures depends on the physico-chemical properties of the system, such as temperature, pH and concentration.

[0013] Once the critical micellar concentration is reached, the surfactants initially arrange themselves so as to form basically spherical micelles. The latter, as the surfactant concentration increases, can evolve into rod-like or disk-like structures. A further increase in concentration can lead to the formation of lyotropic liquid crystalline phases, with the formation of hexagonal or lamellar micelles. Through simple geometric considerations, the structure of the supramolecular aggregates generated in solution can be predicted by introducing the "critical packing parameter (cpp)", which depends on the size of the head and tail of the used surfactant.

[0014] The functional properties of an aqueous mixture of surfactants are determined by the microstructure of the mixture itself, therefore it is clear that the prediction of the favored micelle shape under certain conditions is extremely useful.

[0015] Different types of chemical products used in the cleaning field are known in the state of the art, which often involve the use of various types of surfactants, in addition to the use of other components, among which, especially in products used as degreasers, often are present some compounds having the purpose of making the mixture basic, for example caustic soda, caustic potash, sodium hypochlorite, ammonia, etc.

[0016] Other cleaning products on the market, especially those with anti-limescale and descaling power, contain corrosive acids such as hydrochloric acid, sulfuric acid, muriatic acid, phosphoric acid, etc. <<ADDED PAGE

[0017] US 2019/185785 A1 discloses a washing agent which contains at least one amine oxide together with at least one sugar surfactant.

[0018] EP 1 466 960 A1 relates to a liquid detergent composition containing (a) a specific compound having one alkyl group selected from a 2-ethylhexyl group, an isononyl group and an isodecyl group, (b) a nonionic surfactant having an

alkyl or alkenyl group having 11 to 16 carbon atoms, (c) a hydrophobic organic solvent which is liquid at 20°C and (d) water, wherein (c)/(d) and (c) + (d) are respectively in a specific range.

[0019] US 3 985 670 refers to liquid phosphate-free, regulated-foam washing agent compositions.

[0020] US 2014/274855 A1 relates to the manufacture and use of a cleaning agent, characterized in that the cleaning agent comprises a microemulsion or a fluid nanophase system, and has the following components: a) at least one non-water-soluble substance having a solubility in water of less than 4 g per liter, b) at least one amphiphile substance, NP-MCA, that has no tenside structure, does not form structures on its own, has a solubility in water or oil between 4 g and 1000 g per liter, and preferably does not accumulate at the oil-water boundary, with the provision that NP-MCA is not selected from among 2-Ethyl-1,3-Hexanediol, 2-Methyl-2,4-Pentanediol, 2-(n-Butyl)-2-Ethyl-1,3-Propanediol and/or 1,2-Diols; c) at least one anionic, cationic, amphoteric and/or non-ionic tenside; d) water and/or a water-soluble solvent having hydroxyl functionality and, optionally, additives.

[0021] Furthermore, it is customary in various commercial products to use sequestering agents, which have the function of sequestering calcium and magnesium cations in order to reduce the hardness of water. These ingredients also have the function of promoting the performance of surfactants, helping to retain dirt in solution. Among the "historical" components widely used for this purpose are polyphosphates.

[0022] Following episodes of abnormal growth of algae (eutrophication) in the Adriatic Sea which occurred in the 1970s, the use of these ingredients was severely limited and replaced with other sequestering agents, such as EDTA (ethylenediaminetetraacetic acid). This sequestering agent is able to form a very stable chelate with calcium and magnesium, and is in fact used to avoid the formation and deposit of limestone. However, due to its poor biodegradability, the use of EDTA has been banned in many EU countries.

[0023] In the state of the art, therefore, there remains the need to find a cleaning product that is versatile in all areas of cleaning, and that uses substances that are not harmful to the health and the environment.

[0024] The object of the present invention is to obviate the aforementioned drawbacks and in particular, to provide a cleaning product that is based on natural substances, and therefore ecological, easily biodegradable, and whose use does not involve risks for the safety and health of the user.

[0025] A further object of the present invention is to provide a cleaning product of practical use, which guarantees high efficiency in removing any type of dirt from any surface, reducing cleaning times.

[0026] Another object of the present invention is to provide a synthesis process of said cleaning product.

[0027] These and other objects according to the present invention are achieved by making a cleaning product as set forth in claim 1.

[0028] Further features of the cleaning product are the subject of the dependent claims.

[0029] The features and advantages of the cleaning product according to the present invention will become more apparent from the following description.

[0030] The present invention therefore relates to a cleaning product according to claim 1 characterized by a nanometric micellar composition, said cleaning product comprising:

- a first non-ionic surfactant, present in an amount by weight of between 3.2% and 9.2%;
- at least a second non-ionic surfactant, present in an amount by weight of between 0.2% and 2.2%;
- at least one chelating agent, present in an amount by weight comprised between 2.2% to 4.5%;
- at least one alcohol-based solvent, present in an amount by weight comprised between 12% and 23%;
- water, present in an amount up to 100% by weight,

said quantities by weight being referred to the total weight of the composition.

[0031] In a preferred and advantageous embodiment, the detergent product according to the present invention also comprises at least one buffer system in order to stabilize the pH in a range between 8 and 12, preferably between 9 and 11.

[0032] Preferably, said at least one buffer system comprises trisodium citrate and citric acid, in which the trisodium citrate is present in an amount by weight comprised between 1% and 6.5%, preferably 3%, while the citric acid is present in an amount by weight between 0.45% and 2.2%, preferably 1.2%, these percentage values being referred to the total weight of the composition.

[0033] Examples of other types of buffer systems that can be used in place of or in combination with said system trisodium citrate - citric acid are: fumarate - fumaric acid, malate - malic acid, tartarate - tartaric acid.

[0034] Furthermore, the trisodium citrate, as well as other salts of organic acids that can be used to buffer the pH of the mixture, confers a double advantage in that it also acts as a chelating agent.

[0035] According to the invention, said first non-ionic surfactant comprises one or more esters of the polyoxyethylene glycolic fatty acid, preferably Glycereth-6 Cocoate, even more preferably said first non-ionic surfactant is present in an amount by weight of 6.2% with respect to the total weight of the composition.

[0036] According to the invention, said at least one second non-ionic surfactant is selected from an ethoxylated fatty alcohol $\text{RO}(\text{CH}_2\text{CH}_2\text{O})_7\text{H}$, in which R is a C12-C18 alkyl group, and/or a heptyl polyglucoside, in which said at least a

second non-ionic surfactant is preferably present in an amount by weight of 0.7% with respect to the total weight of the composition.

[0037] The detergent product according to the invention therefore comprises at least one chelating agent, or sequestering agent, preferably GLDA (tetrasodium salt of N, N-dicarboxymethyl-glutamic acid), even more preferably said at least one chelating agent is present in an amount by weight of 3.4% with respect to the total weight of the composition.

[0038] A chelating agent is a chemical compound capable of forming complexes with ions or atoms, sequestering them. GLDA has the advantage of being extremely effective in the chelation of calcium and magnesium, in such a way as to reduce water hardness and avoid limestone deposits, and at the same time, it is a product of natural origin, biodegradable and eco-sustainable.

[0039] Furthermore, the cleaning product according to the present invention comprises at least one alcohol-based solvent, preferably 3-methoxy-3-methyl-1-butanol, even more preferably said at least one alcohol-based solvent is present in an amount by weight of 17.5% with respect to the total weight of the composition.

[0040] In a further embodiment, the cleaning product according to the invention further comprises one or more amphoteric surfactants, preferably dipotassium 2-ethylhexyl dipropionate salt, even more preferably said one or more amphoteric surfactants are present in an amount by weight comprised between 0.14% and 1.54%, preferably 0.63%, with respect to the total weight of the composition.

[0041] The cleaning product according to the present invention has the advantage of being very versatile and can be used in various fields of cleaning, subjecting said product to dilution with water and the addition of specific components according to the field of application. The final products obtained have the advantage of being environmentally friendly, easily biodegradable and extremely safe for the user: they do not produce vapors; they are not corrosive to the skin and can therefore be used without the use of protections such as masks and glasses.

[0042] In particular, the use of said cleaning product according to the invention can be applied for the cleaning of surfaces such as fabrics, grills, leather sofas, clothes, car rims, glass, furniture, dishwashers, etc.

[0043] Additives that can be used depending on the application for which the finished product is intended are, for example, odor suppressants (e.g. zinc ricinoleate), perfumes, solvents, co-solvents, anionic surfactants (e.g. sodium lauryl sulfate, alkyl polysaccharides), preservatives, amphoteric surfactants (e.g. alkylbetaine).

[0044] A further object of the present invention is the production process of said cleaning product according to claim 1, said process comprising the following steps:

- a) pouring demineralized water in a mixer in an amount by weight comprised between 20% and 50%, preferably between 30% and 40% by weight, based on the total weight of the composition;
- b) adding at least one chelating agent and at least one alcohol-based solvent and mixing;
- c) adding the first non-ionic surfactant and mixing;
- d) adding at least the second non-ionic surfactant different from said first surfactant and mixing;
- e) adding demineralized water up to 100 and mixing,

said steps being conducted not necessarily in the order described.

[0045] Preferably, said at least one chelating agent is GLDA, said at least one alcohol-based solvent is 3-methoxy-3-methyl-1-butanol, said first non-ionic surfactant is Glycereth-6 Cocoate, and said at least one second non-ionic surfactant is selected from an ethoxylated fatty alcohol $\text{RO}(\text{CH}_2\text{CH}_2\text{O})_7\text{H}$, wherein R is a C12-C18 alkyl group, and/or a heptyl polyglucoside.

[0046] In a preferred embodiment, said process for the production of the cleaning product according to the invention further comprises a step f) which involves the addition of at least one buffer system, for example the trisodium citrate - citric acid buffer system.

[0047] A further embodiment provides a step g) which involves the addition of one or more amphoteric surfactants, for example dipotassium 2-ethylhexyl dipropionate salt.

[0048] Furthermore, the production process of the cleaning product according to the present invention can comprise a step h) which involves the addition of one or more additives selected from odor suppressants (preferably zinc ricinoleate), perfumes, solvents, co-solvents, anionic surfactants (preferably sodium lauryl sulfate, alkyl polysaccharides), preservatives, amphoteric surfactants (preferably alkyl betaine). Said process is preferably carried out at room temperature.

[0049] In a preferred embodiment, step b) of said process is conducted for 10 minutes, while step c) is conducted for at least 15 minutes and step e) is conducted for 25-30 minutes.

[0050] Said process offers the advantage of generating a cleaning product characterized by a nanometric micellar composition in which the micelles have a particular flattened shape. This feature is advantageous compared to the traditional spherical shape because in the flattened micelle the contact area between the micelle and the fat molecule is greater; therefore, the surface tension is further reduced while the wettability of the fat molecule increases: this allows obtaining a greater efficiency in terms of cleaning performance.

[0051] From the above description, the features of the product object of the present invention are clear, as are the relative

advantages. In practice, any additives may be used according to the technical requirements.

EXAMPLE 1: composition and process according to the invention

[0052] Table 1 shows an illustrative and non-limiting example of the components of a composition according to the invention, together with the relative quantities, trade names and corresponding suppliers.

Table 1

CATEGORY	NAME	COMMERCIAL NAME	SUPPLIER	Quantity (KG)
Chelating Agent	GLDA 38%	AQUACID 2014 ex	CHIMPEX	8.8/100
Salt Of Acid	SODIUM CITRATE	SODIUM CITRATE 2H ₂ O USP	CHIMPEX	3.5/100
Acid	MONO HYDRATE CITRIC ACID	CITRIC ACID MONO-ID.FU	CHIMPEX	1.3/100
Hydrotropic Agent	Heptyl polyglucoside	SIMULSOL SL7G	CHEMICAL SOLUTION	1/100
Amphoteric surfactants	Dipotassium 2-Ethylhexyl Dipropionate Salt	LIBRATERIC BA 70	LIBRA	0.9/100
Non-ionic surfactants	Glycereth-6 Cocoate	LEVENOL F200	UNIVAR	6.2/100
Alcohol-based solvents	3-methoxy-3-methyl-1-butanol	MMB SOLVENT	EIGEMANN & VERONELLI	17.5/100
Non Ionic Surfactants - Alcohol Ethoxylates	RO(CH ₂ CH ₂ O) ₇ H, wherein R = C12 to C18 Alkyl	DEHYDOL LT7	EUROSYN	0.7/100

Preparation Process:

[0053] 30-40% demineralized water is introduced into the mixer, keeping the system always stirred. Raw materials are added in the following order:

- the sodium citrate and subsequently the citric acid are added under stirring;
- 38% GLDA is added and it is subjected to mixing for 10 minutes, then the MMB solvent is added under mixing;
- LIBRATERIC BA70 is introduced and subjected to mixing until dispersion;
- LEVENOL F200 is added, the mixture is left under stirring for at least 15 minutes;
- SIMULSOL SL7G is added and then DEHYDOL LT7 is added;
- demineralized water is added, always stirring, until the desired level is reached (e.g. 100 liters) .

The mixer runs for 25-30 minutes.

Results:

[0054] Table 2 reports the chemical-physical features of the cleaning product according to the invention, as well as its ecological properties and the estimate of toxicity.

Table 2

Appearance	clear, non-colored liquid
Smell	slight characteristic odor
Boiling point / boiling range	>100°C
Relative density	0.98-1.01
pH	9-11

(continued)

	Estimation of the acute oral toxicity of the mixture	ATEmix (oral) > 2000mg/Kg
5	Bioaccumulation potential	not bioaccumulative (assessment performed on individual ingredients)
	Mobility in soil	rapidly absorbed into the soil
10	Results of PBT and vPvB assessment	No PBT or vPvB (assessment performed on individual ingredients)

[0055] It is therefore possible to deduce that the cleaning product according to the present invention is extremely environmentally friendly and its use is safe for the health of the user.

15 Tensiometer measurements:

[0056] To determine the critical micellar concentration of the surfactants, surface tension measurements were performed with the de Nouy ring method.

[0057] For all systems characterized by this technique, a solution of distilled water, 3.5% by weight sodium citrate and 0.5% by weight citric acid were used. The characterized systems are the following:

- A solution of the surfactant Levenol F200;
- A solution of the surfactant Dehydol LT-7;
- A solution of the two surfactants in equal weight ratio.

[0058] The tensiometer measurements returned CMC values equal to 1.57% by weight for the LEVENOL F200 and two values equal to 0.27% and 1.23% by weight for the DEHYDOL LT-7. The anomalous behavior of the double CMC suggests a structural change in the arrangement of the molecules, from a spherical shape to an ellipsoidal or rod-like shape.

[0059] The mixture of both surfactants, on the other hand, has CMC values equal to 0.28% and 1.60% by weight, which leads to the conclusion that the mixture has a nanometric micellar structure at concentrations higher than the aforementioned CMC.

30 Determination of the spherical-ellipsoidal packing nanometric micellar structure of the surfactant Glycereth-6 Cocoate (Levenol F200).

[0060] The critical micellar concentration (CMC) of a sample of the surfactant Glycereth-6 Cocoate was first determined by carrying out surface tension measurements with the Du Noüy ring method, using a solution of distilled water, sodium citrate 3.5 % by weight and 0.5% by weight citric acid. The CMC of Glycereth-6 Cocoate is around $1.57\% \pm 0.08$ w/w.

[0061] A linear fitting was performed on the pre-micellar area of the surface tension curve and, from the slope of this line, thanks to the Gibbs equation ($\Gamma \sigma = -1/RT \times d\gamma/d\ln(\alpha)$), the surface density of the molecules at the interface was determined. On the basis of the density value, it was possible to obtain the minimum interfacial area occupied by the "head" of the surfactant. Glycereth-6 Cocoate has a minimum interfacial area of 0.64 ± 0.02 nm².

[0062] The Dynamic Light Scattering (DLS) technique was used to verify the formation of aggregates once the CMC is reached and thus determine their size.

[0063] A 3% by weight of Glycereth-6 Cocoate sample was analyzed using a solvent consisting of a solution of distilled water, 3.5% by weight sodium citrate and 0.5% by weight citric acid.

[0064] The DLS analysis of the sample shows the presence of a single population of aggregates in solution having a hydrodynamic radius of about 11 nm.

[0065] Based on the Tanford equation $l_{\max} = 0.15 + 0.1265 \text{ NC}$, where NC is the number of carbon atoms present in the alkyl chain, it is possible to estimate the maximum length of the alkyl chain of the surfactant. Since Glycereth-6 Cocoate has a chain of 12-18 carbon atoms, the length of its alkyl chain is 2.42 nm.

[0066] Using the second Tanford formula ($V_T = 2.74 + 2.69 (n)$), where n represents the number of carbon atoms, it was possible to determine that the tail volume of Glycereth-6 Cocoate molecule is 4.8 nm³.

[0067] At this point, also exploiting the value of the minimum area occupied by the surface, through the equation $PC = v/a_0/l_C$, where a_0 represents the minimum interfacial area occupied by the head, v is the volume of the tail or tails and l_C represents the maximum length of the alkyl chain, the critical packing parameter PC has been determined, which is about 0.3. This value suggests that the nanometric micelles have a spherical-ellipsoidal type packing.

Determination of the nanometric micellar structure for the surfactant DEHYDOL LT-7

[0068] Two samples of DEHYDOL LT-7 (one at 0.5% w/w and the other at 3% w/w, therefore at a concentration of about twice the two CMCs shown by the surface tension measurement) were subjected to DLS for the determination of the hydrodynamic radius.

[0069] The analysis of the sample at 0.5% w/w reports the presence of a single population of aggregates around 17 nm.

[0070] The analysis of the sample at 3% w/w, on the other hand, reveals the presence of two populations: the most intense in terms of number of aggregates stands at a hydrodynamic radius of 2.7 ± 0.6 nm, while the less intense concerns some aggregates having a hydrodynamic radius of 15.0 ± 0.7 nm, aggregates attributable to those already present in the measure with the lowest concentration. Using the Tanford equation we can establish the length of the alkyl chain of the surfactant, and considering that this molecule also has 12-18 carbon atoms, the length of the chain is around 2.42 nm. The tail volume is estimated to be around 0.51 nm^3 .

[0071] These values show that a different packing is estimated for this surfactant compared to Levenol F200, in particular a spherical packing is estimated for the aggregates seen at 2.7 nm and non-spherical for the aggregates seen at 15 nm.

[0072] The present invention has been described for illustrative but not limitative purposes according to its preferred embodiments, but it is to be understood that variations and/or modifications may be made by those skilled in the art without departing from the scope of protection defined in the appended claims.

Claims

1. Cleaning product **characterized by** a nanometric micellar composition, said cleaning product comprising:

- a first non-ionic surfactant, present in an amount by weight comprised between 3.2% and 9.2%, comprising one or more esters of the polyoxyethylene glycol fatty acid, preferably Glycereth-6 Cocoate;
- at least a second non-ionic surfactant, present in an amount by weight between 0.2% and 2.2%, selected from an ethoxylated fatty alcohol $\text{RO}(\text{CH}_2\text{CH}_2\text{O})_7\text{H}$, wherein R is an alkyl group C12-C18, and/or a heptyl polyglucoside;
- at least one chelating agent, present in an amount by weight comprised between 2.2% to 4.5%;
- at least one alcohol-based solvent, present in an amount by weight comprised between 12% and 23%;
- water, present in an amount up to 100% by weight,

said quantities by weight being referred to the total weight of the composition.

2. Cleaning product according to claim 1, comprising at least one buffer system in order to stabilize the pH of said composition in a range from 8 to 12, preferably from 9 to 11.

3. Cleaning product according to claim 2, wherein said buffer system comprises trisodium citrate and citric acid,

said trisodium citrate being present in an amount by weight comprised between 1% and 6.5%, preferably 3%, and said citric acid being present in an amount by weight comprised between 0.45% and 2.2%, preferably 1.2%, said quantities by weight being referred to the total weight of the composition.

4. Cleaning product according to any one of the preceding claims, wherein said first non-ionic surfactant is present in an amount by weight of 6.2% with respect to the total weight of the composition.

5. Cleaning product according to any one of the preceding claims, wherein said at least one second non-ionic surfactant is present in an amount by weight of 0.7% with respect to the total weight of the composition.

6. Cleaning product according to any one of the preceding claims, wherein said at least one chelating agent is GLDA (N, N-dicarboxymethyl-glutamic acid tetrasodium salt).

7. Cleaning product according to any one of the preceding claims, wherein said at least one chelating agent is present in an amount by weight of 3.4% with respect to the total weight of the composition.

8. Cleaning product according to any one of the preceding claims, wherein said at least one alcohol-based solvent is 3-methoxy-3-methyl-1-butanol.

9. Cleaning product according to any one of the preceding claims, wherein said at least one alcohol-based solvent is present in an amount by weight of 17.5% with respect to the total weight of the composition.

10. Cleaning product according to any one of the preceding claims, further comprising one or more amphoteric surfactants, preferably dipotassium 2-ethylhexyl dipropionate salt or alkylbetaine.

11. Cleaning product according to any one of the preceding claims, wherein said one or more amphoteric surfactants are present in an amount by weight comprised between 0.14% and 1.54%, more preferably 0.63%, with respect to the total weight of the composition.

12. Cleaning product according to any one of the preceding claims, comprising one or more additives selected from odor suppressants, preferably zinc ricinoleate, perfumes, co-solvents, anionic surfactants preferably sodium lauryl sulfate, alkyl polysaccharides, preservatives.

13. Process for preparing a cleaning product according to any one of claims 1-12, said process comprising the following steps:

a) pouring demineralized water in a mixer in an amount by weight comprised between 20 and 50%, preferably between 30 and 40%, based on the total weight of the composition;

b) adding at least one chelating agent and at least one alcohol-based solvent and mixing;

c) adding a first non-ionic surfactant comprising one or more esters of the polyoxyethylene glycol fatty acid, and mixing;

d) adding at least one second non-ionic surfactant different from said first surfactant selected from an ethoxylated fatty alcohol $\text{RO}(\text{CH}_2\text{CH}_2\text{O})_7\text{H}$, wherein R is an alkyl group C12-C18, and/or a heptyl polyglucoside and mixing;

e) adding demineralized water up to 100% and mixing,

these steps being conducted not necessarily in the order described.

14. Process according to claim 13, wherein said at least one chelating agent is GLDA, said at least one alcohol based solvent is 3-methoxy-3-methyl-1-butanol, said first non-ionic surfactant is Glycereth-6 Cocoate.

15. Process according to claim 13 or 14, further comprising a step f) which involves the addition of at least one buffer system according to any one of claims 2-3.

Patentansprüche

1. Reinigungsprodukt, **gekennzeichnet durch** eine nanometrische mizellare Zusammensetzung, wobei das Reinigungsprodukt umfasst:

- ein erstes nichtionisches Tensid, das in einer in einer Gewichtsmenge zwischen 3,2% und 9,2%, das einen oder mehrere Ester der Polyoxyethylenglykolfettsäure, vorzugsweise Glycereth-6-Cocoat, enthält;

- mindestens ein zweites nichtionisches Tensid, das in einer Gewichtsmenge zwischen 0,2% und 2,2% vorhanden ist, ausgewählt aus einem ethoxylierten Fettalkohol $\text{RO}(\text{CH}_2\text{CH}_2\text{O})_7\text{H}$, worin R eine C12-C18-Alkylgruppe ist, und/oder einem Heptylpolyglucosid;

- mindestens einen Chelatbildner, der in einer Gewichtsmenge zwischen 2,2% und 4,5% vorliegt;

- mindestens ein Lösungsmittel auf Alkoholbasis, das in einer Gewichtsmenge zwischen 12% und 23% vorliegt;

- Wasser, das in einer Menge von bis zu 100 Gew.-% vorhanden ist,

Diese Gewichtsmengen beziehen sich auf das Gesamtgewicht der Zusammensetzung.

2. Reinigungsprodukt nach Anspruch 1, das mindestens ein Puffersystem enthält, um den pH-Wert der Zusammensetzung in einem Bereich von 8 bis 12, vorzugsweise von 9 bis 11, zu stabilisieren.

3. Reinigungsprodukt nach Anspruch 2, wobei das Puffersystem Trinatriumcitrat und Zitronensäure umfasst,

das Trinatriumcitrat in einer Gewichtsmenge zwischen 1% und 6,5%, vorzugsweise 3%, vorhanden ist und wobei die Zitronensäure in einer Gewichtsmenge zwischen 0,45% und 2,2%, vorzugsweise 1,2%, vorhanden ist,

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Diese Gewichtsmengen beziehen sich auf das Gesamtgewicht der Zusammensetzung.

4. Reinigungsprodukt nach einem der vorhergehenden Ansprüche, wobei das erste nichtionische Tensid in einer Gewichtsmenge von 6,2%, bezogen auf das Gesamtgewicht der Zusammensetzung, vorhanden ist.
5. Reinigungsprodukt nach einem der vorhergehenden Ansprüche, wobei das mindestens eine zweite nicht-ionische Tensid in einer Gewichtsmenge von 0,7%, bezogen auf das Gesamtgewicht der Zusammensetzung, vorhanden ist.
6. Reinigungsprodukt nach einem der vorhergehenden Ansprüche, wobei der mindestens eine Chelatbildner GLDA (N,N-Dicarboxymethylglutaminsäure, Tetranatriumsalz) ist.
7. Reinigungsprodukt nach einem der vorhergehenden Ansprüche, wobei der mindestens eine Chelatbildner in einer Gewichtsmenge von 3,4%, bezogen auf das Gesamtgewicht der Zusammensetzung, vorhanden ist.
8. Reinigungsprodukt nach einem der vorhergehenden Ansprüche, wobei das mindestens eine Lösungsmittel auf Alkoholbasis 3-Methoxy-3-methyl-1-butanol ist.
9. Reinigungsprodukt nach einem der vorhergehenden Ansprüche, wobei das mindestens eine Lösungsmittel auf Alkoholbasis in einer Gewichtsmenge von 17,5%, bezogen auf das Gesamtgewicht der Zusammensetzung, vorhanden ist.
10. Reinigungsprodukt nach einem der vorangehenden Ansprüche, ferner enthaltend ein oder mehrere amphotere Tenside, vorzugsweise Dikalium-2-ethylhexyl-dipropionat-Salz oder Alkylbetain.
11. Reinigungsprodukt nach einem der vorhergehenden Ansprüche, wobei das eine oder die mehreren amphoteren Tenside in einer Gewichtsmenge zwischen 0,14% und 1,54%, vorzugsweise 0,63%, bezogen auf das Gesamtgewicht der Zusammensetzung, vorhanden sind.
12. Reinigungsprodukt nach einem der vorhergehenden Ansprüche, enthaltend einen oder mehrere Zusatzstoffe, ausgewählt aus Geruchsunterdrückern, vorzugsweise Zink Ricinoleat, Duftstoffen, Co-Lösungsmitteln, anionischen Tensiden, vorzugsweise Natriumlaurylsulfat, Alkylpolysaccharide als Konservierungsmittel.
13. Verfahren zur Herstellung eines Reinigungsprodukts nach einem der Ansprüche 1-12, wobei dieses Verfahren die folgenden Schritte umfasst:
 - a) Gießen von entmineralisiertem Wasser in einem Mischer in einer Gewichtsmenge zwischen 20 und 50%, vorzugsweise zwischen 30 und 40%, bezogen auf das Gesamtgewicht der Zusammensetzung;
 - b) Zugabe mindestens eines Chelatbildners und mindestens eines Lösungsmittels auf Alkoholbasis und Mischen;
 - c) Zugabe eines ersten nichtionischen Tensids, das einen oder mehrere Ester der Polyoxyethylenglykolfettsäure enthält, und Mischen;
 - d) Zugabe mindestens eines zweiten nichtionischen Tensids, das sich von dem ersten Tensid unterscheidet, ausgewählt aus einem ethoxylierten Fettalkohol RO (CH₂CH₂O)₇H, worin R eine C12-C18-Alkylgruppe ist, und/oder einem Heptylpolyglucosid und Mischen;
 - e) Zugabe von entmineralisiertem Wasser bis zu 100 % und Mischen,

Diese Schritte werden nicht unbedingt in der beschriebenen Reihenfolge durchgeführt.

14. Verfahren nach Anspruch 13, wobei der mindestens eine Chelatbildner GLDA ist, das mindestens eine Lösungsmittel auf Alkoholbasis 3-Methoxy-3-methyl-1-butanol ist und das erste nichtionische Tensid Glycereth-6-cocaoat ist.
15. Verfahren nach Anspruch 13 oder 14, ferner umfassend einen Schritt f), der die Zugabe mindestens eines Puffersystems nach einem der Ansprüche 2-3 beinhaltet.

Revendications

1. Produit de nettoyage **caractérisé par** une composition micellaire nanométrique, ledit produit de nettoyage comprenant:

- un premier agent de surface non ionique, présent dans une quantité en poids comprise entre 3,2% et 9,2%, comprenant un ou plusieurs esters de l'acide gras polyoxyéthylène glycol, de préférence le Glycereth-6 Cocoate;
 - au moins un deuxième agent de surface non ionique, présent en une quantité en poids comprise entre 0,2% et 2,2%, choisi parmi un alcool gras éthoxylé RO (CH₂CH₂O)₇H, dans lequel R est un groupe alkyle C12-C18, et/ou un polyglucoside d'heptyle;
 - au moins un agent chélateur, présent en une quantité en poids comprise entre 2,2% et 4,5%;
 - au moins un solvant à base d'alcool, présent en une quantité en poids comprise entre 12% et 23%;
 - de l'eau, présente en quantité pouvant atteindre 100 % en poids,

Lesdites quantités en poids sont rapportées au poids total de la composition.

2. Produit de nettoyage selon la revendication 1, comprenant au moins un système tampon afin de stabiliser le pH de ladite composition dans une plage allant de 8 à 12, de préférence de 9 à 11.

3. Produit de nettoyage selon la revendication 2, dans lequel ledit système tampon comprend du citrate trisodique et de l'acide citrique,

ledit citrate trisodique est présent en une quantité en poids comprise entre 1% et 6,5%, de préférence 3%, et ledit acide citrique est présent en une quantité en poids comprise entre 0,45% et 2,2%, de préférence 1,2%, lesdites quantités en poids sont rapportées au poids total de la composition.

4. Produit de nettoyage selon l'une quelconque des revendications précédentes, dans lequel ledit premier agent de surface non ionique est présent en une quantité en poids de 6,2% par rapport au poids total de la composition.

5. Produit de nettoyage selon l'une quelconque des revendications précédentes, dans lequel ledit au moins un second agent de surface non ionique est présent en une quantité en poids de 0,7% par rapport au poids total de la composition.

6. Produit de nettoyage selon l'une quelconque des revendications précédentes, dans lequel ledit au moins un agent chélateur est le GLDA (acide N, N-dicarboxyméthyl-glutamique, sel tétrasodique).

7. Produit de nettoyage selon l'une quelconque des revendications précédentes, dans lequel ledit au moins un agent chélateur est présent en une quantité en poids de 3,4% par rapport au poids total de la composition.

8. Produit de nettoyage selon l'une quelconque des revendications précédentes, dans lequel ledit au moins un solvant à base d'alcool est le 3-méthoxy-3-méthyl-1-butanol.

9. Produit de nettoyage selon l'une quelconque des revendications précédentes, dans lequel ledit au moins un solvant à base d'alcool est présent en une quantité en poids de 17,5% par rapport au poids total de la composition.

10. Produit de nettoyage selon l'une quelconque des revendications précédentes, comprenant en outre un ou plusieurs tensioactifs amphotères, de préférence le sel de dipropionate de 2-éthylhexyle dipotassique ou l'alkylbétaine.

11. Produit de nettoyage selon l'une quelconque des revendications précédentes, dans lequel ledit ou lesdits tensioactifs amphotères sont présents dans une quantité en poids comprise entre 0,14% et 1,54%, plus préférentiellement 0,63%, par rapport au poids total de la composition.

12. Produit de nettoyage selon l'une quelconque des revendications précédentes, comprenant un ou plusieurs additifs choisis parmi les supprimeurs d'odeurs, de préférence le ricinoléate de zinc, les parfums, les co-solvants, les tensioactifs anioniques de préférence le lauryl sulfate de sodium, conservateurs à base de polysaccharides d'alkyle.

13. Procédé de préparation d'un produit de nettoyage selon l'une quelconque des revendications 1-12, ledit procédé

comprenant les étapes suivantes:

- a) verser de l'eau déminéralisée dans un mélangeur dans une quantité en poids comprise entre 20 et 50%, de préférence entre 30 et 40%, par rapport au poids total de la composition;
- b) ajouter au moins un agent chélateur et au moins un solvant à base d'alcool et mélanger;
- c) ajouter un premier agent de surface non ionique comprenant un ou plusieurs esters de l'acide gras polyoxyéthylène glycol, et mélanger;
- d) ajouter au moins un deuxième agent tensioactif non ionique différent dudit premier agent tensioactif choisi parmi un alcool gras éthoxylé $\text{RO}(\text{CH}_2\text{CH}_2\text{O})_7\text{H}$, dans lequel R est un groupe alkyle C12-C18, et/ou un polyglucoside d'heptyle et mélanger;
- e) ajouter de l'eau déminéralisée jusqu'à 100% et mélanger,

ces étapes n'étant pas nécessairement effectuées dans l'ordre décrit.

14. Procédé selon la revendication 13, dans lequel ledit au moins un agent chélateur est le GLDA, ledit au moins un solvant à base d'alcool est le 3-méthoxy-3-méthyl-1-butanol, ledit premier tensioactif non ionique est le Glycereth-6 Cocoate.

15. Procédé selon la revendication 13 ou 14, comprenant en outre une étape f) qui implique l'ajout d'au moins un système tampon selon l'une des revendications 2-3.

REFERENCES CITED IN THE DESCRIPTION

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