

Description

Title of Invention: DETERGENT COMPOSITION FOR HARD SURFACES

Field of the Invention

[0001]

The present invention relates to a detergent composition for hard surfaces.

Background of the Invention

[0002]

Various types of hard surfaces comprising tiles, plastics, metals, or the like as materials are present in residential facilities surrounding us, and these hard surfaces are exposed to environments in which various types of soil adheres in living scenes. Especially, hard surfaces used as floor surfaces are surfaces which are positioned in the lowest portions of residential facilities and moreover with which people daily come into contact. Therefore, much soil remains and accumulates easily on those surfaces, and they further have a property making it difficult to remove such soil by cleansing.

[0003]

Soil easy to remove that is not adsorbed on a hard surface such as a floor surface can also be simply

cleaned by suction by a vacuum cleaner or by a wiper using a nonwoven fabric. However, for remaining soil comprising oil, and further odor components remaining on a floor surface, wet wiping using a mop, or wipe cleaning combined with a detergent must be performed. Housework action for this soil remaining easily and being difficult to remove that is present on a floor surface is a large burden on the residents. In addition, it is also desired by the residents that the multiplication of bacteria on a floor surface after cleansing can be inhibited.

[0004]

In addition, it is said that in countries and regions where people often live barefoot in living environments or people have poorly-ventilated house structures, there is a high demand for an improvement in the drying rate of a hard surface such as a floor surface to which a detergent composition is applied.

[0005]

JP-A No. 2008-156607 discloses an auxiliary agent for floor wet wiping and the like that has good wettability on a floor surface, further also has good drying properties after wet wiping, and requires no post-wiping by the combination of a particular nonionic surfactant. There are described an auxiliary agent and the like that exhibits excellent wettability even when containing a cationic surfactant that significantly

decreases wettability. In addition, JP-A No. 2011-241353 discloses a liquid detergent composition for floors containing a particular nonionic surfactant, a cationic surfactant, a polycarboxylic acid, and further a fragrance. There is a description of a liquid detergent for a floor in which the amount of surfactants blended based on a water-insoluble fragrance compound is kept small and which does not cause the remaining of foam or the like. JP-A No. 2008-266375 describes a detergent for hard surfaces that contains an amine oxide, a particular nonionic surfactant, a cationic surfactant, and an organic acid and is less likely to damage the material of an object to be cleansed.

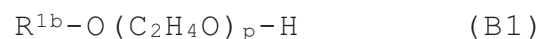
Summary of Invention

[0006]

The present invention relates to a detergent composition for hard surfaces comprising:

0.05% by mass or more and 3% by mass or less of
(A) an amine oxide type surfactant [hereinafter referred to as an (A) component];

(B) a nonionic surfactant represented by the following general formula (B1) [hereinafter referred to as a (B) component],



wherein R^{1b} represents an alkyl group having 8 or more and 22 or less carbon atoms, and p represents an average

addition mole number and is a number of 0.1 or more and 20 or less;

(C) a cationic surfactant [hereinafter referred to as a (C) component]; and

0.001% by mass or more and 4.5% by mass or less of (D) a polycarboxylic acid having 3 or more and 6 or less carbon atoms or a salt thereof [hereinafter referred to as a (D) component], wherein

a mass ratio of the (B) component to the (A) component, $(B)/(A)$, is 0.5 or more and 1.5 or less,

a mass ratio of the (C) component to the (A) component, $(C)/(A)$, is 0.5 or more and 1.5 or less, and

a mass ratio of the (B) component to the (C) component, $(B)/(C)$, is 0.5 or more and 3.0 or less.

[0007]

In addition, the present invention relates to a method for cleansing a hard surface, comprising applying to a hard surface a cleansing liquid obtained by diluting the above detergent composition for hard surfaces according to the present invention by 70 times or more and 200 times or less with water.

Further, the present invention provides an application of the above composition as a detergent for hard surfaces.

In addition, the present invention relates to an application, as a detergent for hard surfaces, of a cleansing liquid obtained by diluting the above

detergent composition for hard surfaces by 70 times or more, further 100 times or more, and 200 times or less, further 150 times or less, with water, and further to a use of the above composition as a detergent for hard surfaces, comprising drying a hard surface without rinsing after applying the above detergent to the hard surface.

Description of Embodiments

[0008]

A high cleansing effect in cleansing a hard surface such as a floor surface is a desired function. But, it has been desired that after soil comprising oil is cleansed with a detergent composition, the drying rate of the floor surface, a hard surface, to which the detergent composition is applied is enhanced to improve finish properties.

[0009]

In addition, the multiplication of bacteria remaining on a floor surface is a large problem for the residents, and it has been desired that a high disinfection effect is provided during the cleansing of a floor surface.

[0010]

The present inventor has found that the above problems of conventional art can be solved by blending three surfactants at particular concentrations and a

particular ratio, leading to the completion of the present invention.

[0011]

The present invention provides a hard surface detergent composition having excellent cleansing power, disinfecting power, and quick drying properties and finish properties after cleansing for hard surfaces, particularly a hard surface such as a floor surface. In addition, the present invention provides a hard surface detergent composition having good storage stability.

[0012]

According to the present invention, a hard surface detergent composition having excellent cleansing power, disinfecting power, and quick drying properties and finish properties after cleansing for hard surfaces such as a floor surface is provided. In addition, according to the present invention, a hard surface detergent composition having good storage stability is provided. Further, according to the present invention, a simple method for cleansing a hard surface in which cleansing can be completed without rinsing because of excellent quick drying properties and finish properties after cleansing is provided.

[0013]

The quick drying properties of residual water drops on a cleansed surface obtained by the detergent

composition for hard surfaces according to the present invention is achieved by the formulation of the (A) component, the (B) component, and the (C) component in a particular proportion. The mechanism is presumed as follows. Usually, surfactants are contained in liquid drops of a detergent composition for hard surfaces remaining on a hard surface such as a floor. In these liquid drops, the concentration of the surfactants increases relatively with the evaporation of water. With the increase in the concentration of the surfactants, the liquid drops comprising the surfactants form a liquid crystal phase. In the liquid crystal phase, the convection of the liquid is poor, and the evaporation of water is inhibited, and therefore, the drying rate tends to be decreased. It is considered that in the present invention, the (A) component, the (B) component, and the (C) component, which are surfactants, are mixed at a particular ratio, and therefore, even if high concentration is reached in the liquid drops by the evaporation of water, a liquid crystal phase is not formed, and the evaporation of water proceeds quickly. In other words, it is considered that the present invention attains unprecedented quick drying properties by mixing particular surfactants at a particular ratio to control the phase state in the drying process.

[0014]

In the present invention, by formulating the (A) component, the (B) component, and the (C) component in a particular proportion, in addition to the improvement in quick drying properties as described above, improvements in cleansing power and disinfecting power can be attained.

[0015]

<(A) Component>

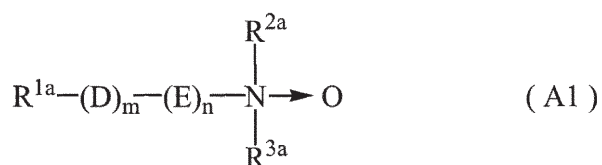
The (A) component used in the present invention is an amine oxide type surfactant. The (A) component not only has a cleansing power improvement effect but is effective in an improvement in drying rate in application to a surface to be cleansed, disinfecting power improvement, an improvement in finish properties, and an improvement in the storage stability of the detergent composition.

[0016]

As the amine oxide type surfactant, alkyl- or alkenylamine oxides having an alkyl group or an alkenyl group having 1 or more and 24 or less carbon atoms are preferred. Examples of more preferred amine oxides can include amine oxides represented by the following general formula (A1).

[0017]

[Formula 1]



[0018]

wherein R^{1a} represents an alkyl group or an alkenyl group having 8 or more and 24 or less carbon atoms, R^{2a} and R^{3a} each identically or differently represent an alkyl group having 1 or more and 3 or less carbon atoms, D represents a $-\text{NHC}(=\text{O})-$ group or a $-\text{C}(=\text{O})\text{NH}-$ group, E represents an alkylene group having 1 or more and 5 or less carbon atoms, and m and n represent $m = 0$ and $n = 0$ or $m = 1$ and $n = 1$.

[0019]

In the above general formula (A1), R^{1a} is an alkyl group or an alkenyl group having 8 or more and 24 or less carbon atoms and is preferably an alkyl group having 12 or more and 18 or less carbon atoms. R^{2a} and R^{3a} are each an alkyl group having 1 or more and 3 or less carbon atoms and are each preferably a methyl group having 1 carbon atom. In addition, in the above general formula (A1), m and n are preferably $m = 0$ and $n = 0$.

[0020]

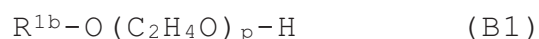
Especially, as the amine oxide type surfactant, alkyldimethylamine oxides having an alkyl group having 8 or more and 24 or less carbon atoms are preferred, alkyldimethylamine oxides having an alkyl group having 10 or more and 14 or less carbon atoms are more preferred,

alkyldimethylamine oxides having an alkyl group having 12 or more and 14 or less carbon atoms are further preferred, and lauryldimethylamine oxide is still further preferred.

[0021]

<(B) Component>

The (B) component of the present invention is a nonionic surfactant represented by the following general formula (B1). Surprisingly, the (B) component not only has a cleansing power improvement effect but is effective in an improvement in drying rate in application to a surface to be cleansed, and an improvement in the storage stability of the detergent composition.



wherein R^{1b} represents an alkyl group having 8 or more and 22 or less carbon atoms, and p represents an average addition mole number and is a number of 0.1 or more and 20 or less.

[0022]

In general formula (B1), R^{1b} is an alkyl group having 8 or more, preferably 10 or more, and more preferably 12 or more and 22 or less, preferably 18 or less, and more preferably 14 or less carbon atoms in terms of cleansing power.

[0023]

In general formula (B1), p is a number of 0.1 or

more, preferably 1 or more, more preferably 2 or more, more preferably 3 or more, further preferably 4 or more, and still further preferably 5 or more and 20 or less, preferably 15 or less, more preferably 10 or less, and further preferably 7 or less in terms of improvements in cleansing power and drying rate.

[0024]

The method for preparing the (B) component includes, but is not particularly limited to, a method to produce the component, for example, by adding a predetermined amount of ethylene oxide to an alcohol having an alkyl group represented by R^{1b} -OH. The addition reaction of ethylene oxide requires a catalyst, and an alkali hydroxide such as NaOH or KOH can be used. In addition, a catalyst comprising magnesium oxide as a main component described in JP-A No. 8-323200 can be used. With the former, a polyoxyethylene alkyl ether having a relatively wide addition mole number distribution can be obtained, and with the latter, a compound having a relatively narrow addition mole number distribution can be obtained. In addition, by using an alkali catalyst and a metal oxide catalyst in combination as disclosed in JP-A No. 10-158384, the addition mole number distribution can also be controlled.

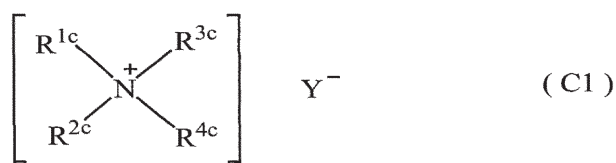
[0025]

<(C) Component>

The (C) component of the present invention is a cationic surfactant. As the cationic surfactant, mono long chain alkyl type quaternary ammonium salts are preferred. The (C) component is preferably a cationic surfactant having disinfecting properties. As the cationic surfactant, a cationic surfactant selected from compounds represented by the following general formula (C1) and compounds represented by general formula (C2) is preferred.

[0026]

[Formula 2]

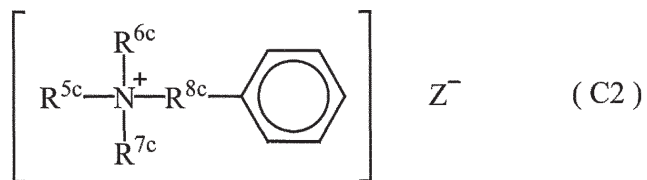


[0027]

wherein R^{1c} and R^{2c} each identically or differently represent a long chain alkyl group, a long chain alkenyl group, or a long chain hydroxyalkyl group having 8 or more and 16 or less carbon atoms, the total number of carbon atoms of R^{1c} and R^{2c} is 16 or more and 26 or less, R^{3c} and R^{4c} each identically or differently represent an alkyl group or a hydroxyalkyl group having 1 or more and 3 or less carbon atoms, or a polyoxyethylene group having an average addition mole number of 10 or less, and Y^- represents an anionic residue of a halogen atom or an ester of sulfonate or sulfate having 1 or more and 5 or less carbon atoms.

[0028]

[Formula 3]



[0029]

wherein R^{5c} represents a long chain alkyl group, a long chain alkenyl group, or a long chain hydroxyalkyl group having 8 or more and 16 or less carbon atoms, R^{6c} and R^{7c} each identically or differently represent an alkyl group or a hydroxyalkyl group having 1 or more and 3 or less carbon atoms, or a polyoxyethylene group having an average addition mole number of 10 or less, R^{8c} represents an alkylene group having 1 or more and 3 or less carbon atoms; and Z^- represents an anionic residue of a halogen atom or an ester of sulfonate or sulfate having 1 or more and 5 or less carbon atoms.

[0030]

In general formula (C2), R^{5c} is preferably a linear alkyl group having 12 or more and 16 or less carbon atoms, R^{6c} and R^{7c} are each preferably a methyl group, R^{8c} is preferably a methylene group, and Z^- is preferably a halogen ion, further preferably a chloride ion (Cl^-).

[0031]

The (C) component is preferably a cationic surfactant selected from the compounds represented by

the above general formula (C2).

[0032]

<(D) Component>

The (D) component of the present invention is a polycarboxylic acid having 3 or more and 6 or less carbon atoms or a salt thereof. The number of carbon atoms also includes the carbon atoms of the carboxylic acid group. Examples of the (D) component include one or more polycarboxylic acids or salts thereof selected from malonic acid, succinic acid, glutaric acid, adipic acid, malic acid, tartaric acid, citric acid, and salts thereof. Examples of the salts include alkali metal salts such as sodium salts and potassium salts, ammonium salts, or alkanolamine salts. Among these compounds, preferred ones are one or more polycarboxylic acids or salts thereof selected from succinic acid, malic acid, citric acid, and salts thereof. Citric acid or salts thereof are more preferred.

[0033]

<Composition and the Like of Hard Surface Detergent Composition>

The detergent composition for hard surfaces according to the present invention contains 0.05% by mass or more, preferably 0.2% by mass or more, more preferably 0.3% by mass or more, further preferably 0.4% by mass or more, still further preferably 0.5% by

mass or more, and still further preferably 0.6% by mass or more of the (A) component in terms of cleansing power, disinfecting power, quick drying properties, and storage stability and contains 3% by mass or less, preferably 2% by mass or less, more preferably 1.5% by mass or less, further preferably 1.2% by mass or less, still further preferably 1.0% by mass or less, and still further preferably 0.8% by mass or less of the (A) component in terms of quick drying properties, storage stability, and finish properties.

[0034]

The detergent composition for hard surfaces according to the present invention contains preferably 0.05% by mass or more, more preferably 0.2% by mass or more, further preferably 0.3% by mass or more, still further preferably 0.4% by mass or more, and still further preferably 0.6% by mass or more of the (B) component in terms of cleansing power, quick drying properties, and storage stability and contains preferably 3% by mass or less, more preferably 2% by mass or less, further preferably 1.5% by mass or less, still further preferably 1.2% by mass or less, further 1.0% by mass or less, and further 0.8% by mass or less of the (B) component in terms of finish properties.

[0035]

The detergent composition for hard surfaces according to the present invention contains preferably

0.2% by mass or more, more preferably, 0.3% by mass or more, further preferably 0.4% by mass or more, still further preferably 0.5% by mass or more, and further 0.6% by mass or more of the (C) component in terms of disinfecting power and contains preferably 3% by mass or less, more preferably 2% by mass or less, further preferably 1.5% by mass or less, still further preferably 1.0% by mass or less, and further 0.8% by mass or less of the (C) component in terms of quick drying properties.

[0036]

The detergent composition for hard surfaces according to the present invention contains 0.001% by mass or more, preferably 0.005% by mass or more, more preferably 0.01% by mass or more, further preferably 0.05% by mass or more, and still further preferably 0.1% by mass or more of the (D) component in terms of cleansing power and contains 4.5% by mass or less, preferably 4% by mass or less, more preferably 3% by mass or less, further preferably 2% by mass or less, still further preferably 1% by mass or less, and further 0.5% by mass or less of the (D) component in terms of disinfecting power.

[0037]

In the detergent composition for hard surfaces according to the present invention, the mass ratio of the (B) component to the (A) component, $(B)/(A)$, is 0.5

or more, preferably 0.7 or more, more preferably 0.8 or more, and further preferably 0.9 or more in terms of quick drying properties and cleansing power and is 1.5 or less, preferably 1.3 or less, more preferably 1.2 or less, and further preferably 1.1 or less in terms of quick drying properties and cleansing power. The contents of the (A) component and the (B) component in the composition are selected so as to satisfy this mass ratio.

[0038]

In the detergent composition for hard surfaces according to the present invention, the mass ratio of the (C) component to the (A) component, $(C)/(A)$, is 0.5 or more, preferably 0.7 or more, more preferably 0.8 or more, and further preferably 0.9 or more in terms of quick drying properties and cleansing power and is 1.5 or less, preferably 1.3 or less, more preferably 1.2 or less, and further preferably 1.1 or less in terms of quick drying properties and cleansing power. The contents of the (A) component and the (C) component in the composition are selected so as to satisfy this mass ratio.

[0039]

In the detergent composition for hard surfaces according to the present invention, the mass ratio of the (B) component to the (C) component, $(B)/(C)$, is 0.5 or more, preferably 0.7 or more, more preferably 0.8

or more, and further preferably 0.9 or more in terms of quick drying properties and cleansing power and is 3.0 or less, preferably 1.5 or less, more preferably 1.2 or less, and further preferably 1.1 or less in terms of quick drying properties and cleansing power. The contents of the (B) component and the (C) component in the composition are selected so as to satisfy this mass ratio.

[0040]

In the detergent composition for hard surfaces according to the present invention, the mass ratio of the (D) component to the (A) component, $(D)/(A)$, is 0.01 or more, preferably 0.03 or more, more preferably 0.1 or more, and further preferably 0.3 or more in terms of further enhancing quick drying properties and cleansing power and is 10 or less, preferably 8 or less, more preferably 5 or less, further preferably 2 or less, further preferably 1 or less, and further preferably 0.5 or less in terms of further enhancing quick drying properties and cleansing power. Preferably, the contents of the (B) component and the (C) component in the composition are selected so as to satisfy this mass ratio.

[0041]

In the detergent composition for hard surfaces according to the present invention, the mass ratio of the (A) component to the total amount of the (A)

component, the (B) component, and the (C) component, $(A)/[(A) + (B) + (C)]$, is preferably 0.1 or more, more preferably 0.2 or more, and further preferably 0.3 or more in terms of further enhancing quick drying properties and is preferably 0.6 or less, more preferably 0.5 or less, and further preferably 0.4 or less in terms of further enhancing quick drying properties.

[0042]

In the detergent composition for hard surfaces according to the present invention, the mass ratio of the (B) component to the total amount of the (A) component, the (B) component, and the (C) component, $(B)/[(A) + (B) + (C)]$, is preferably 0.1 or more, more preferably 0.2 or more, and further preferably 0.3 or more in terms of further enhancing quick drying properties and is preferably 0.6 or less, more preferably 0.5 or less, and further preferably 0.4 or less in terms of further enhancing quick drying properties.

[0043]

In the detergent composition for hard surfaces according to the present invention, the mass ratio of the (C) component to the total amount of the (A) component, the (B) component, and the (C) component, $(C)/[(A) + (B) + (C)]$, is preferably 0.1 or more, more preferably 0.2 or more, and further preferably 0.3 or

more in terms of further enhancing quick drying properties and is preferably 0.6 or less, more preferably 0.5 or less, and further preferably 0.4 or less in terms of further enhancing quick drying properties.

[0044]

In the detergent composition for hard surfaces according to the present invention, the mass ratio of the (D) component to the total amount of the (A) component, the (B) component, and the (C) component, $(D)/[(A) + (B) + (C)]$, is preferably 0.001 or more, more preferably 0.003 or more, further preferably 0.005 or more, still further preferably 0.01 or more, further 0.05 or more, and further 0.1 or more in terms of further enhancing cleansing power and is preferably 15 or less, more preferably 10 or less, further preferably 5 or less, still further preferably 3 or less, further 1 or less, and further 0.5 or less in terms of further enhancing quick drying properties.

[0045]

In the detergent composition for hard surfaces according to the present invention, the total content of the (A) component, the (B) component, the (C) component, and the (D) component is preferably 0.1% by mass or more, more preferably 0.3% by mass or more, further preferably 1% by mass or more, still further preferably 1.5% by mass or more, and further 2% by mass

or more in terms of further enhancing cleansing power and is preferably 6.5% by mass or less, more preferably 5% by mass or less, and further preferably 3% by mass or less in terms of finish properties.

[0046]

In the detergent composition for hard surfaces according to the present invention, the total content of the (A) component, the (B) component, and the (C) component is preferably 0.1% by mass or more, more preferably 0.3% by mass or more, further preferably 1% by mass or more, still further preferably 1.5% by mass or more, and further 2% by mass or more in terms of further enhancing storage stability and is preferably 6.5% by mass or less, more preferably 5% by mass or less, and further preferably 3% by mass or less in terms of further enhancing finish properties.

[0047]

The detergent composition for hard surfaces according to the present invention can contain as an (E) component a surfactant other than the (A) component, the (B) component, and the (C) component. Examples of the (E) component can include one or more surfactants selected from amphoteric surfactants other than the (A) component, nonionic surfactants other than the (B) component, and anionic surfactants. The content of the (E) component is preferably 50% by mass or less, more preferably 30% by mass or less, further preferably 10%

by mass or less, still further preferably 5% by mass or less, further 3% by mass or less, further 1% by mass or less, further 0.1% by mass or less, and further 0.01% by mass or less based on the amount of all surfactants in terms of further enhancing quick drying properties. The detergent composition still further preferably contains no (E) component.

[0048]

In addition, the content of the anionic surfactant is preferably 10% by mass or less, more preferably 5% by mass or less, further preferably 3% by mass or less, still further preferably 1% by mass or less, further 0.1% by mass or less, and further 0.01% by mass or less based on the amount of all surfactants in terms of further enhancing disinfecting power and quick drying properties. The detergent composition still further preferably contains no anionic surfactant.

[0049]

A thickening agent, a fragrance, coloring matter, a solvent, and the like, which are generally blended in a hard surface detergent, can be blended in the detergent composition for hard surfaces according to the present invention as other components.

[0050]

The detergent composition for hard surfaces according to the present invention is a liquid detergent composition containing water. The

detergent composition may be in any form in which the above components are dissolved, dispersed, or emulsified in water. For the water, ion-exchanged water or distilled water in which metal components are removed, hypochlorous acid sterile water in which about 0.5 ppm or more and 10 ppm or less of hypochlorous acid is dissolved, or the like can be used. The water is the balance of the composition and is contained in an amount making the total 100% by mass.

[0051]

In the detergent composition for hard surfaces according to the present invention, the pH of the stock solution is preferably 5 or more, more preferably 6 or more, and further preferably 6.5 or more and preferably 8 or less, more preferably 7.5 or less, at 20°C. Adjustment to such a pH is performed using an inorganic acid selected from sulfuric acid, hydrochloric acid, and phosphoric acid, or an inorganic alkali agent such as sodium hydroxide, potassium hydroxide, magnesium hydroxide, sodium carbonate, or potassium carbonate. The pH is preferably 8 or less in terms of influence on a wax when the detergent composition is applied to a floor, and a pH of 5 or more is preferred in terms of residual marks after wiping and metal product damage because a required amount of an acid is small. In the present invention, the detergent composition preferably has buffer capacity in terms of cleansing

power persistence and preferably contains an inorganic alkali agent. The content of the inorganic alkali agent is preferably 0.001% by mass or more, more preferably 0.005% by mass or more, and preferably 0.02% by mass or less, more preferably 0.01% by mass or less, in the detergent composition of the present invention.

[0052]

The detergent composition for hard surfaces according to the present invention is preferred as a wet wiping composition or a wet wiping article for hard surfaces. In other words, the detergent composition is preferably used for the light cleansing of hard surfaces (various types of articles, floors, walls, ceilings, and the like) and the like in residential surroundings such as living rooms, rooms, kitchens, bathrooms, and toilets, and the like. In this case, the composition of the present invention does not foam, is not slimy, does not leave marks, has excellent finish properties, and also dries quickly, and therefore, separate wet wiping (double wiping) is not necessary. The present invention provides a method for cleansing a hard surface, comprising applying the detergent composition for hard surfaces according to the present invention to a hard surface and then performing wipe cleansing. In the wipe cleansing, it is preferred to remove the composition applied to the hard surface from the hard surface using a dishcloth, a dustcloth, a

nonwoven fabric, or the like.

[0053]

The detergent composition for hard surfaces according to the present invention is preferably applied to a hard surface as a cleansing liquid obtained by diluting the detergent composition by 70 times or more, further 100 times or more, and 200 times or less, further 150 times or less, with water. Then, after the cleansing liquid is applied to the hard surface, the above hard surface can be dried without rinsing.

[0054]

In addition, it is also possible to impregnate a substrate with the detergent composition for hard surfaces according to the present invention or a cleansing liquid obtained by diluting the detergent composition as described above (hereinafter sometimes simply referred to as a cleansing liquid) and use the impregnated substrate as a cleaning article. The cleaning article obtained by impregnating a substrate with the detergent composition for hard surfaces according to the present invention or the cleansing liquid is preferred in terms of the workability of cleaning work.

[0055]

As the substrate used in the cleaning article impregnated with the detergent composition for hard surfaces or the cleansing liquid, those that have

flexibility, can be impregnated with the detergent composition for hard surfaces or the cleansing liquid, have sufficient strength during use, and generate no wastes or the like are used. Particularly, substrates that can be impregnated with the detergent composition for hard surfaces or the cleansing liquid in an amount described later under no load are preferably used.

[0056]

Examples of such substrates include fiber structures composed of fibrous materials, for example, various types of paper, nonwoven fabrics, woven fabrics, or knitted fabrics. Examples of the fibrous materials constituting these fiber structures include cellulosic fibers, modified cellulosic fibers, synthetic fibers, and mixtures of two or more thereof.

[0057]

In addition, porous structures obtained by dispersing bubbles in resins (for example, sponge-like structures) can also be used as the above substrate.

[0058]

In addition, the cleansing method in which a hard surface is wiped using the cleaning article impregnated with the detergent composition for hard surfaces according to the present invention or the cleansing liquid is preferred for the light cleansing of a hard surface in terms of the workability of cleaning work. The cleaning article impregnated with the detergent

composition for hard surfaces or the cleansing liquid may be either one obtained by previously impregnating a substrate with the detergent composition for hard surfaces or the cleansing liquid, or one obtained by impregnating a dry substrate with the detergent composition for hard surfaces or the cleansing liquid by spraying or the like immediately before use. In addition, a surface to be cleaned may be cleaned using a sprayed cleaning article. The cleaning article impregnated with the detergent composition for hard surfaces or the cleansing liquid may be attached to a mop-like cleaning tool and used, or may be directly held by hand and used for wipe cleaning.

[0059]

When the detergent composition for hard surfaces or the cleansing liquid is previously impregnated, the impregnation rate of the detergent composition for hard surfaces or the cleansing liquid is preferably 100% by mass or more, more preferably 150% by mass or more, and preferably 1000% by mass or less, more preferably 400% by mass or less, and further preferably 350% by mass or less per substrate mass [that is, the basis of the mass of the substrate in an unimpregnated state (dry state)] in terms of cleaning properties. When the impregnation rate is 100% by mass or more, sufficient cleaning performance for stains and dust is obtained. When the impregnation rate is 1000% by mass or less,

the amount of the detergent composition released on a surface to be cleaned is proper, and no soil or dust remains on the surface to be cleaned, and the cleaning article can be used without affecting cleaned surfaces comprising various materials such as woody materials. In terms of a further improvement in cleaning properties, when the substrate is a sheet, the basis weight before impregnation with the detergent composition for hard surfaces or the cleansing liquid is preferably 40 g/m² or more, more preferably 50 g/m² or more, and preferably 200 g/m² or less, more preferably 150 g/m² or less, in terms of the detergent retention properties required for the cleansing of a certain area, and the operability of the sheet and cost.

[0060]

During the use of the cleaning article impregnated with the detergent composition for hard surfaces or the cleansing liquid, the cleaning article may be used while the detergent composition for hard surfaces according to the present invention or the cleansing liquid is separately atomized on an object to be cleaned or the above cleaning article. A wider area can be cleaned by the use method.

[0061]

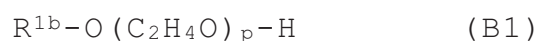
Aspects of the present invention are illustrated below.

<1> A detergent composition for hard surfaces

comprising:

0.05% by mass or more and 3% by mass or less of
(A) an amine oxide type surfactant [hereinafter
referred to as an (A) component];

(B) a nonionic surfactant represented by the
following general formula (B1) [hereinafter referred
to as a (B) component],



wherein R^{1b} represents an alkyl group having 8 or more
and 22 or less carbon atoms, and p represents an average
addition mole number and is a number of 0.1 or more and
20 or less;

(C) a cationic surfactant [hereinafter referred
to as a (C) component]; and

0.001% by mass or more and 4.5% by mass or less
of (D) a polycarboxylic acid having 3 or more and 6 or
less carbon atoms or a salt thereof [hereinafter
referred to as a (D) component], wherein

a mass ratio of the (B) component to the (A)
component, $(B)/(A)$, is 0.5 or more and 1.5 or less,

a mass ratio of the (C) component to the (A)
component, $(C)/(A)$, is 0.5 or more and 1.5 or less, and

a mass ratio of the (B) component to the (C)
component, $(B)/(C)$, is 0.5 or more and 3.0 or less.

<2> The detergent composition for hard surfaces
according to <1>, comprising 0.05% by mass or more,
preferably 0.2% by mass or more, more preferably 0.3%

by mass or more, further preferably 0.4% by mass or more, still further preferably 0.5% by mass or more, and still further preferably 0.6% by mass or more and 3% by mass or less, preferably 2% by mass or less, more preferably 1.5% by mass or less, further preferably 1.2% by mass or less, still further preferably 1.0% by mass or less, and still further preferably 0.8% by mass or less of the (A) component.

<3> The detergent composition for hard surfaces according to <1> or <2>, comprising preferably 0.05% by mass or more, more preferably 0.2% by mass or more, further preferably 0.3% by mass or more, still further preferably 0.4% by mass or more, and still further preferably 0.6% by mass or more and preferably 3% by mass or less, more preferably 2% by mass or less, further preferably 1.5% by mass or less, still further preferably 1.2% by mass or less, further 1.0% by mass or less, and further 0.8% by mass or less of the (B) component.

<4> The detergent composition for hard surfaces according to any of <1> to <3>, comprising preferably 0.2% by mass or more, more preferably, 0.3% by mass or more, further preferably 0.4% by mass or more, still further preferably 0.5% by mass or more, and further 0.6% by mass or more and preferably 3% by mass or less, more preferably 2% by mass or less, further preferably 1.5% by mass or less, still further preferably 1.0% by

mass or less, and further 0.8% by mass or less of the (C) component.

<5> The detergent composition for hard surfaces according to any of <1> to <4>, comprising 0.001% by mass or more, preferably 0.005% by mass or more, more preferably 0.01% by mass or more, further preferably 0.05% by mass or more, and still further preferably 0.1% by mass or more and 4.5% by mass or less, preferably 4% by mass or less, more preferably 3% by mass or less, further preferably 2% by mass or less, still further preferably 1% by mass or less, and further 0.5% by mass or less of the (D) component.

<6> The detergent composition for hard surfaces according to any of <1> to <5>, wherein the mass ratio of the (B) component to the (A) component, $(B)/(A)$, is 0.5 or more, preferably 0.7 or more, more preferably 0.8 or more, and further preferably 0.9 or more and 1.5 or less, preferably 1.3 or less, more preferably 1.2 or less, and further preferably 1.1 or less.

<7> The detergent composition for hard surfaces according to any of <1> to <6>, wherein the mass ratio of the (C) component to the (A) component, $(C)/(A)$, is 0.5 or more, preferably 0.7 or more, more preferably 0.8 or more, and further preferably 0.9 or more and 1.5 or less, preferably 1.3 or less, more preferably 1.2 or less, and further preferably 1.1 or less.

<8> The detergent composition for hard surfaces

according to any of <1> to <7>, wherein the mass ratio of the (B) component to the (C) component, $(B)/(C)$, is 0.5 or more, preferably 0.7 or more, more preferably 0.8 or more, and further preferably 0.9 or more and 3.0 or less, preferably 1.5 or less, more preferably 1.2 or less, and further preferably 1.1 or less.

<9> The detergent composition for hard surfaces according to any of <1> to <8>, wherein a mass ratio of the (A) component to a total content of the (A) component, the (B) component, and the (C) component, $(A)/[(A) + (B) + (C)]$, is preferably 0.1 or more, more preferably 0.2 or more, and further preferably 0.3 or more and preferably 0.6 or less, more preferably 0.5 or less, and further preferably 0.4 or less.

<10> The detergent composition for hard surfaces according to any of <1> to <9>, wherein a mass ratio of the (B) component to the total content of the (A) component, the (B) component, and the (C) component, $(B)/[(A) + (B) + (C)]$, is preferably 0.1 or more, more preferably 0.2 or more, and further preferably 0.3 or more and preferably 0.6 or less, more preferably 0.5 or less, and further preferably 0.4 or less.

<11> The detergent composition for hard surfaces according to any of <1> to <10>, wherein a mass ratio of the (C) component to the total content of the (A) component, the (B) component, and the (C) component, $(C)/[(A) + (B) + (C)]$, is preferably 0.1 or more, more

preferably 0.2 or more, and further preferably 0.3 or more and preferably 0.6 or less, more preferably 0.5 or less, and further preferably 0.4 or less.

<12> The detergent composition for hard surfaces according to any of <1> to <11>, wherein a mass ratio of the (D) component to the total content of the (A) component, the (B) component, and the (C) component, $(D)/[(A) + (B) + (C)]$, is preferably 0.001 or more, more preferably 0.003 or more, further preferably 0.005 or more, still further preferably 0.01 or more, further 0.05 or more, and further 0.1 or more and preferably 15 or less, more preferably 10 or less, further preferably 5 or less, still further preferably 3 or less, further 1 or less, and further 0.5 or less.

<13> The detergent composition for hard surfaces according to any of <1> to <12>, wherein a total content of the (A) component, the (B) component, the (C) component, and the (D) component is preferably 0.1% by mass or more, more preferably 0.3% by mass or more, further preferably 1% by mass or more, still further preferably 1.5% by mass or more, and further 2% by mass or more and preferably 6.5% by mass or less, more preferably 5% by mass or less, and further preferably 3% by mass or less.

<14> The detergent composition for hard surfaces according to any of <1> to <13>, wherein the total content of the (A) component, the (B) component, and

the (C) component is preferably 0.1% by mass or more, more preferably 0.3% by mass or more, further preferably 1% by mass or more, still further preferably 1.5% by mass or more, and further 2% by mass or more and preferably 6.5% by mass or less, more preferably 5% by mass or less, and further preferably 3% by mass or less.

<15> The detergent composition for hard surfaces according to any of <1> to <14>, comprising as an (E) component a surfactant other than the (A) component, the (B) component, and the (C) component, wherein a content of the (E) component is preferably 50% by mass or less, more preferably 30% by mass or less, further preferably 10% by mass or less, and still further preferably 5% by mass or less based on all surfactants.

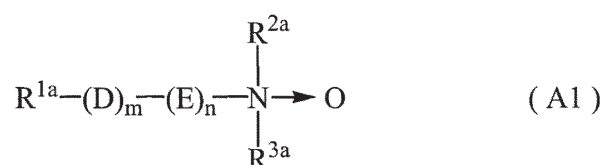
<16> The detergent composition for hard surfaces according to any of <1> to <15>, wherein a content of an anionic surfactant is preferably 10% by mass or less, more preferably 5% by mass or less, further preferably 3% by mass or less, still further preferably 1% by mass or less, further 0.1% by mass or less, and further 0.01% by mass or less based on an amount of all surfactants, and still further preferably, the detergent composition comprises no anionic surfactant.

<17> The detergent composition for hard surfaces according to any of <1> to <16>, wherein a pH of a stock solution is preferably 5 or more, more preferably 6 or

more, and further preferably 6.5 or more and preferably 8 or less, more preferably 7.5 or less, at 20°C.

<18> The detergent composition for hard surfaces according to any of <1> to <17>, wherein the (A) component is a compound represented by the following general formula (A1):

[Formula 1]

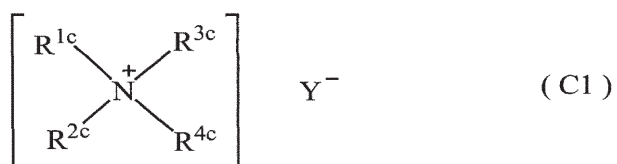


wherein R^{1a} represents an alkyl group or an alkenyl group having 8 or more and 24 or less carbon atoms, R^{2a} and R^{3a} each identically or differently represent an alkyl group having 1 or more and 3 or less carbon atoms, D represents a -NHC(=O)- group or a -C(=O)NH- group, E represents an alkylene group having 1 or more and 5 or less carbon atoms, and m and n represent m = 0 and n = 0 or m = 1 and n = 1.

<19> The detergent composition for hard surfaces according to any of <1> to <17>, wherein R^{1b} in the (B) component is an alkyl group having 12 or more and 22 or less carbon atoms.

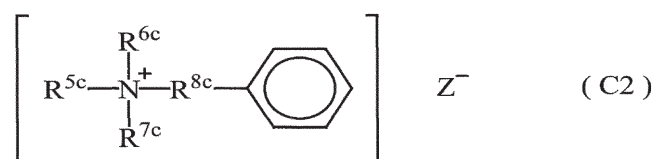
<20> The detergent composition for hard surfaces according to any of <1> to <19>, wherein the (C) component is a compound selected from a compound represented by the following general formula (C1) and a compound represented by general formula (C2),

[Formula 2]



wherein R^{1c} and R^{2c} each identically or differently represent a long chain alkyl group, a long chain alkenyl group, or a long chain hydroxyalkyl group having 8 or more and 16 or less carbon atoms, a total number of carbon atoms of R^{1c} and R^{2c} is 16 or more and 26 or less, R^{3c} and R^{4c} each identically or differently represent an alkyl group or a hydroxyalkyl group having 1 or more and 3 or less carbon atoms, or a polyoxyethylene group having an average addition mole number of 10 or less, and Y^- represents an anionic residue of a halogen atom or an ester of sulfonate or sulfate having 1 or more and 5 or less carbon atoms,

[Formula 3]



wherein R^{5c} represents a long chain alkyl group, a long chain alkenyl group, or a long chain hydroxyalkyl group having 8 or more and 16 or less carbon atoms, R^{6c} and R^{7c} each identically or differently represent an alkyl group or a hydroxyalkyl group having 1 or more and 3 or less carbon atoms, or a polyoxyethylene group having an average addition mole number of 10 or less, and R^{8c}

represents an alkylene group having 1 or more and 3 or less carbon atoms; and Z⁻ represents an anionic residue of a halogen atom or an ester of sulfonate or sulfate having 1 or more and 5 or less carbon atoms.

<21> The detergent composition for hard surfaces according to <20>, wherein the (C) component is a compound represented by general formula (C2).

<22> The detergent composition for hard surfaces according to any of <1> to <21>, wherein the (C) component is a cationic surfactant having disinfecting properties.

<23> The detergent composition for hard surfaces according to any of <1> to <22>, wherein the (D) component is one or more polycarboxylic acids or salts thereof selected from malonic acid, succinic acid, glutaric acid, adipic acid, malic acid, tartaric acid, citric acid, and salts thereof.

<24> The detergent composition for hard surfaces according to any of <1> to <23>, wherein the hard surface is a floor surface.

<25> An application, as a detergent for hard surfaces, of a cleansing liquid obtained by diluting the detergent composition for hard surfaces according to any of <1> to <24> by 70 times or more, further 100 times or more, and 200 times or less, further 150 times or less, with water.

<26> A use of the composition according to <25> as a

detergent for hard surfaces, comprising drying a hard surface without rinsing after applying the detergent to the hard surface.

<27> A method for cleansing a hard surface, comprising applying to a hard surface a cleansing liquid obtained by diluting the detergent composition for hard surfaces according to any of <1> to <24> by 70 times or more and 200 times or less with water.

<28> The cleansing method according to <27>, comprising drying a hard surface without rinsing after applying the cleansing liquid to the hard surface.

Examples

[0062]

The following Examples describe the practice of the present invention. The Examples describe illustrations of the present invention and are not for limiting the present invention.

[0063]

Liquid detergent compositions for hard surfaces shown in Table 1 were prepared, and the following evaluations were performed. The results are shown in Table 1.

[0064]

<Evaluation Methods>

(1) Cleansing Power

1 ml of rapeseed oil (manufactured by Wako Pure

Chemical Industries, Ltd.) was uniformly applied to a 30 cm X 30 cm tile, and this was used as model soil. A liquid detergent composition for hard surfaces was diluted 100 times using water whose hardness was adjusted to 4° dH. A mop was sufficiently impregnated with the diluted liquid detergent composition and lightly wrung by hand, and then, the above model soil was lightly wiped off by the mop. The state of cleansing of the model soil on the tile wiped off by the mop was visually evaluated as a cleansing rate in 10% from 0 to 100%. This was repeated 10 times, and the cleansing power was evaluated by the average value. [0065]

(2) Quick Drying Properties of Cleansed Surface

2 ml of a liquid obtained by diluting a liquid detergent composition for hard surfaces 100 times with water whose hardness was adjusted to 4° dH was applied to a 30 cm X 30 cm tile surface to which no soil adhered, uniformly spread, and naturally dried in an enclosed space without air flow. The temperature was 25°C, and the humidity was 40%. At this time, the time until visually confirmable water drops disappeared completely was measured, and the drying time was compared. This experiment was repeated 10 times, and the average was taken. A case where all water drops evaporated within 7 minutes was set to "10" points. Subsequently, 1 point was deducted each time the drying

time was extended by 1 minute, and a case where water drops remained even after more than 16 minutes was set to "1" point.

[0066]

(3) Disinfecting Power

37°C/24 hour culture of *Staphylococcus aureus* (strain NBRC12732) on a nutrient agar culture medium (prepared with a Nutrient Agar reagent manufactured by Difco according to the package insert) was repeated twice. The cultured *Staphylococcus aureus* was scraped off and suspended and dispersed in a 1/2 nutrient liquid culture medium (prepared with a Nutrient Broth reagent manufactured by Difco at a concentration 1/2 of that in the package insert), and the bacterial concentration was adjusted to $2.5 \text{ to } 13 \times 10^8 \text{ cfu/mL}$ using the 1/2 nutrient liquid culture medium. The obtained liquid was mixed with a 3% by mass aqueous solution of bovine serum albumin in equal volume to provide a test bacterial liquid. A sterilized stainless steel disk having a diameter of 20 mm, a thickness of 1 mm, and a surface grade of 2B was placed in a glass petri dish having an inner diameter of 75 mm, and 10 μL of the above test bacterial liquid was inoculated on the disk surface by a micropipette (Gilson, trade name PIPETMAN) and spread. The test bacterial liquid was allowed to stand under the condition of $25 \pm 1^\circ\text{C}$ without being covered with the lid of the glass petri dish. After

the dryness of the bacterial liquid was confirmed, a liquid obtained by diluting a detergent composition for hard surfaces 100 times with water whose hardness was adjusted to 4° dH was rapidly adhered. The adhesion of the liquid obtained by diluting a detergent composition for hard surfaces 100 times with water whose hardness was adjusted to 4° dH was performed by inoculating 10 µL of the liquid obtained by diluting a detergent composition for hard surfaces 100 times with water whose hardness was adjusted to 4° dH on 3.14 cm² of the surface of the stainless steel disk having a diameter of 20 mm (corresponding to 0.32 g/100 cm²) by a micropipette (Gilson, trade name PIPETMAN) and spreading the liquid. 5 Minutes after the adhesion, while care was taken so that the adhered composition did not run down, the disk was introduced into a certain amount of an LP water-diluted solution (prepared with one manufactured by NISSUI PHARMACEUTICAL CO., LTD. according to the package insert) to inactivate the disinfection performance of the composition, and the bacterial concentration in the LP water-diluted solution was counted by a pour culture method. An operation in which the same operation (10 µL inoculation on a disk surface by inoculation by the above micropipette and spread, and introduction into an LP diluted solution 5 minutes after the inoculation) was performed using a physiological saline solution

instead of the composition was taken as a control operation, and the difference in the logarithm of the number of bacteria in the LP diluted solution from the control operation was calculated and taken as an indicator of disinfection performance according to the following criteria.

○ (circle): the difference in the logarithm of the number of bacteria is 2 or more

× (cross): the difference in the logarithm of the number of bacteria is less than 2

[0067]

(4) Storage Stability

All components were mixed in a glass beaker (diameter 10 cm, height 12 cm) so as to provide the composition of each composition described in Table 1. The total of the mixture was 200 g. 30 g of the obtained mixture was placed in a glass bottle with a lid and kept in a sealed state in a thermostat at 5°C for 10 days, then at 40°C for 10 days, and further at 50°C for 10 days. Subsequently, the appearance of the composition was visually evaluated according to the following criteria.

○ (circle): transparent

△ (triangle): semitransparent or partially turbid.

× (cross) : opaque or totally turbid.

[0068]

(5) Finish Properties of Cleansed Surface

2 ml of a liquid obtained by diluting a liquid detergent composition for hard surfaces 100 times with water whose hardness was adjusted to 4° dH was applied to a 30 cm X 30 cm tile surface to which no soil adhered, uniformly spread, and allowed to stand as it was for natural drying (temperature 25°C, humidity 50%). After standing at 25°C for 30 minutes, the tile surface was touched by hand, and its finish properties (sticky feeling) were evaluated by the touch of a hand. Five skilled researchers performed the test per sample, and the total point was shown.

3: no stickiness at all.

2: somewhat sticky

1: considerably sticky.

[0069]

[Table 1]

		Examples												Comparative Examples				
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)
Detergent composition for hard surfaces	Composition by mass %																	
	(A)																	
	(B)																	
	(C)																	
	(D)																	
Detergent composition for hard surfaces	Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	pH (20°C)	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	(B)/(A) (mass ratio)	1.0	1.0	0.71	1.4	1.0	0.56	1.3	0.78	1.2	0.71	1.5	1.0	—	—	1.0	0.61	1.0
	(C)/(A) (mass ratio)	1.0	1.0	0.71	0.71	1.0	0.78	1.2	0.56	1.3	1.3	0.50	1.0	—	—	0.00	0.45	1.0
	(B)/(C) (mass ratio)	1.0	1.0	1.0	2.0	1.0	0.71	1.1	1.4	0.88	0.56	3.0	1.0	1.0	0.70	—	1.3	1.0
Detergent composition for hard surfaces	(D)/(A) (mass ratio)	0.43	0.05	1.1	0.14	0.014	0.33	0.50	0.33	0.50	0.43	0.43	4.3	—	—	0.43	0.09	50
	(A) + (B) + (C) + (D) (% by mass)	2.4	6.1	2.5	2.3	2.11	2.4	2.4	2.4	2.4	2.4	2.4	5.1	1.7	2.0	1.7	7.1	5.3
	(D)/[(A) + (B) + (C)] (mass ratio)	0.14	0.017	0.47	0.045	0.0048	0.14	0.14	0.14	0.14	0.14	0.14	1.4	0.21	0.18	0.21	0.06	16.7
	Cleansing power (%)	95	90	80	75	93	94	94	95	93	93	97	95	30	35	35	40	50
	Quick drying properties of cleansed surface	9	8	10	10	9	9	9	10	9	9	10	9	5	5	5	2	6
Detergent composition for hard surfaces	Disinfecting power	○	○	○	○	○	○	○	○	○	○	○	○	×	×	×	○	×
	Storage stability	○	○	○	○	○	○	○	○	○	○	○	○	×	×	○	×	○
	Finish properties (low stickiness) of cleansed surface	15	14	15	15	15	15	15	15	15	15	15	15	9	8	7	5	8

[0070]

The components in the table are the following.

·Amine oxide: lauryldimethylamine oxide

·Alkyl ethoxylate: a nonionic surfactant in which in general formula (B1), R^{1b} is a linear primary alkyl group having 12 carbon atoms, and p is 6.

·Benzalkonium chloride: an alkylbenzyldimethylammonium chloride salt [a cationic surfactant in which in general formula (C2), R^{5c} is an alkyl group having 12 to 16 carbon atoms, R^{6c} and R^{7c} are each a methyl group, R^{8c} is a methylene group, and Z^- is a chloride ion]

The adjustment of pH was performed using sulfuric acid and sodium hydroxide.

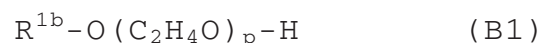
Claims

[Claim 1]

A detergent composition for hard surfaces comprising:

0.05% by mass or more and 3% by mass or less of (A) an amine oxide type surfactant [hereinafter referred to as an (A) component];

(B) a nonionic surfactant represented by the following general formula (B1) [hereinafter referred to as a (B) component],



wherein R^{1b} represents an alkyl group having 8 or more and 22 or less carbon atoms, and p represents an average addition mole number and is a number of 0.1 or more and 20 or less;

(C) a cationic surfactant [hereinafter referred to as a (C) component]; and

0.001% by mass or more and 4.5% by mass or less of (D) a polycarboxylic acid having 3 or more and 6 or less carbon atoms or a salt thereof [hereinafter referred to as a (D) component], wherein

a mass ratio of the (B) component to the (A) component, $(B)/(A)$, is 0.5 or more and 1.5 or less,

a mass ratio of the (C) component to the (A) component, $(C)/(A)$, is 0.5 or more and 1.5 or less,

a mass ratio of the (B) component to the (C)

component, (B)/(C), is 0.5 or more and 3.0 or less, and
a total content of all anionic surfactants is 5% by
mass or less based on the amount of all surfactants.

[Claim 2]

The detergent composition for hard surfaces according
to claim 1, wherein a mass ratio of the (D) component to
a total content of the (A) component, the (B) component,
and the (C) component, (D)/[(A) + (B) + (C)], is 0.001 or
more and 15 or less.

[Claim 3]

The detergent composition for hard surfaces according
to claim 1 or 2, wherein a total content of the (A) component,
the (B) component, the (C) component, and the (D) component
is 0.1% by mass or more and 6.5% by mass or less.

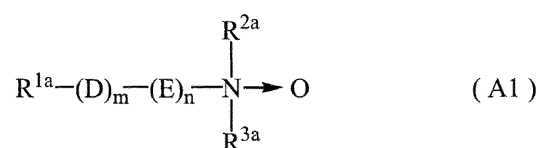
[Claim 4]

The detergent composition for hard surfaces according
to any one of claims 1 to 3, wherein a stock solution thereof
has a pH of 5 or more and 8 or less at 20°C.

[Claim 5]

The detergent composition for hard surfaces according
to any one of claims 1 to 4, wherein the (A) component is
a compound represented by the following general formula
(A1):

[Formula 1]



wherein R^{1a} represents an alkyl group or an alkenyl group having 8 or more and 24 or less carbon atoms, R^{2a} and R^{3a} each identically or differently represent an alkyl group having 1 or more and 3 or less carbon atoms, D represents a -NHC(=O)- group or a -C(=O)NH- group, E represents an alkylene group having 1 or more and 5 or less carbon atoms, and m and n represent m = 0 and n = 0 or m = 1 and n = 1.

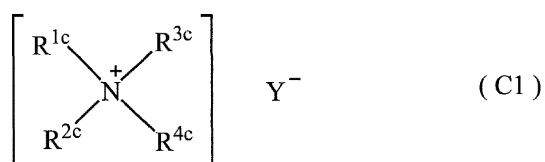
[Claim 6]

The detergent composition for hard surfaces according to any one of claims 1 to 5, wherein the (B) component is a nonionic surfactant in which R^{1b} in general formula (B1) is an alkyl group having 12 or more and 22 or less carbon atoms.

[Claim 7]

The detergent composition for hard surfaces according to any one of claims 1 to 6, wherein the (C) component is a cationic surfactant selected from a compound represented by the following general formula (C1) and a compound represented by general formula (C2),

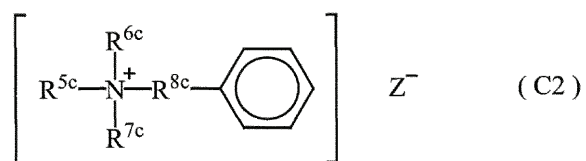
[Formula 2]



wherein R^{1c} and R^{2c} each identically or differently represent a long chain alkyl group, a long chain alkenyl

group, or a long chain hydroxyalkyl group having 8 or more and 16 or less carbon atoms, a total number of carbon atoms of R^{1c} and R^{2c} is 16 or more and 26 or less, R^{3c} and R^{4c} each identically or differently represent an alkyl group or a hydroxyalkyl group having 1 or more and 3 or less carbon atoms, or a polyoxyethylene group having an average addition mole number of 10 or less, and Y⁻ represents an anionic residue of a halogen atom or an ester of sulfonate or sulfate having 1 or more and 5 or less carbon atoms, and

[Formula 3]



wherein R^{5c} represents a long chain alkyl group, a long chain alkenyl group, or a long chain hydroxyalkyl group having 8 or more and 16 or less carbon atoms, R^{6c} and R^{7c} each identically or differently represent an alkyl group or a hydroxyalkyl group having 1 or more and 3 or less carbon atoms, or a polyoxyethylene group having an average addition mole number of 10 or less, and R^{8c} represents an alkylene group having 1 or more and 3 or less carbon atoms, and Z⁻ represents an anionic residue of a halogen atom or an ester of sulfonate or sulfate having 1 or more and 5 or less carbon atoms.

[Claim 8]

The detergent composition for hard surfaces

according to claim 7, wherein the (C) component is a compound represented by general formula (C2).

[Claim 9]

The detergent composition for hard surfaces according to any one of claims 1 to 8, wherein the (C) component is a cationic surfactant having disinfecting properties.

[Claim 10]

The detergent composition for hard surfaces according to any one of claims 1 to 9, wherein the (D) component is one or more polycarboxylic acids or salts thereof selected from malonic acid, succinic acid, glutaric acid, adipic acid, malic acid, tartaric acid, citric acid, and salts thereof.

[Claim 11]

The detergent composition for hard surfaces according to any one of claims 1 to 10, comprising as an (E) component a surfactant other than the (A) component, the (B) component, and the (C) component in an amount of 50% by mass or less based on an amount of all surfactants.

[Claim 12]

The detergent composition for hard surfaces according to any one of claims 1 to 11, wherein the hard surface is a floor surface.

[Claim 13]

A method for cleansing a hard surface, comprising

applying to a hard surface a cleansing liquid obtained by diluting the detergent composition for hard surfaces according to any one of claims 1 to 12 by 70 times or more and 200 times or less with water.

[Claim 14]

The method for cleansing hard surfaces according to claim 13, comprising drying a hard surface without rinsing after applying the cleansing liquid to the hard surface.