

CLEANING AGENT

The invention relates to a cleaning agent according to the preamble of claim 1.

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The object of the invention is to provide a cleaning agent that shows an improved cleaning action and achieves optimal results when used for the cleaning of water-resistant, especially non-textile surfaces. An additional object is to provide a cleaning agent that is optimally suitable for use in scrubbing machines.

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The object of the invention is achieved with a cleaning agent that has the features according to claim 1.

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In contrast to traditional cleaning methods for textiles, the mode of action of the cleaning agent according to the invention is based less on the principle of the emulsification of dirt by surfactants, but rather consists of a combination of two cleaning technologies. Through the wetting agent used, the surface tension of the water-diluted cleaning agent is lowered in a very short time (less than 1 second) to less than 30 mN/m (measured at room temperature), such that the aqueous cleaning solution in combination with the mechanical strength of the cleaning offers the possibility of suspending the dirt particles in the wash liquor. Through combination with an anti-redeposition agent, the dirt particles are held in suspension, which counteracts redeposition.

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The emulsifying agent enables the poorly water-soluble wetting agent to achieve a rapid, homogeneous distribution in the wash liquor, and surprisingly imparts a strongly improved emulsifying effect. The thus suspended, weakly negatively-charged dirt particles are electrosterically held in suspension due to the negative charges of the neutralized poly(aspartic acid). In contrast to the known use in textile washing agent liquors of poly(aspartic acid), same is not used here to bind to the Ca^{2+} ions present, but rather is used for the electrosteric repulsion of the negatively-charged dirt particles by the likewise negatively-charged, long-chain molecules.

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The advantages achieved by the invention are essentially the following:

- the negatively charged dirt particles are electrosterically repelled;
- due to an excess of water-solvated, negatively-charged complexing agent fractions, a reciprocal repulsion is effected against the dirt particles known from

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experience to be mostly negatively charged;

- the liquor has an extremely good anti-redeposition action; and,
- surprisingly, there is a strongly improved emulsifying ability of the cleaning agent according to the invention, which is attributed to a synergistic effect of the emulsifying agents; and,
- no high-foaming surfactants are used, so that defoaming agents can be avoided.

Further advantageous embodiments of the invention can be mentioned as follows:

The negatively-charged, organic macromolecule is advantageously a polymeric anti-redeposition agent and can be selected from the following substance classes: aminopolycarboxylates, organic phosphonates, polycarboxylates or copolymers thereof. In particular, the at least one negatively-charged, organic macromolecule can be a poly(aspartic acid) or water-soluble salt thereof.

The negatively-charged, organic macromolecule can also be a polyacrylate, e.g., an acrylic homopolymer, preferably with a molecular weight of from 4,000 to 6,000.

The non-ionic wetting agent can be an acetyl diol, preferably an alkoxyated acetyl diol; the anionic wetting agent can be an anionic perfluoroalkyl polymer or alkyl sulfosuccinate; the cationic wetting agent can be a cationic perfluoroalkyl copolymer, and the amphoteric wetting agent can be an alkyl amidopropyl betaine. The wetting agent can also comprise one or more ethoxylated acetyl diols.

The non-ionic emulsifying agent can be selected from the group of fatty alcohol alkoxyates; the anionic emulsifying agent can be selected from the group of alkyl sulfates or alkyl ether sulfates; the cationic emulsifying agent can be selected from the group of quaternary ammonium compounds; and, the amphoteric emulsifying agent can be selected from the group of betaines and sultaines. The emulsifying agent can also comprise one or more, preferably branched, ethoxylated fatty alcohols.

The poly(aspartic acid) (or salt thereof) preferably has an average molecular mass of 1000-10,000 g/mol, preferably 2000-3000 g/mol.

Expediently, the particle size distribution D50 of the at least one negatively-charged,

organic macromolecule, and preferably the at least one poly(aspartic acid) or water-soluble salt thereof, that is present in particle form, is 0.1 mm. A particle size distribution D50 of 0.07 mm, or even of 0.01 mm, gives particularly good results.

- 5 The cleaning agent is preferably used in granular or tablet form, which simplifies storage. The tablets expediently have a volume of at least 1 cm³, preferably at least 5 cm³. The volume is expediently not more than 100 cm³, preferably not more than 12 cm³.

10 The maximum diameter of the tablets is expediently 10 cm, preferably 7 cm. The minimum diameter of the tablets is expediently 1 cm, preferably 3 cm. These dimensions allow for optimal dosing and dissolution in water.

The cleaning agent according to the invention is expediently dissolved in water shortly before its use. Based on one part by weight of the sum of the three components a) + b) +
15 c), 500-100,000 parts by weight of water is used the dissolution thereof. Expediently, 600-1900 parts by weight of water, preferably 900 to 1300 parts by weight of water, can be used in its dissolution.

Advantageously, the cleaning agent additionally contains a substance that swells in water,
20 e.g., polyvinylpyrrolidone. Thus, the cleaning agent present in granular or tablet form dissolves quickly in water. The cleaning agent formed as a tablet should expediently dissolve residue-free in water in less than 10 minutes, preferably in less than 2 minutes. The surface tension of the aqueous solution of the cleaning agent at room temperature is lowered to a value below 40 mN/m, preferably below 30 mN/m, within at most 1 second,
25 preferably within at most 0.6 second.

In a particular embodiment, the cleaning agent contains the following additional component:

- 30 d) effervescent mixture from a carbonate and an organic acid, preferably in equimolar amounts.

The effervescent mixture is preferably a mixture of citric acid, sodium hydrogen carbonate and/or sodium carbonate. In a granular or tablet usage form, the cleaning agent can form
35 an effervescent mixture by admixture with a carbonate and an organic acid, e.g., citric

acid, and/or a citrate. The excess of citrate serves for complexation of the calcium ions.

In a particular embodiment, the branched, ethoxylated fatty alcohol is an iso-C8-C18 non-ionic surfactant, which is preferably etherified with 2-20 ethylene oxide units. Specifically,
5 the branched, ethoxylated fatty alcohol is an iso-C10-C14 non-ionic surfactant, which is preferably etherified with 5-10 ethylene oxide units. The iso-C8-C18 non-ionic surfactant can be the iso-C13 (10 EO) or iso-C11 (7 EO).

10 The proportions of components a), b) and c) of the cleaning agent according to the invention can have the following ratio with respect to one another:

Component a) 0.1 - 100 parts by weight;
Component b) 0.05 - 50 parts by weight;
Component c) 0.01 - 50 parts by weight.

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Expediently, the components a), b) and c) can have the following ratio with respect to one another:

Component a) 1 - 10 parts by weight;
20 Component b) 0.5 - 5 parts by weight;
Component c) 0.1 - 5.0 parts by weight.

Advantageously, the components a), b) and c) can have the following ratio with respect to one another:

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Component a) 3 - 5 parts by weight;
Component b) 1 - 2 parts by weight;
Component c) 1 - 2 parts by weight.

30 In addition to the proportions of components a), b), and c), the following proportion of component (d) can also be provided:

Component d): 0.3 - 150 parts by weight, preferably 3.0 – 15.0 parts by weight.

35 The cleaning agent according to the invention is specifically suitable for use in scrubbing machines. It is particularly suitable for wet mopping and for manual or industrial foams.

In a particular embodiment, the cleaning agent can additionally contain a complexing agent.

5 The invention and further refinements of the invention are explained in more detail below in terms of several formulations. The formulations represent the composition of a dosing unit (e.g., 1 tablet or 1 sachet or 1 powder portion, etc.), which is dissolved in 8 – 10 liters of water to get a suitable cleaning solution:

10 **Example 1**

8 g Poly(aspartic acid) Na salt

4 g organo-modified polydimethylsiloxane (as wetting agent)

4 g iso-C12-14 fatty alcohol (8EO) (as emulsifying agent for the wetting agent)

15 **Example 2**

6 g Poly(aspartic acid) Na salt

4 g 2,4,7,9-tetramethyl-5-decyne-4,7-diol (as wetting agent)

2 g C10-12 fatty alcohol EO/PO

20 **Example 3**

4 g Poly(aspartic acid) Na salt

2 g anionic fluoro wetting agent (C4-C6 straight-chain fluorinated hydrocarbon)

3 g Na lauryl ether sulfate (2EO) (as emulsifying agent for the wetting agent)

25 **Example 4**

4 g Poly(aspartic acid) Na salt

4 g Na diisooctyl sulfosuccinate (as wetting agent)

3g C10 Guerbet alcohol (9EO) (as emulsifying agent for the wetting agent)

30 **Example 5**

7.8 g acrylic homopolymer (MW 4000-6000)

4.1 g anionic fluoro wetting agent (C4-C6 straight-chain fluorinated hydrocarbon)

4 g iso-C12-14 fatty alcohol (8EO) (as emulsifying agent for the wetting agent)

0.15 g Diethylenetriamine (as complexing agent)

Example 6

5.9 g acrylic homopolymer (MW 4000-6000)

3.9 g 2,4,7,9-tetramethyl-5-decyne-4,7-diol (as wetting agent)

2 g C10-12 fatty alcohol EO/PO

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Example 7

4 g acrylic homopolymer (MW 4000-6000)

2 g anionic fluoro wetting agent (C4-C6 straight-chain fluorinated hydrocarbon)

3 g Na lauryl ether sulfate (2EO) (as emulsifying agent for the wetting agent)

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Example 8

4 g acrylic homopolymer (MW 4000-6000)

4 g Na diisooctyl sulfosuccinate (as wetting agent)

3 g C10 Guerbet alcohol (9EO) (as emulsifying agent for the wetting agent)

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Although various embodiments of the present invention are present, as described above, they are to be understood such that the various features can be used both individually and in any desired combination.

20 This invention is therefore not just limited to the abovementioned, particularly preferred embodiments.

CLAIMS

1. Cleaning agent suitable for the cleaning of water-resistant, especially non-textile surfaces, in scrubbing machines, for wet mopping and for manual or industrial foams; the cleaning agent containing the following components:
 - a) at least one substance selected from:
 - (i) a polymeric anti-redeposition agent;
 - (ii) aminopolycarboxylates, organic phosphonates, polycarboxylates or copolymers thereof;
 - (iii) a poly(aspartic acid) or water-soluble salts thereof; or
 - (iv) a polyacrylate.
 - b) at least one non-ionic, anionic, cationic, or amphoteric wetting agent;
 - (i) the non-ionic wetting agent being an acetylene diol or a polydimethylsiloxane;
 - (ii) the anionic wetting agent being an anionic perfluoroalkyl polymer or an alkyl sulfosuccinate;
 - (iii) the cationic wetting agent being a cationic perfluoroalkyl copolymer; and
 - c) at least one non-ionic, anionic, cationic, or amphoteric emulsifying agent for the at least one wetting agent, **characterized in that**
 - d) the proportions of components a), b), and c) have the following relationship with one another:

Component a) 1 - 10 parts by weight;
Component b) 0.5 - 5 parts by weight;
Component c) 0.1 - 5.0 parts by weight; and
 - e) the cleaning agent is available in granular or tablet form.
2. Cleaning agent according to claim 1, characterised in that the polyacrylate is an acrylic homopolymer, preferably with a molecular weight of from 4,000 to 6,000.
3. Cleaning agent according to claim 1 or 2, characterised in that component a) is used in granular form and the average diameter of the individual granular particle is preferably 400 to 800 μm .
4. Cleaning agent according to one of claims 1 through 3, characterised in that the non-ionic wetting agent is an alkoxylated acetylene diol.

5. Cleaning agent according to one of claims 1 through 4, characterised in that the non-ionic emulsifying agent is selected from the group of fatty alcohol alkoxylates.
6. Cleaning agent according to one of claims 1 through 5, characterised in that the anionic emulsifying agent is selected from the group of alkyl sulfates or alkyl ether sulfates.
7. Cleaning agent according to one of claims 1 through 6, characterised in that the cationic emulsifying agent is selected from the group of quaternary ammonium compounds.
8. Cleaning agent according to one of claims 1 through 7, characterised in that the amphoteric emulsifying agent is selected from the group of betaines and sultaines.
9. Cleaning agent according to one of claims 1 through 8, characterised in that the at least one poly(aspartic acid) or salt thereof has a molecular mass between 1,000 and 10,000 g/mol, preferably 2,000 to 3,000 g/mol.
10. Cleaning agent according to one of claims 1 through 9, characterised in that the wetting agent comprises one or more ethoxylated acetylene diols as wetting agents.
11. Cleaning agent according to one of claims 1 through 10, characterised in that the emulsifying agent comprises one or more, preferably branched, ethoxylated fatty alcohols.
12. Cleaning agent according to one of claims 1 through 11, characterised in that it is available as a tablet with a volume of at least 1 cm³, preferably at least 5 cm³.
13. Cleaning agent according to one of claims 1 through 12, characterised in that it is available as a tablet with a volume of at most 100 cm³, preferably at most 12 cm³.
14. Cleaning agent according to claims 1 to 13, characterised in that it is available as a tablet with a maximum diameter of 10 cm, preferably 7 cm.
15. Cleaning agent according to one of claims 1 to 14, characterised in that it is available as a tablet with a minimum diameter of 1 cm, preferably 3 cm.

16. Cleaning agent according to one of claims 1 to 15, characterised in that component a) and preferably the at least one poly(aspartic acid) or water-soluble salt thereof is available in particle form with a particle size distribution D50 of 0.1 mm.
17. Cleaning agent according to claim 16, characterised in that the particle size distribution D50 is 0.07 mm, preferably 0.01 mm.
18. Cleaning agent according to one of claims 1 to 17, characterised in that it contains the following additional component:
d) effervescent mixture from a carbonate and an organic acid, preferably in equimolar amounts.
19. Cleaning agent according to claim 18, characterised in that the effervescent mixture is a mixture of citric acid, Na hydrogen carbonate, and/or sodium carbonate.
20. Cleaning agent according to one of claims 1 to 19, characterised in that it additionally contains a substance that swells in water, preferably polyvinylpyrrolidone.
21. Cleaning agent according to one of claims 11 to 20, characterised in that the branched, ethoxylated fatty alcohol is an iso-C8-C18 non-ionic surfactant, which is preferably etherified with 2-20 ethylene oxide units.
22. Cleaning agent according to claim 21, characterised in that the branched, ethoxylated fatty alcohol is an iso-C10-C14 non-ionic surfactant, which is preferably etherified with 5-10 ethylene oxide units.
23. Cleaning agent according to claim 21, characterised in that the iso-C8-C18 non-ionic surfactant is iso-C13(10EO) or iso-C11(7EO).
24. Cleaning agent according to one of claims 1 to 23, characterised in that the proportions of components a), b), and c) have the following relationship with one another:
Component a) 3 - 5 parts by weight;
Component b) 1 - 2 parts by weight;
Component c) 1 - 2 parts by weight.

25. Cleaning agent according to one of claims 18 to 24, characterised in that, in addition to the proportions of components a), b), and c), the proportion of component d) is provided:

Component d): 0.3 - 150 parts by weight, preferably 3.0 — 15.0 parts by weight.

26. Cleaning agent according to one of claims 1 to 25, characterised in that the cleaning agent formed as a tablet dissolves residue-free in water in less than 10 minutes, preferably in less than 2 minutes.

27. Cleaning agent according to one of claims 1 through 26, characterised in that it additionally contains a complexing agent.

28. Cleaning agent according to one of claims 1 through 27, characterised in that the wetting agent is selected such that the surface tension of said cleaning agent at room temperature is measured to be less than 30 mN/m.

29. Use of the cleaning agent according to one of claims 1 through 28, for the cleaning of water-resistant, especially non-textile surfaces.

30. Use of the cleaning agent according to one of claims 1 through 28 in scrubbing machines.

31. Use of the cleaning agent according to one of claims 1 through 28 for wet mopping.

32. Use of the cleaning agent according to one of claims 1 through 28 for manual or industrial foams.