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(54) A detergent composition in liquid form for the pretreatment of textiles.

(57) The present invention relates to a detergent composition in liquid form for the pretreatment of textiles, comprising, calculated on the total detergent composition:

a. at least 60 wt.% water,
b. 0.001 to 2.0 wt.% enzyme,
c. 0.01 to 5 wt.% nonionic and/or anionic surfactant,
d. 0.1 to 5 wt.% propanolamine,
e. at least one organic acid in an amount up to a pH ranging from 5 to 12,
f. 0 to 30 wt.% liquid and/or water-soluble glycol, and, if desired,
g. other additives in an amount of not more than 5 wt.%.

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A detergent composition in liquid form for the pretreatment of textiles.

The present invention relates to a detergent composition for the pretreatment of textiles, in particular to a liquid stain remover, which is especially suitable for local pretreatment of stains before washing the laundry in the conventional manner. For the purpose of removing persistent stains on laundry the stains are increasingly given a pretreatment with a liquid stain remover, a so-called pre-spotter. As a result of this pretreatment the stains are better removed in the conventional washing treatment.

These products are often based on a combination of a nonionic surfactant, e.g., ethoxylated nonyl phenyl, with sodium citrate and water. Also known are products based on alkanes and isopropyl alcohol to which water and ethoxylated fatty alcohol are added.

A variety of such detergent compositions are known from the literature and the market. For instance, French patent publication 2,448,568 discloses a stain remover for removing greasy stains which consists of a large amount of nonionic surfactant, an organic solvent, water, an enzyme, and an alkanolamine. Such pretreatment compositions are specific, i.e. they are suitable for one type of stains only.

The object of the invention is to provide a universal detergent composition in liquid form for the pretreatment of textiles, which is suitable for substantially all types of stains, and which has a clearly improved activity over the known pretreatment compositions.

This invention therefore comprises a detergent composition in liquid form for the preatreatment of textiles, comprising, calculated on the total detergent composition:

a. at least 60 wt.% water,
b. 0.001 to 2.0 wt.% enzyme,
c. 0.01 to 5 wt.% nonionic and/or anionic surfactant,
d. 0.1 to 5 wt.% propanolamine, preferably isopropanolamine,
e. at least one organic acid in an amount up to a pH ranging from 5 to 12,
f. 0 to 30 wt.% liquid and/or water-soluble glycol, and, if desired,
g. other additives in an amount of not more than 5 wt.%.

Surprisingly, it has been found that the composition according to this invention has an excellent cleansing activity against all types of different stains. In this connection it is highly important that the composition should contain the prescribed amount of water in combination with enzyme, surfactant, and isopropanol-amine. The use of this combination results in an adequate removal of stains, for which the cohesion parameter of isopropanolamine in the system, combined with the other active components, is likely to be responsible.

The cohesion parameter is a measure of a substance property which meets with increased use (see, e.g., A.F.M. Barton "Handbook of solubility parameters and other cohesion parameters", 1983, CRC Press, Inc. ISBN 0-8493-3295-8). The cohesion of a substance is connected with the intermolecular forces, such as dispersion forces, dipole interaction, induced dipole interaction, hydrogen bonds etc., in brief the van der Waals forces which effect the cohesion of a substance. The cohesion parameter is calculated as the root of the quotient of the energy content per mole and the molar volume. Substances having the same cohesion parameter excellently dissolve in each other.

The value of the cohesion parameter can be determined by way of experiment, but can also be calculated from the atom group composition of the molecule (see Barton's above-cited Handbook, chapter 6).

Important advantages of the detergent composition according to this invention are its simple composition, the fact that the detergent composition contains few if any components that may induce irritation of the skin, and also the absence of components in ecologically unsound amounts. The detergent composition is in principle also odourless, which in particular with agents for removing greasy stains is certainly not the case.

The detergent composition according to this invention may consist of the above-mentioned components, but a polyglycol and/or a polyglycol ether are preferably also incorporated in the detergent composition, because this will lead to further improved results.

The glycol and/or glycol ether employed are preferably dipropylene glycol and/or hexylene glycol and/or ethylene glycol, more in particular a mixture of these two compounds in a weight ratio of 0.5 to 2.

It is also possible to incorporate in the stain remover components promoting the removal of a specific type of stains. For the removal of greasy stains oleic acid may be added, and more in particular, metal salts can be bound by using nitrilotriacetic acid. Finally, the total stain removing activity can be intensified by using, e.g., urea in the solution.

In order to obtain a suitable activity, it is ensured that the stain remover has a pH value ranging from 5

to 12, and more in particular from 6 to 9. At such a pH the activity is most satisfactory.

This pH can be obtained by first dissolving all the components and then adapting the pH by addition of organic acid. Suitable organic acids are citric acid, formic acid and benzoic acid.

The surfactant may be an anionic or a nonionic surfactant. Since according to the invention the content of metal ions in the detergent composition is preferably limited as much as possible in order to obtain a better cleansing effect and a stable product, the use of a nonionic surfactant, such as an alkanol ethoxylate, e.g., fat alcohol ethoxylate, is preferred. Preferably, use is made of a nonionic surfactant based on an ethylene oxide adduct having an average of preferably 7-9 ethoxylene oxide units per molecule. The amount of surfactant ranges from 0.01 to 5 wt.%, and 0.1-2 wt.% based on the total detergent composition gives the most satisfactory results. It is also possible to use an anionic surfactant. In view of the requirement of introducing as few metal ions as possible into the system, the cation preferably employed is a nitrogen base. Suitable nitrogen bases are amines, such as ethanolamine.

The content of metal ions in the detergent composition preferably does not exceed 0.1 wt.%. At higher contents problems occur with the stain removing activity of the detergent composition.

In addition to the above-mentioned main components, a sequestering agent may be incorporated in the detergent composition, such as nitrilotriacetic acid, in order to bind calcium and magnesium ions with the wash water. The amounts of sequestering agent may vary within wide limits. Suitable limits range from 0.1 to 4 wt.%.

Enzyme concentrates are used in conventional amounts of from 0.001 to 2.0 wt.% based on the total weight.

Suitable enzymes are selected from the group consisting of proteolytic enzymes, lipolytic enzymes, cellulytic enzymes, and amylytic enzymes. In general, proteolytic enzymes or proteases are preferred. It is also possible, however, to use a combination of lipolytic enzymes, cellulytic enzymes, and amylytic enzymes. These enzymes may be used in pure form, or as enzyme preparation.

The detergent composition according to this invention may also contain other additives which may be present in amounts of maximally 5 wt.%. Special examples thereof are perfumes, colorants, bleaching agents, and thickening agents.

The detergent composition according to this invention can be simply composed by dissolving the different components to be used. It is possible to bring the stain remover into paste form by adding gelling or paste-forming components in such an amount as to obtain a processable paste. This can be appropriately spread on the stain.

The invention will now be explained with reference to a few examples, which are for the purpose of elucidation only.

Examples

A plurality of compositions were compared with each other for activity with respect to stain removal.

Basic composition:	
Hexylene glycol	10.0%
Ethylene glycol	10.0%
Enzyme concentrate (protease)	0.5%
Benzoic acid	0.1%
Formic acid	up to about 2.5%
Aminoalkanol	4.0%
Water	up to 100 %.

Amount of pre-spotter per cloth: 2 g.
Soaking time: 5 min.
Washing time: 30 min.
Washing temperature: 30 ° C.

These products were tested on a plurality of test cloths.

After the reflection had been measured on different cloths, samples thereof were soaked in the different products for 15 minutes, and after washing with a conventional main wash detergent composition in the linitester, the reflection was determined again.

PRE-SPOTTER	VEKOPROP	EMPA 112	KW YOVE PK.	SUNAK	EMPA 101	EMPA 116	KREFELD	EMPA 111	AVERAGE	pH
a. Only washing	-3	4	8	20	2	8	3	39	9.9	
b. basis with morpholine	8	6	6	18	1	18	4	42	12.8	6.1
c. basis with monoethanolamine	9	4	13	20	1	20	4	44	14.3	5.9
l. basis with 1-aminopropanol-2	11	8	10	19	1	17	5	45	14.5	5.9
d. basis with 3-aminopropanol	8	5	9	20	2	20	4	46	14.3	6.0
e. basis with diethanolamine	9	7	10	18	1	17	4	45	13.8	6.0
f. basis with triethanolamine	6	8	11	16	1	22	4	46	14.3	6.1
g. basis with 3-aminopropanediol	10	16	15	19	2	20	4	30	14.5	7.0

Standard soiled cloth	supplier	type of soil
1. Vekoprop	TNO Nederland	fat, carbohydrate, egg white ,pigment
2. Kwijove-polyester-cotton	id.	quartz, iron oxide, oil, fat
3. Sunak	id.	sugar, wine
4. Empa 101 (ink/oil)	Empa Switzerland	ink, oil, egg white
5. Empa 111 (blood)	id.	blood
6. Empa 112 (cocoa)	id.	cocoa, egg white, fat
7. Empa 116 (standard)	id.	blood, milk, ink
8. Krefeld	DWF, Krefeld, FRG	kaolin, soot, iron oxide
Literature: Detergency "Theory and Test methods" Part II, (Ed. W.G. Cutler and R.C. Davies), New York, 1975, page 539		

The differences with the reference are listed in the following table:

PRE-SPOTTER	VEKOPROP	EMPA 112	KW. PK	SUNAK	EMPA 101	KREFELD	EMPA 116	EMPA 111	AVERAGE
only washing	0	0	0	0	0	0	0	0	0.0
basis with morpholine	12	2	-1	-2	-2	10	1	4	2.9
basis with monoethanolamine	13	0	5	-1	-1	12	1	5	4.3
basis with 1-aminopropanol-2	15	4	3	-1	-1	9	2	6	4.6
basis with 3-aminopropanol	12	1	2	0	-1	13	1	8	4.4
basis with diethanolamine	13	4	2	-2	-1	9	1	6	3.8
basis with triethanolamine	9	4	3	-4	-1	14	1	8	4.4
basis with 3-aminopropanediol	13	12	7	-1	0	12	1	-9	4.6

All these examples clearly show that the formulation with isopropanol is superior.

Example 2 and comparative example.

Three formulations were tested in a test starting from laundry from a number of households. The laundry was first sorted according to the number and nature of the stains, so that comparable stain numbers were present in each laundry charge. The stains were pretreated with a detergent composition in equal amounts. Then the laundry was washed with a mediocre detergent composition so as to show the differences more clearly. The results are listed in the table, together with the composition of the employed detergent compositions.

Table 1

Composition (wt.%)			
	A	B	C
isopropanolamine	2.5	-	-
morpholine	-	2.5	-
nonionic surfactant	2.0[x]	2.0[x]	8[xx]
sodium citrate	-	-	2
enzyme	0.5	0.5	-
ethylene glycol	10	10	-
dipropylene glycol	10	10	-
citric acid	up to pH = 8	up to pH = 9	-
thickening agent	1.0	1.0	-
water	up to 100%	up to 100%	up to 100%

[x] 1 part of Synperonic A7, 1 part of amine oxide
[xx] nonyl phenol-7 EO.

Table 2

Composition	A	B	C	-[x]
Stain removal with kitchen-cloths	17.7	11.8	10.4	8.7

[x] no treatment

Claims

1. A detergent composition in liquid form for the pretreatment of textiles, comprising, calculated on the total detergent composition:
   a. at least 60 wt.% water,
   b. 0.001 to 2.0 wt.% enzyme,
   c. 0.01 to 5 wt.% nonionic and/or anionic surfactant,
   d. 0.1 to 5 wt.% propanolamine,
   e. at least one organic acid in an amount up to a pH ranging from 5 to 12,
   f. 0 to 30 wt.% liquid and/or water-soluble glycol, and, if desired,
   g. other additives in an amount of not more than 5 wt.%.

2. A detergent composition according to claim 1, comprising as glycol dipropylene glycol and/or ethylene glycol and/or hexylene glycol.

3. A detergent composition according to claim 2, wherein dipropylene glycol and ethylene glycol are used in a weight ratio of 0.5 to 2.

4. A detergent composition according to claims 1-3, comprising 75 to 98 wt.% water.

5. A detergent composition according to claims 1-4, comprising at least one enzyme or enzyme preparation selected from the group consisting of proteolytic enzymes, lipolytic enzymes, cellulytic enzymes and amylytic enzymes.

6. A detergent composition according to claims 1-5, comprising as additives agents selected from the group consisting of thickening agents, perfumes and colorants.

7. A detergent composition according to claims 1- 6, comprising as nonionic surfactant at least one compound selected from the group consisting of alkanol ethoxylates and/or amine oxides.

8. A detergent composition according to claim 7, comprising at least one fatty acid ethoxylate having an ethylene oxide content of 5-9 units on average per alkanol ethoxylate.

9. A detergent composition according to claims 1-7, comprising 0.1 to 3.5 wt.% organic acid.

10. A detergent composition according to claims 1-9, having a pH of 5.5-9.

11. A detergent composition according to claims 1-10, comprising as organic acid citric acid, acetic acid and/or formic acid.

12. A detergent composition according to claims 1-11, comprising up to 2.5 wt.% nonionic surfactant.

13. A detergent composition according to claims 1-12, comprising not more than 0.1 wt.% alkali and alkaline earth metal ions.

14. A detergent composition according to claims 1-13, comprising an anionic surfactant in combination with a nitrogen base.

15. A detergent composition according to claims 1-14, comprising an isopropanolamine as propanolamine.