

DESCRIPTION

Title of Invention: DETERGENT COMPOSITION FOR TEXTILE PRODUCTS AND CLEANING METHOD

Technical Field

[0001]

The present invention relates to a detergent composition for textile products and also to a cleaning method.

Background Art

[0002]

As a detergent composition for cleaning textile products such as garments, for example, PTL 1 discloses that the incorporation of a salt of an organic phosphate ester anion and an organic amine derivative cation together with a nonionic surfactant results in improved cleaning performance on mud stains. However, with the detergent described in PTL 1, it is difficult to remove blood stains adhering to a textile product.

[0003]

Generally, by using a detergent that incorporates an alkaline agent and thus has an increased pH, blood stains can be removed. However, a detergent having a high pH causes damage to textile products. Thus, PTL 2 discloses a detergent composition for textile articles, which contains a phosphate ester type anionic surfactant and an alkali metal carbonate and has a pH of 9.5 to 11.5.

Citation List

Patent Literature

[0004]

PTL 1: JP2000-008078A

PTL 2: JP2021-054911A

Summary of Invention

Technical Problem

[0005]

An object of an embodiment of the invention is to provide a detergent composition for textile products, which can improve cleaning performance on blood stains while suppressing damage to textile products, and also a cleaning method.

Solution to Problem

[0006]

The invention includes the following embodiments.

[1] A detergent composition for textile products, including (A) an amphoteric surfactant, (B) a fatty acid alkanolamide, (C) at least one carbonate selected from the group consisting of sodium carbonate and potassium carbonate, and (D) at least one hydrogencarbonate selected from the group consisting of sodium hydrogencarbonate and potassium hydrogencarbonate.

[2] The detergent composition for textile products according to [1], in which the contents of the carbonate (C) and the hydrogencarbonate (D) per 100 parts by mass of the amphoteric surfactant (A) are 5 to 80 parts by mass and 3 to 80 parts by mass, respectively.

[3] The detergent composition for textile products according to [1] or [2], in

which the content of the fatty acid alkanolamide (B) per 100 parts by mass of the amphoteric surfactant (A) is 5 to 85 parts by mass.

[4] The detergent composition for textile products according to any one of [1] to [3], further including (E) a quaternary ammonium salt.

[0007]

[5] A cleaning method for cleaning a textile product using a detergent composition that includes (A) an amphoteric surfactant, (B) a fatty acid alkanolamide, (C) at least one carbonate selected from the group consisting of sodium carbonate and potassium carbonate, and (D) at least one hydrogencarbonate selected from the group consisting of sodium hydrogencarbonate and potassium hydrogencarbonate.

[6] The cleaning method according to [5], in which the contents of the carbonate (C) and the hydrogencarbonate (D) per 100 parts by mass of the amphoteric surfactant (A) are 5 to 80 parts by mass and 3 to 80 parts by mass, respectively.

[7] The cleaning method according to [5] or [6], in which the content of the fatty acid alkanolamide (B) per 100 parts by mass of the amphoteric surfactant (A) is 5 to 85 parts by mass.

[8] The cleaning method according to any one of [5] to [7], in which the detergent composition further includes (E) a quaternary ammonium salt.

Advantageous Effects of Invention

[0008]

According to an embodiment of the invention, it is possible to improve cleaning performance on blood stains and sebum stains while suppressing damage to textile products such as garments.

Description of Embodiments

[0009]

Hereinafter, an embodiment of the invention will be described in detail.

[0010]

[Amphoteric Surfactant (A)]

A detergent composition for textile products (hereinafter also referred to as “detergent composition”) according to this embodiment contains an amphoteric surfactant as a component (A). As amphoteric surfactants, for example, a betaine type amphoteric surfactant, a sulfobetaine type amphoteric surfactant, an amine oxide type amphoteric surfactant, and the like can be mentioned. Any one of them, or a combination of two or more kinds, can be used. As the component (A), a betaine type amphoteric surfactant is preferably used.

[0011]

A betaine type amphoteric surfactant is a surfactant having a quaternary ammonium as a cationic group together with -COO^- as an anionic group. As specific examples of betaine type amphoteric surfactants, alkyl betaine type amphoteric surfactants such as lauryldimethylaminoacetic acid betaine and coconut oil dimethylaminoacetic acid betaine, amido betaine type amphoteric surfactants such as lauric acid amidopropyl betaine, octanoic acid amidopropyl betaine, coconut oil fatty acid amidopropyl betaine, and palm kernel oil fatty acid amidopropyl betaine, imidazolinium betaine type amphoteric surfactants such as 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine, and the like can be mentioned. Any one of them, or a combination of two or more kinds, can be used. Among them, it is preferable to use at least one member selected from the group consisting of an alkyl dimethylaminoacetic acid betaine, a fatty acid amidopropyl betaine, and a 2-alkyl-

N-carboxymethyl-N-hydroxyethyl imidazolinium betaine.

[0012]

The hydrocarbon group as a hydrophobic group contained in the alkyl betaine type amphoteric surfactant may be saturated or unsaturated, or may be a mixture of both, and is preferably a saturated alkyl group. The number of carbon atoms in the hydrocarbon group is not particularly limited and may be 8 to 20, 8 to 18, or 10 to 18. It is preferable that the short-chain hydrocarbon group attached to the nitrogen atom together with the hydrophobic group is an alkyl group having 1 to 4 carbon atoms, more preferably a methyl group.

[0013]

The hydrocarbon group as a hydrophobic group contained in the amido betaine type amphoteric surfactant may be saturated or unsaturated, or may be a mixture of both. The number of carbon atoms in the hydrocarbon group is not particularly limited and may be 8 to 20, 8 to 18, or 10 to 18. The number of carbon atoms in the alkylene group between NH of the amide bond and the nitrogen atom of the quaternary ammonium is not particularly limited and may be 1 to 6, or 2 to 4, and a trimethylene group having 3 carbon atoms is preferable. It is preferable that the short-chain hydrocarbon group attached to the nitrogen atom of the quaternary ammonium is an alkyl group having 1 to 4 carbon atoms, more preferably a methyl group.

[0014]

The hydrocarbon group as a hydrophobic group contained in the imidazolinium betaine type amphoteric surfactant may be saturated or unsaturated, or may be a mixture of both. The number of carbon atoms in the hydrocarbon group is not particularly limited and may be 8 to 20, 8 to 18, or 10 to 18.

[0015]

The sulfobetaine type amphoteric surfactant is a surfactant having a quaternary ammonium as a cationic group together with -SO_3^- as an anionic group. As sulfobetaine type amphoteric surfactants, for example, alkylhydroxysulfobetaines, alkylamidohydroxysulfobetaines, and the like can be mentioned.

[0016]

As the amine oxide type amphoteric surfactant, for example, an alkyldimethylamine oxide such as lauryldimethylamine oxide can be mentioned.

[0017]

[Fatty Acid Alkanolamide (B)]

The detergent composition according to this embodiment contains a fatty acid alkanolamide as a component (B). A fatty acid alkanolamide is an amide compound of a fatty acid and an alkanolamine, and is a type of nonionic surfactant.

[0018]

As fatty acid alkanolamides, fatty acid monoalkanolamides, fatty acid dialkanolamides, and these fatty acid alkanolamides with a polyoxyalkylene (e.g., polyoxyethylene) added thereto can be mentioned. Among them, fatty acid dialkanolamides are preferable.

[0019]

The fatty acid constituting a fatty acid alkanolamide is not particularly limited and may be a saturated fatty acid or an unsaturated fatty acid, or may be a mixture of both. The number of carbon atoms in the fatty acid is not particularly limited and may be 8 to 20, 8 to 18, or 10 to 18. In addition, the number of carbon atoms in the hydroxyalkyl group (i.e., the alkanolamine-derived group) attached to the nitrogen atom of the amide bond is preferably 1 to 4, and a hydroxyethyl group having 2 carbon atoms is more preferable.

[0020]

As specific examples of fatty acid alkanolamides, fatty acid monoethanolamides such as lauric acid monoethanolamide, stearic acid monoethanolamide, coconut oil fatty acid monoethanolamide, palm kernel oil fatty acid monoethanolamide, lauric acid isopropanolamide, and coconut oil fatty acid isopropanolamide, fatty acid diethanolamides such as lauric acid diethanolamide, myristic acid diethanolamide, stearic acid diethanolamide, coconut oil fatty acid diethanolamide, and palm kernel oil fatty acid diethanolamide, and the like can be mentioned. Any one of them, or a combination of two or more kinds, can be used. Among them, it is preferable to use fatty acid diethanolamides.

[0021]

[Sodium Carbonate and/or Potassium Carbonate (C)]

The detergent composition according to this embodiment contains at least one carbonate selected from the group consisting of sodium carbonate and potassium carbonate (hereinafter referred to as "carbonate (C)") as a component (C). That is, the detergent composition may contain, as the component (C), sodium carbonate alone, potassium carbonate alone, or both sodium carbonate and potassium carbonate.

[0022]

The presence of at least one carbonate (C) selected from sodium carbonate and potassium carbonate in this manner results in improved cleaning performance on blood stains, and the combined use with the components (A) and (B) described above results in improved cleaning performance on sebum stains.

[0023]

[Sodium Hydrogencarbonate and/or Potassium Hydrogencarbonate (D)]

The detergent composition according to this embodiment contains at least one

hydrogencarbonate selected from the group consisting of sodium hydrogencarbonate and potassium hydrogencarbonate (hereinafter referred to as “hydrogencarbonate (D)”) as a component (D). That is, the detergent composition may contain, as the component (D), sodium hydrogencarbonate alone, potassium hydrogencarbonate alone, or both sodium hydrogencarbonate and potassium hydrogencarbonate.

[0024]

The presence of at least one hydrogencarbonate (D) selected from sodium hydrogencarbonate and potassium hydrogencarbonate in this manner makes it possible to suppress damage to textile products while maintaining the cleaning performance on blood stains given by the carbonate (C).

[0025]

[Quaternary Ammonium Salt (E)]

In addition to the components (A) to (D) described above, the detergent composition according to this embodiment may further contain a quaternary ammonium salt as a component (E). The presence of a quaternary ammonium salt makes it possible to impart bactericidal properties (antibacterial properties) to the detergent composition.

[0026]

Quaternary ammonium salts are not particularly limited, and, for example, dialkyldimethylammonium salts such as didecyldimethylammonium chloride, dicoconut alkyldimethylammonium chloride, dioleyldimethylammonium chloride, distearyldimethylammonium chloride, and di-hardened beef tallow alkyldimethylammonium chloride, alkyldimethylbenzylammonium salts such as lauryldimethylbenzylammonium chloride, coconut alkyldimethylbenzylammonium chloride, tetradecyldimethylbenzylammonium chloride, and alkyl (C₈₋₁₈)

dimethylbenzylammonium chloride (benzalkonium chloride), alkyltrimethylammonium salts such as decyltrimethylammonium chloride, lauryltrimethylammonium chloride, cetyltrimethylammonium chloride, stearyltrimethylammonium chloride, coconut alkyltrimethylammonium chloride, beef tallow alkyltrimethylammonium chloride, and oleyltrimethylammonium chloride, and the like can be mentioned. Any one of them, or a combination of two or more kinds, can be used.

[0027]

[Detergent Composition for Textile Products]

The detergent composition according to this embodiment contains the amphoteric surfactant (A), fatty acid alkanolamide (B), carbonate (C), and hydrogencarbonate (D) described above. As a result, it is possible to improve cleaning performance on blood stains and sebum stains while suppressing damage to textile products such as garments. Specifically, the presence of the carbonate (C) makes it possible to improve cleaning performance on blood stains. In addition, the presence of the amphoteric surfactant (A) and the fatty acid alkanolamide (B) together with the carbonate (C) makes it possible to improve cleaning performance on sebum stains. Further, the combined use of the hydrogencarbonate (D) with the carbonate (C) makes it possible to suppress an increase in pH and reduce damage to textile products while maintaining the cleaning performance.

[0028]

The incorporating proportions of the components (A) to (D) described above are not particularly limited. In one embodiment, the content of the component (B) per 100 parts by mass of the component (A) is preferably 5 to 85 parts by mass, more preferably 10 to 70 parts by mass, and still more preferably 15 to 50 parts by mass.

[0029]

In addition, in one embodiment, the content of the component (C) per 100 parts by mass of the component (A) is preferably 5 to 80 parts by mass, more preferably 10 to 70 parts by mass, and still more preferably 20 to 50 parts by mass.

[0030]

In addition, in one embodiment, the content of the component (D) per 100 parts by mass of the component (A) is preferably 3 to 80 parts by mass, more preferably 10 to 60 parts by mass, and still more preferably 15 to 40 parts by mass.

[0031]

The content of the component (A) in the detergent composition is not particularly limited and may be, for example, 10 to 80 mass%, 20 to 70 mass%, or 30 to 60 mass% based on 100 mass% of the total solids (non-volatile matter) of the detergent composition.

[0032]

In one embodiment, the detergent composition preferably further contains a quaternary ammonium salt (E). As a result, bactericidal properties (antibacterial properties) are imparted to the detergent composition. In particular, according to this embodiment, because the components (A) to (D) described above are not anionic surfactants, it is possible to impart the bactericidal effect given by the quaternary ammonium salt (E) while simultaneously achieving the original effects, that is, effects on the suppression of damage to textile products and the cleaning performance.

[0033]

The content of the component (E) is not particularly limited. In one embodiment, the content of the component (E) per 100 parts by mass of the component (A) may be 3 to 50 parts by mass, 5 to 30 parts by mass, or 10 to 25 parts by mass.

[0034]

The detergent composition is preferably a liquid detergent composition containing water together with the components (A) to (D) and the optional component (E). In the case of such a liquid detergent composition, the presence of the amphoteric surfactant (A) makes it possible to suppress the cloudiness or separation of the detergent composition, thereby improving the stability.

[0035]

The solids concentration (non-volatile concentration) of the liquid detergent composition is not particularly limited. For example, in the case of commercializing the composition as a liquid concentrate to be diluted with water and used upon laundry, the solids concentration of the liquid detergent composition may be 10 to 50 mass%, or 15 to 40 mass%. Meanwhile, in the case where the liquid detergent composition is directly applied to a textile product and used, the solids concentration of the liquid detergent composition may be lower and may be, for example, 0.01 to 30 mass%, or 0.1 to 10 mass%. Therefore, the solids concentration for both cases together may be 0.01 to 50 mass%, or 0.1 to 40 mass%.

[0036]

Incidentally, in the case where the liquid detergent composition is commercialized as a liquid concentrate as described above, as a result of incorporating the fatty acid alkanolamide (B), a thickening effect can be obtained, thereby improving the usability.

[0037]

The pH of the detergent composition is not particularly limited, but it is preferable that the pH in the form of an aqueous solution having a concentration of 1 mass% is 9.5 to 11.5, more preferably 9.8 to 11.2, and still more preferably 10.0 to 11.0. Here, the pH in the form of an aqueous solution having a concentration of 1 mass% is

the pH of an aqueous solution measured at 25°C, the aqueous solution being prepared by dissolving the detergent composition in water or diluting the detergent composition with water to a solids concentration of 1 mass%. Here, the pH is measured by the glass electrode method in accordance with JIS Z8802.

[0038]

In addition to the components (A) to (D), the optional component (E), and water, the detergent composition according to this embodiment may incorporate other components without interfering with its effects. As other components, for example, other surfactants, chelating agents, pH adjusters (sodium hydroxide, potassium hydroxide, sulfuric acid, hydrochloric acid, etc.), bleaches, softeners, fluorescent agents, enzymes, preservatives, fragrances, colorants, defoamers, and hydrophilic solvents (monohydric alcohol, dihydric alcohol, etc.) can be mentioned. However, when an anionic surfactant is incorporated, the bactericidal properties given by the quaternary ammonium salt (E) are impaired. Therefore, in the case where the quaternary ammonium salt (E) is incorporated, it is preferable that the detergent composition does not contain an anionic surfactant.

[0039]

As the other surfactants, for example, nonionic surfactants other than the component (B), cationic surfactants other than the component (E), and the like can be mentioned. As nonionic surfactants, for example, polyoxyalkylene alkyl ethers, polyoxyalkylene alkylphenyl ethers, polyoxyalkylene fatty acid esters, polyoxyalkylene sorbitan fatty acid esters, sucrose fatty acid esters, and the like can be mentioned. Here, the polyoxyalkylene is preferably polyoxyethylene.

[0040]

As the chelating agents, for example, tetrasodium ethylenediaminetetraacetate,

nitrilotriacetate, diethylenetriaminepentaacetate, hydroxyethylethylenediaminetriacetate, triethylenetetraminehexaacetate, 1,3-propanediaminetetraacetate, L-glutamatediacetate, ethylenediaminedisuccinate, citrate, 1-hydroxyethylidene-1,1-diphosphonate, nitrilotris(methylenephosphonic acid) salt, ethylenediaminetetra(methylenephosphonic acid) salt, and the like can be mentioned.

[0041]

[Method for Cleaning Textile Product]

The detergent composition according to an embodiment described above can be used as a detergent for cleaning textile products such as garments. Therefore, a method for cleaning a textile product according to an embodiment is a method in which a textile product is cleaned using the detergent composition described above.

[0042]

The specific cleaning method is not particularly limited. For example, it is possible that using a washing machine such as a drum type washing machine or a pulsator type washing machine, the detergent composition is added to water such as tap water and stirred with a textile product, thereby performing cleaning. In addition, it is also possible that a textile product is soak-washed or rub-washed in a cleaning solution formed of the detergent composition dissolved in or diluted with water, thereby performing cleaning. In addition, it is also possible that the detergent composition is directly applied to the soiled part of a textile product, followed by cleaning in water.

[0043]

The amount of detergent composition used is not particularly limited and may be, as the solids concentration in a cleaning solution obtained by mixing the detergent composition with water, 0.01 to 2 mass%, or 0.1 to 1 mass%. The bath ratio (volume (L) of the cleaning solution used to wash 1 kg of an object to be cleaned) is not

particularly limited either, and may be, for example, 1:3 to 1:40, or 1:5 to 1:30.

[0044]

Examples of textile products include woven fabrics, knitted fabrics, nonwoven fabrics, and like fabrics using organic fibers, as well as garments (clothing, underwear, etc.) and other cloth products (e.g., towels, sheets) obtained using them. As organic fibers, for example, synthetic fibers such as polyester fibers, polyamide fibers, and acrylic fibers, natural fibers such as cotton, hemp, and silk, and cellulosic fibers such as rayon and acetate can be mentioned.

[0045]

Incidentally, unless otherwise noted, the various numerical ranges of incorporation amounts, carbon numbers, concentrations, pHs, etc., mentioned above each include its upper and lower limits. In addition, the upper and lower limits of the numerical ranges can be arbitrarily combined, and all such combinations are incorporated herein as preferred numerical ranges.

Examples

[0046]

Hereinafter, the invention will be described in further detail with reference to examples, but is not limited thereto.

[0047]

Using the following components (A) to (E) and water, the components were mixed according to the formulation shown in Table 1 (parts by mass), thereby preparing detergent compositions. Incidentally, with respect to each component, in the case where a product in the form of an aqueous solution was used, the parts by mass in the table indicates the parts by mass as an active ingredient (solids).

[0048]

Component (A):

- A-1: Lauryldimethylaminoacetic acid betaine (“AMOGEN S-H” manufactured by DKS Co., Ltd.)
- A-2: Coconut oil fatty acid amidopropyl betaine (“AMOGEN CB-H” manufactured by DKS Co., Ltd.)
- A-3: 2-Alkyl-N-carboxymethyl-N-hydroxyethylimidazolinium betaine (“ENAGICOL C-40H” manufactured by Lion Specialty Chemicals Co., Ltd.)

[0049]

Component (B):

- B-1: Coconut oil fatty acid diethanolamide (“DIANOL CDE” manufactured by DKS Co., Ltd.)
- B-2: Lauric acid diethanolamide (“AMINON L-02” manufactured by Kao Corporation)

[0050]

Component (C):

- C-1: Sodium carbonate
- C-2: Potassium carbonate

[0051]

Component (D):

- D-1: Sodium hydrogencarbonate
- D-2: Potassium hydrogencarbonate

[0052]

Component (E):

- E-1: Lauryldimethylbenzylammonium chloride (“CATIOGEN BC-50”

manufactured by DKS Co., Ltd.)

- E-2: Didecyldimethylammonium chloride (“CATIOGEN DDM-PG”
manufactured by DKS Co., Ltd.)

[0053]

The obtained detergent compositions were each evaluated for stability, blood stain cleaning performance, sebum stain cleaning performance, fabric damage after cleaning, and bactericidal properties using the following evaluation methods. In addition, according to the above method, each detergent composition was measured for the pH in the form of an aqueous solution having a concentration of 1 mass% (25°C).

[0054]

- Stability:

The detergent composition was stored at 50°C for 24 hours and checked for the absence of cloudiness or separation. A rating of “A” was given when the composition was transparent, while “B” was given in the case where cloudiness or separation occurred.

[0055]

- Blood stain cleaning performance:

A standard artificially soiled cloth (EMPA 111, manufactured by Swissatest) was cut into 6 cm × 6 cm to give an object to be cleaned, and subjected to a cleaning test. The soiled cloth was immersed in 1 L of a cleaning solution obtained by diluting each detergent composition with water to 2 mass% (50-fold dilution), and stirred for 10 minutes. Subsequently, the soiled cloth was taken out, rinsed with 1 L of tap water for 10 seconds, rinsed again with 1 L of tap water for 10 seconds, and dried at room temperature. After drying, the Y-value was measured by reflection (Specular reflection processing, SCE) using a spectrophotometer (“SD6000” manufactured by Nippon

Denshoku Industries Co., Ltd.) and evaluated according to the following criteria.

Evaluation Criteria

A: Y-value is 70 or more

B: Y-value is 65 or more and less than 70

C: Y-value is less than 65

[0056]

- Sebum stain cleaning performance:

The Y-value was measured in the same manner as for blood stain cleaning performance except that the standard artificially soiled cloth was changed to “WFK 10D” manufactured by WFK, and evaluated according to the following criteria.

Evaluation Criteria

A: Y-value is 55 or more

B: Y-value is 50 or more and less than 55

C: Y-value is less than 50

[0057]

- Fabric damage after cleaning:

In a tergotometer, 1 L of a cleaning solution obtained by diluting the detergent composition 50-fold with water was prepared, and, after adjusting the temperature to 30°C, a Kanakin No. 3 cloth (10 × 10 cm) was added as a test cloth, followed by a washing test at a speed of 100 rpm for 20 minutes. The cloth was rinsed with tap water for 1 minute, then lightly squeezed, and hung to dry at room temperature for 2 hours. This was repeated five times, and the resulting test cloth was checked by ten panelists for the presence or absence of surface roughening in comparison with the control, and evaluated according to the following criteria. Incidentally, the control is a cloth obtained by performing the same washing test using water instead of the cleaning

solution.

Evaluation Criteria

- A: Eight or more panelists judged that there was no roughening
- B: Five to seven panelists judged that there was no roughening
- C: Four or less panelists judged that there was no roughening

[0058]

- Bactericidal properties

The detergent composition was diluted 50-fold with sterile water, and 0.1 mL of a previously prepared bacterial solution (cell count: 5.0 to 45.0×10^5 to 6 CFU/mL) was added to 4.9 mL of the obtained diluted solution, the resulting solution was stirred, and then allowed to stand for 20 minutes. The solution was further diluted 10-fold with a neutralizing agent and allowed to stand for 10 minutes, and the viable cell count was then checked using the smear method. The sterilization rate relative to the control was determined, and evaluated according to the following criteria. As to the control, the viable cell count was checked in the same manner, except for using 4.9 mL of sterile water instead of 4.9 mL of the diluted solution. The sterilization rate is the percentage reduction relative to the control viable cell count. The evaluation test was performed for *Staphylococcus aureus* and also for *Escherichia coli*. In Table 1, the results for *Staphylococcus aureus* are shown as “Bactericidal properties 1”, and the results for *Escherichia coli* are shown as “Bactericidal properties 2”.

Evaluation Criteria

- A: Sterilization rate: 99% or more
- B: Sterilization rate: 90% or more and less than 99%
- C: Sterilization rate: less than 90%

[0059]

[Table 1]

	Example																		Comparative Example			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	1	2	3	4
Formulation (parts by mass)																						
A-1	12	-	12	12	12	12	7	24	12	12	12	12	12	12	12	12	8.7	-	-	12	12	12
A-2	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
B-1	3	3	-	3	3	3	3	3	15	8	3	3	3	3	3	3	7	3	3	-	3	3
B-2	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C-1	4	4	4	-	4	4	4	4	4	4	2	8	4	4	4	4	4	4	4	4	-	4
C-2	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D-1	3	3	3	3	-	3	3	3	3	3	3	3	1.5	5	3	0.5	3	3	3	3	3	-
D-2	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E-1	1.5	1.5	1.5	1.5	1.5	-	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	-	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E-2	-	-	-	-	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest	Rest
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Proportion incorporated	100 × B/A	25	25	25	25	25	42.9	12.5	12.5	66.7	25	25	25	25	25	25	80.5	25	-	0	25	25
Proportion incorporated	100 × C/A	33.3	33.3	33.3	33.3	33.3	57.1	16.7	33.3	33.3	16.7	66.7	33.3	33.3	33.3	33.3	46	33.3	-	33.3	0	33.3
Proportion incorporated	100 × D/A	25	25	25	25	25	42.9	12.5	25	25	25	25	12.5	41.7	25	4.2	34.5	25	-	25	25	0
Evaluation																						
Stability	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A
Blood stain cleaning performance	A	A	A	A	A	A	A	A	B	A	B	A	A	B	A	A	A	A	B	B	C	B
Sebum stain cleaning performance	A	A	A	A	A	A	B	A	B	A	B	A	A	A	A	A	A	A	C	C	C	A
Fabric damage	A	A	A	A	A	A	A	B	A	B	A	B	B	A	A	B	B	A	A	A	A	C
Bactericidal properties 1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A
Bactericidal properties 2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A
pH	10.1	10.2	10.3	10.2	10.2	10.1	10.1	10.2	10.1	10.3	9.9	10.4	10.5	9.9	10.1	10	10.1	9.9	10.1	10.1	8.9	11.0

[0060]

The results are as shown in Table 1. In Comparative Example 1, because no amphoteric surfactant (A) was incorporated, the cleaning performance on sebum stains was inferior, and also separation was observed in the detergent composition stability evaluation, indicating poor stability. In Comparative Example 2, because no fatty acid alkanolamide (B) was incorporated, the cleaning performance on sebum stains was inferior. In Comparative Example 3, because no carbonate (C) was incorporated, the cleaning performance on blood stains and the cleaning performance on sebum stains were inferior. In Comparative Example 4, because no hydrogencarbonate (D) was incorporated, the fabric damage after cleaning was high.

[0061]

In contrast, in Examples 1 to 18 incorporating all of the components (A) to (D), while the fabric damage after cleaning was suppressed, the cleaning performance on blood stains and the cleaning performance on sebum stains were excellent, and the detergent compositions were also excellent in stability. In addition, in Examples 1 to 14 and 16 to 18 further incorporating the component (E), while the suppression of fabric damage and the cleaning performance on blood stains and sebum stains were simultaneously achieved, the detergent compositions had bactericidal properties imparted thereto.

[0062]

Although some embodiments of the invention have been described above, these embodiments are presented as examples and not intended to limit the scope of the invention. These embodiments can be implemented in other various modes, and, without departing from the gist of the invention, various omissions, substitutions, and changes can be made thereto. These embodiments, as well as omissions, substitutions, and changes thereto, etc., fall within the scope and gist of the invention, and also fall within the scope of the claimed invention and its equivalents.

CLAIMS

[Claim 1]

A detergent composition for textile products, comprising:

- (A) an amphoteric surfactant;
- (B) a fatty acid alkanolamide;
- (C) at least one carbonate selected from the group consisting of sodium carbonate and potassium carbonate; and
- (D) at least one hydrogencarbonate selected from the group consisting of sodium hydrogencarbonate and potassium hydrogencarbonate.

[Claim 2]

The detergent composition for textile products according to claim 1, wherein the contents of the carbonate (C) and the hydrogencarbonate (D) per 100 parts by mass of the amphoteric surfactant (A) are 5 to 80 parts by mass and 3 to 80 parts by mass, respectively.

[Claim 3]

The detergent composition for textile products according to claim 1 or 2, wherein the content of the fatty acid alkanolamide (B) per 100 parts by mass of the amphoteric surfactant (A) is 5 to 85 parts by mass.

[Claim 4]

The detergent composition for textile products according to claim 1 or 2, further comprising (E) a quaternary ammonium salt.

[Claim 5]

A cleaning method for cleaning a textile product using a detergent composition that comprises (A) an amphoteric surfactant, (B) a fatty acid alkanolamide, (C) at least one

carbonate selected from the group consisting of sodium carbonate and potassium carbonate, and (D) at least one hydrogencarbonate selected from the group consisting of sodium hydrogencarbonate and potassium hydrogencarbonate.

[Claim 6]

The cleaning method according to claim 5, wherein the contents of the carbonate (C) and the hydrogencarbonate (D) per 100 parts by mass of the amphoteric surfactant (A) are 5 to 80 parts by mass and 3 to 80 parts by mass, respectively.

[Claim 7]

The cleaning method according to claim 5 or 6, wherein the content of the fatty acid alkanolamide (B) per 100 parts by mass of the amphoteric surfactant (A) is 5 to 85 parts by mass.

[Claim 8]

The cleaning method according to claim 5 or 6, wherein the detergent composition further comprises (E) a quaternary ammonium salt.