

DESCRIPTION

Title of the Invention: DETERGENT COMPOSITION FOR HARD SURFACES

Field of the Invention

[0001]

The present invention relates to a detergent composition for hard surfaces, a detergent article for hard surfaces, a method for washing a floor, and a method for reducing wiping lines on a ceramic tile floor.

Background of the Invention

[0002]

In residential environmental facilities surrounding people, there are various hard surfaces made of a ceramic, a plastic, a metal, or the like as the materials, and these hard surfaces are exposed to an environment where various kinds of dirt is attached in living scenes. Among others, hard surfaces used as floor surfaces are positioned at the lowermost part of the residential environmental facilities and in addition, people ordinarily come into contact with the surfaces. Thus, a large amount of dirt is likely to remain and accumulate, and in addition, such dirt has a property of being difficult to remove by cleaning.

[0003]

Easy-to-remove dirt that is not adsorbed on a hard surface such as a floor can be easily cleaned out by suction of a vacuum cleaner, a wiper with a nonwoven fabric, and the like. However, residual dirt containing oil and furthermore, odorous components remaining on a floor are forced to be removed by water-wiping with a mop or by wiping-cleaning with a detergent. Such household affairs against the dirt on floors that easily remains and is hardly removed have been a large burden on consumers.

[0004]

JP-A 2000-160199 discloses a detergent composition for hard surfaces, which allows, upon removing dirt on a hard surface, a washing operation to be performed with minimum labor.

[0005]

In the detergent composition for hard surfaces disclosed in JP-A 2000-160199, easiness of wiping is studied. However, the detergent composition does not have a sufficient performance in terms of residual wiping lines when washing a hard surface such as a floor.

Summary of the Invention

[0006]

The present invention provides a detergent composition for hard surfaces which has good detergency and is excellent in a finishing property for not leaving wiping lines after

washing (hereinafter, also merely referred to as finishing property), and a method for washing a floor using the detergent composition.

[0007]

The present invention relates to a detergent composition for hard surfaces, containing (a) ethanol [hereinunder, referred to as component (a)] in an amount of 5% by mass or more and 23% by mass or less, (b) a polyether-modified silicone [hereinunder, referred to as component (b)], (c) a surfactant [hereinunder, referred to as component (c)], and water.

[0008]

Furthermore, the present invention relates to a detergent article for hard surfaces, containing the detergent composition for hard surfaces of the present invention filled in a spray container.

[0009]

Furthermore, the present invention relates to a method for washing a floor, which includes depositing the detergent composition for hard surfaces of the present invention on the floor and then wiping off the composition.

[0010]

Furthermore, the present invention relates to a method for reducing wiping lines on a ceramic tile floor, which uses the detergent composition for hard surfaces of the present

invention.

[0011]

According to the present invention, it is possible to provide a detergent composition for hard surfaces which has good detergency and is excellent in a finishing property for not leaving wiping lines after washing, and a method for washing a floor using the detergent composition.

Embodiments of the Invention

[0012]

The present inventors have found that by using a polyether-modified silicone and ethanol in predetermined amounts in addition to a surfactant, it is possible, in washing a hard surface, to satisfy a desired detergency and to achieve finishing with excellent aesthetic properties, such as leaving no wiping line.

In the detergent composition for hard surfaces of the present invention, a polyether-modified silicone is uniformly dissolved or dispersed in the composition containing ethanol. Thus, it is supposed that wet-spreadability of the polyether-modified silicone and a quick-drying property of the composition are enhanced, and as a result, a good detergency for a hard surface can be achieved while no wiping lines remain after washing.

[0013]

<Component (a)>

Component (a) of the present invention is ethanol.

[0014]

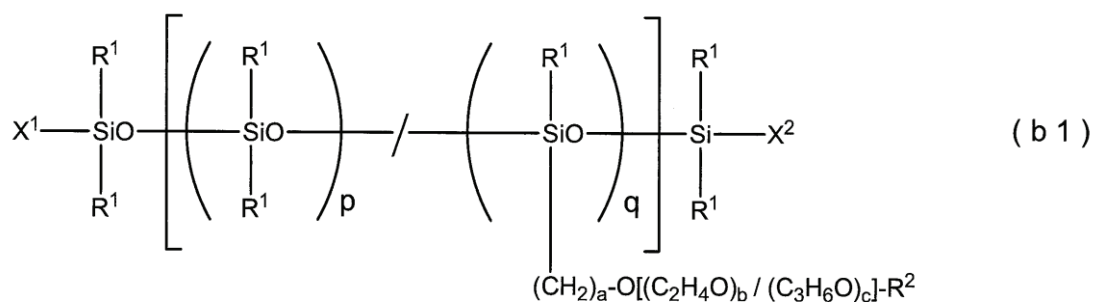
<Component (b)>

Component (b) of the present invention is a polyether-modified silicone.

Component (b) is suitably a compound represented by the following general formula (b1):

[0015]

[Chem. 1]



[0016]

wherein, R¹s may be the same or different, and each represent an alkyl group having 1 or more and 4 or less carbon atoms; p represents a number of 0 or more and 1000 or less, and q represents a number of 1 or more and 1000 or less; X¹ and X² may be the same or different, and each represent a hydroxy group, or an alkyl group or an alkoxy group having 1 or more and 4 or less carbon atoms; R² represents a hydrogen atom, an alkyl group having 1 or more and 4 or less carbon atoms, or an acyl group having 2 or more and 4 or less carbon atoms; a represents a number of 1 or more and 4 or less, b

represents a number of 1 or more and 100 or less, and c represents a number of 0 or more and 50 or less; and / indicates that the constituting units with p and q, and the constituting units with b and c may be in a random form or a block form.
[0017]

In the general formula (b1), R^1 is, from the viewpoint of the finishing property, preferably a methyl group.

X^1 and X^2 are, from the viewpoint of the finishing property, preferably an alkyl group having 1 or more and 3 or less carbon atoms and more preferably a methyl group.

R^2 is, from the viewpoint of the finishing property, preferably a hydrogen atom, an alkyl group having 1 or more and 4 or less carbon atoms, and an acyl group having 2 or more and 3 or less carbon atoms, and more preferably a hydrogen atom.

[0018]

In the general formula (b1), p is, from the viewpoint of the finishing property, 0 or more, and preferably 1 or more, and 1000 or less, preferably 100 or less, and more preferably 10 or less. q is, from the viewpoint of the finishing property, 1 or more, and 1000 or less, preferably 100 or less, and more preferably 20 or less.

In the general formula (b1), a is, from the viewpoint of the finishing property, preferably 1 or more and 3 or less.

In the general formula (b1), b is, from the viewpoint

of the finishing property, 1 or more, preferably 2 or more, and more preferably 3 or more, and 100 or less, preferably 50 or less, more preferably 30 or less, further preferably 15 or less, and furthermore preferably 8 or less.

In the general formula (b1), c is, from the viewpoint of the finishing property, 0 or more, and 50 or less, preferably 30 or less, more preferably 10 or less, further preferably 3 or less, and may be 0.

[0019]

The HLB value of the compound represented by (b1) is, from the viewpoints of the detergency and finishing property, preferably 4 or more, more preferably 6 or more, further preferably 8 or more, and furthermore preferably 10.5 or more, and from the same viewpoints, preferably 20 or less, more preferably 18 or less, further preferably 16 or less, furthermore preferably 15 or less, and furthermore preferably 14.5 or less.

[0020]

The HLB value of the compound represented by (b1) is determined by the following expression.

HLB value = molecular weight of polyoxyethylene in compound represented by (b1) $\times$ 20 / molecular weight of compound represented by (b1)

Incidentally, a, b, c, p, q, R¹, R², X¹, and X² can be determined by NMR or the like.

[0021]

The kinematic viscosity (mm^2/s) of component (b) is, from the viewpoints of the detergency and finishing property, preferably 1 or more, more preferably 5 or more, and further preferably 10 or more, and from the same viewpoints, preferably 1500 or less, more preferably 1000 or less, further preferably 500 or less, and furthermore preferably 100 or less. The kinematic viscosity of component (b) is a value measured by Ubbelohde viscometer (Sibata Scientific Technology, Ltd.) at 25°C.

[0022]

<Component (c)>

Component (c) of the present invention is a surfactant. Component (c) is used from the viewpoints of the detergency, finishing property, and blending stability. Incidentally, the polyether-modified silicone of component (b) is excluded from component (c).

[0023]

Examples of component (c) include one or more surfactants selected from a nonionic surfactant, an anionic surfactant, an amphoteric surfactant, and a cationic surfactant, preferably one or more surfactants selected from a nonionic surfactant, an anionic surfactant, and an amphoteric surfactant.

The detergent composition for hard surfaces of the

present invention contains, as component (c), from the viewpoints of the finishing property and detergency, preferably one or more surfactants selected from a nonionic surfactant, an anionic surfactant, and an amphoteric surfactant, more preferably one or more surfactants selected from nonionic surfactants, and further preferably a glycoside-type nonionic surfactant.

[0024]

Examples of the nonionic surfactant include one or more nonionic surfactants selected from (1) polyoxyalkylene mono-alkyl or alkenyl ethers, (2) glycoside-type nonionic surfactants (alkylglycosides, etc.), (3) fatty acid alkanol amides, (4) sorbitan-based nonionic surfactants, (5) alkyl monoglyceryl ethers, (6) fatty acid glycerol monoesters, (7) sucrose fatty acid esters, and (8) amine oxides.

The nonionic surfactant is, from the viewpoint of the finishing property, preferably one or more nonionic surfactants selected from (1) polyoxyalkylene mono-alkyl or alkenyl ethers, (2) glycoside-type nonionic surfactants (alkylglycosides, etc.), and (8) amine oxides, more preferably one or more nonionic surfactants selected from (1) polyoxyalkylene mono-alkyl or alkenyl ethers and (2) glycoside-type nonionic surfactants (alkylglycosides, etc.), and further preferably (2) glycoside-type nonionic surfactants (alkylglycosides, etc.).

[0025]

The nonionic surfactant is further specifically described.

(1) Polyoxyalkylene mono-alkyl or alkenyl ether

In the nonionic surfactant of (1), the carbon number of the alkyl group or alkenyl group is, from the viewpoints of the detergency and finishing property, preferably 6 or more, more preferably 8 or more, further preferably 10 or more, and furthermore preferably 12 or more, and from the same viewpoints, preferably 22 or less, more preferably 18 or less, further preferably 16 or less, and furthermore preferably 14 or less.

[0026]

In the nonionic surfactant of (1), the average number of moles of added alkylene oxide is, from the viewpoints of the detergency and finishing property, preferably more than 0, more preferably 1 or more, further preferably 3 or more, furthermore preferably 5 or more, and from the same viewpoints, preferably 50 or less, more preferably 30 or less, further preferably 20 or less, and furthermore preferably 15 or less.

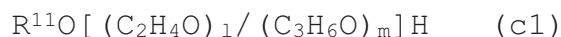
[0027]

The alkylene oxide is, from the viewpoints of the detergency and finishing property, preferably one or more selected from ethylene oxide, propylene oxide, and butylene oxide, and more preferably one or more selected from ethylene

oxide, and propylene oxide.

[0028]

Preferred examples of the nonionic surfactant of (1) may include a nonionic surfactant represented by the following general formula (c1):



wherein, R^{11} represents a hydrocarbon group having 6 or more and 22 or less carbon atoms; l and m represent an average number of added moles, l represents a number of 0 or more and 30 or less, m represents a number of 0 or more and 30 or less, and l and m are not simultaneously 0; and "/" indicates that the ethyleneoxy group (C_2H_4O) and the propyleneoxy group (C_3H_6O) may be added either in a random or block form regardless of the order thereof.

[0029]

The carbon number of R^{11} in the general formula (c1) is, from the viewpoints of the detergency and finishing property, preferably 8 or more, more preferably 10 or more, further preferably 12 or more, and from the same viewpoints, preferably 18 or less, more preferably 17 or less, further preferably 16 or less, and furthermore preferably 14 or less.

[0030]

R^{11} is, from the viewpoints of the detergency and finishing property, preferably an alkyl group or an alkenyl group, and more preferably an alkyl group.

[0031]

Specific examples of the alkyl group include various octyl groups (including 2-ethylhexyl group), various nonyl groups, various decyl groups, various undecyl groups, various dodecyl groups (lauryl group), various tridecyl groups, various tetradecyl groups, various pentadecyl groups, various hexadecyl groups, various heptadecyl groups, and various octadecyl groups.

Examples of the alkenyl group include various octanyl groups, various nonanyl groups, various decanyl groups, various undecanyl groups, various dodecanyl groups, various tridecanyl groups, various tetradecanyl groups, various pentadecanyl groups, various hexadecanyl groups, various heptadecanyl groups, and various octadecanyl groups (for example, oleyl group, linoleic group). Incidentally, "various" means various isomers including n-, sec-, tert-, and iso-isomers.

[0032]

l in the general formula (c1) is, from the viewpoints of the detergency and finishing property, preferably more than 0, more preferably 1 or more, further preferably 3 or more, and furthermore preferably 5 or more, and from the same viewpoint, preferably 50 or less, more preferably 30 or less, further preferably 20 or less, and furthermore preferably 15 or less.

m in the general formula (c1) is, from the viewpoints of the detergency and finishing property, preferably 0 or more, and preferably 10 or less, and more preferably 5 or less.
[0033]

The polyoxyalkylene mono-alkyl or alkenyl ether, further, the nonionic surfactant represented by the general formula (c1), has an HLB value of, from the viewpoints of the detergency, finishing property, and blending stability, preferably 5 or more, more preferably 7 or more, and further preferably 10 or more, and from the same viewpoints, preferably 20 or less, more preferably 18 or less, and further preferably 16 or less.

Here, the HLB values for the polyoxyalkylene mono-alkyl or alkenyl ether, further for the nonionic surfactant represented by the general formula (c1) are defined by the following griffin's formula:

$$\text{HLB value} = 20 \times \text{Mw}/\text{M}$$

wherein, M is a molecular weight of the nonionic surfactant, and Mw is a molecular weight of the hydrophilic portion of the nonionic surfactant.

[0034]

(2) Glycoside-type nonionic surfactant

The nonionic surfactant of (2) is preferably a nonionic surfactant represented by the following general formula (c2):



wherein, R^{21} is a linear or branched alkyl group or alkenyl group having 6 or more and 18 or less carbon atoms, or an alkylphenyl group, and preferably an alkyl group; R^{22} represents an alkylene group having 2 or more and 4 or less carbon atoms, and G is a residue derived from a reducing sugar having 5 or 6 carbon atoms; x represents an average number of added moles, and is 0 or more and 5 or less; and y represents numbers having an average of 1 or more and 5 or less.

[0035]

In the general formula (c2), R^{21} is, from the viewpoints of the detergency, blending stability, and finishing property, a linear or branched alkyl group having preferably 8 or more, and more preferably 10 or more carbon atoms; and preferably 16 or less, and more preferably 14 or less carbon atoms.

[0036]

In the general formula (c2), x is, from the viewpoints of the detergency, blending stability, and finishing property, preferably 0 or more and 2 or less, and more preferably 0. y is, from the viewpoints of the detergency, blending stability, and finishing property, preferably 1.1 or more, and preferably 1.5 or less, and more preferably 1.4 or less. Incidentally, y is a measurement value by a proton NMR method.

[0037]

In the general formula (c2), examples of G include, in terms of availability and cost thereof, a residue derived from

one or more monosaccharides selected from glucose and fructose. Further examples of G include a residue derived from one or more polysaccharides selected from maltose and sucrose. G is preferably a residue derived from one or more monosaccharides selected from glucose and fructose, and more preferably a residue derived from glucose.

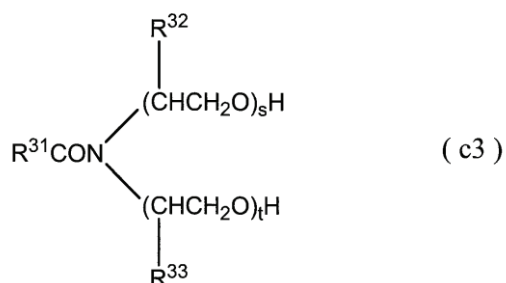
[0038]

(3) Fatty acid alkanol amide

The nonionic surfactant of (3) is preferably a nonionic surfactant represented by the following general formula (c3):

[0039]

[Chem. 2]



[0040]

wherein, R^{31} represents an alkyl group or alkenyl group having 8 or more and 22 or less, and preferably 10 or more and 18 or less carbon atoms; R^{32} and R^{33} may be the same or different and each represent a hydrogen atom or a methyl group; s represents a number of 1 to 3; and t represents a number of 0 to 3.

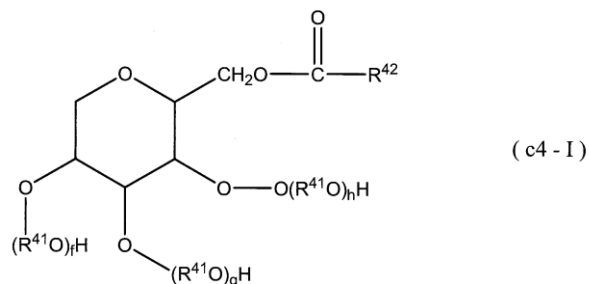
[0041]

(4) Sorbitan-based nonionic surfactant

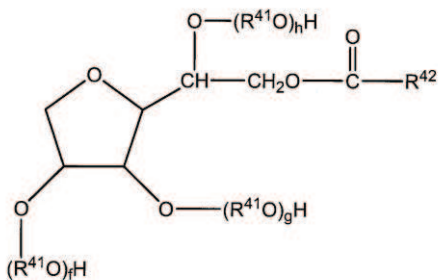
Examples of the nonionic surfactant of (4) include one or more nonionic surfactants selected from a nonionic surfactant represented by the following general formula (c4-I) and a nonionic surfactant represented by the following general formula (c4-II):

[0042]

[Chem. 3]



(c4 - II)



[0043]

wherein, R⁴¹ represents an alkylene group having 2 or more and 4 or less carbon atoms; R⁴² each independently represents an alkyl group or alkenyl group having 1 or more and 14 or less carbon atoms, and the alkyl group and the alkenyl group may be any of a linear, a branched, and a cyclic group; and f,

g, and h represent an average number of added moles, and the total sum of f, g, and h is 3 or more and 50 or less.

[0044]

In the general formula (c4-I) or (c4-II), R^{41} is an alkylene group having 2 or more and 4 or less carbon atoms, preferably an ethylene group or a propylene group, and more preferably an ethylene group.

[0045]

In addition, in the general formula (c4-I) or (c4-II), f, g, and h are, from the viewpoints of the detergency, blending stability, and finishing property, each independently preferably 0 or more, and preferably 50 or less, and more preferably 30 or less. The total sum of f, g, and h is, from the viewpoints of the detergency, blending stability, and finishing property, preferably 3 or more, and more preferably 4 or more, and preferably 50 or less, and more preferably 30 or less.

[0046]

(5) Alkyl monoglyceryl ether

The nonionic surfactant of (5) is an alkyl monoglyceryl ether having a linear or branched alkyl group with preferably 6 or more and 22 or less carbon atoms, and more preferably 10 or more and 14 or less carbon atoms.

[0047]

(6) Fatty acid glycerol monoester

Examples of the nonionic surfactant of (6) include a fatty acid glycerol monoester in which the fatty acid moiety is a fatty acid with 8 or more and 22 or less carbon atoms, and preferably 10 or more and 14 or less carbon atoms. The nonionic surfactant of (6) is preferably a fatty acid glycerol monoester in which the fatty acid moiety is a fatty acid having a linear or branched alkyl group with 8 or more and 22 or less carbon atoms, and preferably 10 or more and 14 or less carbon atoms.

[0048]

(7) Sucrose fatty acid ester

Examples of the nonionic surfactant of (7) include a sucrose fatty acid ester in which the fatty acid moiety is a fatty acid with 8 or more and 18 or less carbon atoms, and preferably 10 or more and 14 or less carbon atoms. The nonionic surfactant of (7) is preferably a sucrose fatty acid ester in which the fatty acid moiety is a fatty acid having a linear or branched alkyl group with 8 or more and 18 or less carbon atoms, and more preferably 10 or more and 14 or less carbon atoms.

[0049]

(8) Amine oxide

Examples of the nonionic surfactant of (8) include an alkyl or alkenyl amine oxide having a linear or branched alkyl group or alkenyl group with 6 or more and 24 or less carbon

atoms. Preferred examples of the amine oxide include an amine oxide represented by the following general formula (c8):

[0050]

[Chem. 4]



[0051]

wherein, R^{81} represents a hydrocarbon group having 6 or more and 24 or less carbon atoms, and preferably a linear or branched alkyl group or alkenyl group having 6 or more and 24 or less carbon atoms; R^{82} and R^{83} may be the same or different, and each independently represent a hydrocarbon group having 1 or more and 3 or less carbon atoms; D represents a group selected from $-\text{COO}-$, $-\text{CONH}-$, and $-\text{O}-$; E represents a divalent hydrocarbon group having 1 or more and 5 or less carbon atoms; and i and j are numbers satisfying $i=0$ and $j=0$, or numbers satisfying $i=1$ and $j=1$.

[0052]

Examples of the anionic surfactant include an anionic surfactant having a polyoxyalkylene group, for example, one or more selected from a polyoxyalkylene alkyl ether sulfate salt, a polyoxyalkylene alkenyl ether sulfate salt, a polyoxyalkylene alkylaryl ether sulfate salt, a polyoxyalkylene alkenylaryl ether sulfate salt, a

polyoxyalkylene alkyl ether carboxylate salt, and a polyoxyalkylene alkenyl ether carboxylate salt, preferably one or more selected from a polyoxyalkylene alkyl ether sulfate salt, a polyoxyalkylene alkenyl ether sulfate salt, and a polyoxyalkylene alkyl ether carboxylate salt, and more preferably a polyoxyalkylene alkyl ether sulfate salt. The alkylene group is preferably an ethylene group or a propylene group, and more preferably an ethylene group, and the alkyl group and the alkenyl group preferably have 12 or more and 14 or less carbon atoms.

In addition, examples of the anionic surfactant include an alkylsulfate salt. The alkyl group of the alkylsulfate salt preferably has 10 or more and 14 or less carbon atoms.

Examples of the salt of the anionic surfactant include an alkali metal salt, such as a sodium salt and a potassium salt, an ammonium salt, and an organic ammonium salt, and the salt is preferably an alkali metal salt.

[0053]

Examples of the amphoteric surfactant include one or more selected from alkylamidepropyl-N,N-dimethylacetic acid betaine, alkylamidepropyl-N,N-dimethyl-2-hydroxypropyl sulfobetaine, alkylamidepropyl-N,N-dimethyl-propyl sulfobetaine, etc., preferably one or more selected from lauramidepropyl-N,N-dimethylacetic acid betaine, hydroxylauryl sulfobetaine,

lauramidepropyl-N,N-dimethyl-2-hydroxypropyl betaine, etc., and more preferably hydroxylauryl sulfobetaine.

[0054]

Examples of the cationic surfactant include one or more selected from a monoalkyltrimethylammonium salt having one alkyl group with 8 or more and 16 or less carbon atoms, a dialkyldimethylammonium salt having two alkyl groups with 8 or more and 14 or less carbon atoms, and an alkyldimethylbenzylammonium salt having one alkyl group with 8 or more and 14 or less carbon atoms, preferably an alkyldimethylbenzyl ammonium salt having one alkyl group with 8 or more and 14 or less carbon atoms, and more preferably an alkyldimethylbenzylammonium salt having one alkyl group with 12 carbon atoms.

[0055]

<Water>

The detergent composition for hard surfaces of the present invention is a liquid detergent composition containing water. Components (a) to (c) may be any of forms in which the component is dissolved, dispersed, and emulsified in water, but from the viewpoints of the detergency and finishing property, the component is preferably dissolved in water. As water, ion exchanged water and distilled water in which metal components have been removed, or hypochlorous acid-sterilized water having 0.5 ppm or more and 10 ppm or

less of hypochlorous acid dissolved therein may be used. Water constitutes the balance of the composition, and contained in an amount to give the total amount of 100 % by mass.

[0056]

<Composition, etc. of a detergent composition for hard surfaces>

The detergent composition for hard surfaces of the present invention contains component (a), from the viewpoint of the finishing property, in an amount of 5% by mass or more, preferably 6% by mass or more, more preferably 8% by mass or more, and further preferably 10% by mass or more, and from the same viewpoint, 23% by mass or less, preferably 20% by mass or less, more preferably 18% by mass or less, and further preferably 15% by mass or less.

[0057]

The detergent composition for hard surfaces of the present invention contains component (b), from the viewpoint of the finishing property, in an amount of preferably 0.0008% by mass or more, more preferably 0.001% by mass or more, and further preferably 0.003% by mass or more, and from the viewpoints of the detergency and finishing property, preferably 3% by mass or less, more preferably 0.8% by mass or less, further preferably 0.5% by mass or less, furthermore preferably 0.1% by mass or less, furthermore preferably 0.08%

by mass or less, furthermore preferably 0.05% by mass or less, and furthermore preferably 0.03% by mass or less.

[0058]

The detergent composition for hard surfaces of the present invention contains component (c), from the viewpoints of the detergency and finishing property, in an amount of preferably 0.005% by mass or more, more preferably 0.008% by mass or more, further preferably 0.01% by mass or more, and furthermore preferably 0.05% by mass or more, and from the viewpoint of the finishing property, preferably 5% by mass or less, more preferably 3% by mass or less, further preferably 1% by mass or less, furthermore preferably 0.8% by mass or less, and furthermore preferably 0.5% by mass or less.

[0059]

In the detergent composition for hard surfaces of the present invention, a mass ratio of component (a) to component (b), $(a)/(b)$, is, from the viewpoint of the finishing property, preferably 20 or more, more preferably 50 or more, further preferably 100 or more, furthermore preferably 300 or more, furthermore preferably 500 or more, and furthermore preferably 800 or more, and from the same viewpoint, preferably 20000 or less, more preferably 15000 or less, further preferably 10000 or less, and furthermore preferably 6000 or less. This mass ratio is a mass ratio of a content

of component (a) to a content of component (b) .

[0060]

In the detergent composition for hard surfaces of the present invention, a mass ratio of component (b) to component (c), $(b)/(c)$, is, from the viewpoint of the finishing property, preferably 0.001 or more, more preferably 0.003 or more, further preferably 0.005 or more, furthermore preferably 0.01 or more, and furthermore preferably 0.03 or more, and from the viewpoints of the detergency and finishing property, preferably 10 or less, more preferably 5 or less, further preferably 1 or less, and furthermore preferably 0.5 or less.

In addition, when component (c) is a nonionic surfactant, a mass ratio of component (b) to the nonionic surfactant, $(b)/(\text{nonionic surfactant})$, is, from the viewpoint of the finishing property, preferably 0.001 or more, more preferably 0.003 or more, further preferably 0.005 or more, furthermore preferably 0.01 or more, and furthermore preferably 0.03 or more, and from the viewpoints of the detergency and finishing property, preferably 10 or less, more preferably 5 or less, further preferably 1 or less, and furthermore preferably 0.5 or less.

In addition, when the detergent composition for hard surfaces of the present invention contains a glycoside-type nonionic surfactant as component (c), a mass ratio of component (b) to the glycoside-type nonionic surfactant,

(b)/(glycoside-type nonionic surfactant), is, from the viewpoint of the finishing property, preferably 0.001 or more, more preferably 0.003 or more, further preferably 0.005 or more, furthermore preferably 0.01 or more, and furthermore preferably 0.03 or more, and from the viewpoints of the detergency and finishing property, preferably 10 or less, more preferably 5 or less, further preferably 1 or less, and furthermore preferably 0.5 or less.

[0061]

The detergent composition for hard surfaces of the present invention contains water, from the viewpoints of solubility, finishing property, and detergency, in an amount of preferably 75% by mass or more, more preferably 80% by mass or more, further preferably 82% by mass or more, and furthermore preferably 84% by mass or more, and preferably 94.8% by mass or less, more preferably 94% by mass or less, further preferably 92% by mass or less, and furthermore preferably 90% by mass or less.

[0062]

In the detergent composition for hard surfaces of the present invention, as another component, a dispersant, a chelating agent, a thickener, a fragrance, a colorant, a solvent, a preservative, and the like which are generally incorporated in a detergent for hard surfaces can be incorporated.

[0063]

In the detergent composition for hard surfaces of the present invention, the pH of the undiluted solution at 20°C is, from the viewpoint of the finishing property and the viewpoint of damaging properties for metallic products, preferably 5 or more, more preferably 6 or more, and further preferably 6.5 or more, and from the viewpoint of minimizing an effect to a wax present on a hard surface, preferably 8 or less, and more preferably 7.5 or less. The regulation of the pH as the above is achieved by using an inorganic acid such as sulfuric acid, hydrochloric acid, and phosphoric acid; an organic acid such as malic acid, citric acid, and acetic acid; an inorganic alkali agent such as sodium hydroxide, potassium hydroxide, magnesium hydroxide, sodium carbonate, and potassium carbonate; and an organic alkali agent such as monoethanol amine, and 2-amino-2-methyl-1-propanol. In the present invention, it is preferred that the detergent composition has a buffering capacity in terms of persistence of detergency, and thus the detergent composition suitably contains an inorganic alkali agent. The content of the inorganic alkali agent is preferably 0.001% by mass or more, and more preferably 0.005% by mass or more, and preferably 0.02% by mass or less, and more preferably 0.01% by mass or less, in the detergent composition of the present invention.

[0064]

The detergent composition for hard surfaces of the present invention is suitable for wipe-washing. That is, the detergent composition for hard surfaces of the present invention is suitably used for washing hard surfaces (various objects, floors, walls, ceilings, etc.) around residence, such as those in a living room, a room, a kitchen, a bathroom, and a toilet. In this case, the composition of the present invention is excellent in finishing properties without foaming, sliminess, remaining traces, and with few wiping lines, and furthermore, since the composition is dried quickly, additional wiping with water (double wiping) is not required. Owing to the above effects, the hard surface is preferably a floor.

Examples of the hard surface include a hard surface made of one or more materials selected from a ceramic, a plastic, a wood, a stone, and a metal.

According to the present invention, a washing method for a hard surface is provided, the method includes applying the detergent composition for hard surfaces of the present invention to the hard surface, and then performing wipe-washing.

Furthermore, according to the present invention, a method for washing a floor is provided, the method includes depositing the detergent composition for hard surfaces of the

present invention on the floor, and then wiping off the composition. Examples of the floor include a floor made of one or more materials selected from a ceramic, a plastic, a wood, a stone, and a metal. From the viewpoint that the effect of reducing wiping lines can be notably felt, the floor is preferably a ceramic tile floor. According to the present invention, a method for reducing wiping lines on a ceramic tile floor is provided, the method using the detergent composition for hard surfaces of the present invention. The method is a method for reducing, after washing a ceramic tile floor using a detergent composition, wiping lines caused by wiping off the detergent composition, and is a method for reducing wiping lines after washing a ceramic tile floor, which uses, as the detergent composition, the detergent composition for hard surfaces of the present invention.

In the wipe-washing, the composition applied on a hard surface is preferably removed from the hard surface using a dishcloth, a floorcloth, a nonwoven fabric, a mop, a paper, or the like.

[0065]

The detergent composition for hard surfaces of the present invention can be applied as-is, without dilution, to a hard surface with a spray or the like. Furthermore, the detergent composition for hard surfaces of the present invention can also be applied to a hard surface as a washing

liquid in which the detergent composition is diluted in water at preferably 10 times or more, and further preferably 50 times or more, and preferably 200 times or less, and further preferably 150 times or less. Then, after the washing liquid is applied to a hard surface, the wipe-washing is preferably performed. Furthermore, after the washing liquid is applied to a hard surface, the hard surface can be dried without rinsing.

[0066]

When a floor is washed, the detergent composition for hard surfaces of the present invention is deposited, in an amount of preferably 0.5 g or more, and more preferably 1 g or more, and preferably 50 g or less, and more preferably 20 g or less, per m² floor area. The composition is preferably deposited on the floor by spraying. Then, the composition deposited on the floor is wiped off with a mop, a cloth, or a paper. After the composition is deposited on the floor and then allowed to stand for preferably 60 seconds or less, and more preferably 30 seconds or less, the composition is wiped off. It is preferred that the composition is wiped off while the composition is in a wet state.

[0067]

In addition, the detergent composition for hard surfaces of the present invention or a washing liquid of the detergent composition diluted as described above

(hereinafter, sometimes referred to as merely a washing liquid) can be used as a cleaning article by impregnating a base therewith. Such a cleaning article in which a base is impregnated with the detergent composition for hard surfaces of the present invention or a washing liquid is preferred from the viewpoint of workability of the cleaning work.

[0068]

As the base used in the cleaning article in which a base is impregnated with the detergent composition for hard surfaces or a washing liquid, a base that has flexibility, can be impregnated with the detergent composition for hard surfaces or a washing liquid, has a sufficient strength in use, and does not generate scraps, is used. In particular, a base that can be impregnated with the detergent composition for hard surfaces or a washing liquid in an amount described later under no-load is preferably used.

[0069]

Examples of such a base as the above include a fiber structure made of a fibrous material, e.g., various papers, nonwoven fabrics, woven fabrics, or knitted fabrics. Examples of the fibrous material forming the fiber structure include a cellulose fiber, a modified-cellulose fiber, a synthetic fiber, and a mixture of two or more thereof.

[0070]

In addition, a porous structure (for example,

sponge-form structure) obtained by dispersing air bubbles in a resin can also be used as the base.

[0071]

In addition, a washing method for wiping a hard surface with a cleaning article impregnated with the detergent composition for hard surfaces of the present invention or a washing liquid is preferably applied in a light washing of a hard surface, from the viewpoint of workability of the cleaning work. The cleaning article impregnated with the detergent composition for hard surfaces or a washing liquid may be any of one in which a base is impregnated in advance with the detergent composition for hard surfaces or a washing liquid, or one in which a dried base is impregnated immediately before use, with a spray or the like, with the detergent composition for hard surfaces or a washing liquid. In addition, a surface to be cleaned may be cleaned with a cleaning article having the detergent composition or a washing liquid sprayed thereon. A cleaning article impregnated with the detergent composition for hard surfaces or a washing liquid may be used after being attached to a mop-form cleaning tool, or may be used for wiping-cleaning while being directly held by a hand. A mop is preferably used for washing a floor.

[0072]

In the case where a base is previously impregnated with

the detergent composition for hard surfaces or a washing liquid, the impregnation ratio of the detergent composition for hard surfaces or a washing liquid is, from the viewpoint of cleaning properties, based on the base mass [that is, based on the mass of the base in the unimpregnated state (dry state)], preferably 100% by mass or more, and more preferably 150% by mass or more, and preferably 1000% by mass or less, more preferably 500% by mass or less, and further preferably 400% by mass or less. When the impregnation ratio is 100% by mass or more, sufficient cleaning performances against stains and dusts can be achieved. When the ratio is 1000% by mass or less, an appropriate amount of the detergent composition is released on a surface to be cleaned, stains and dusts do not remain on the surface to be cleaned, and the detergent composition can be used for cleaning surfaces made of various materials such as a wooden material. In terms of further enhancing the cleaning properties, when the base is a sheet, the basis weight before impregnation with the detergent composition for hard surfaces or a washing liquid is, from the viewpoints of holding ability of the detergent required for washing a certain area and workability and cost of the sheet, preferably 40 g/m² or more, and more preferably 50 g/m² or more, and preferably 200 g/m² or less, and more preferably 150 g/m² or less.

[0073]

When a cleaning article impregnated with the detergent composition for hard surfaces or a washing liquid is used, the detergent composition for hard surfaces of the present invention or a washing liquid may be separately used while spraying it on the object to be cleaned or on the cleaning article. By this use method, a larger area can be cleaned.

[0074]

The present invention relates to a detergent article for hard surfaces obtained by filling the detergent composition for hard surfaces of the present invention in a spray container.

Examples of the spray-type container include a spray container having a trigger-type sprayer attached thereto (referred to as trigger-type spray container). Examples of the trigger-type spray container include a container including a container main body for containing the detergent composition for hard surfaces of the present invention and a trigger-type liquid jetting unit attached to an opening of the container main body, and, as a further example, a spray container in which a trigger-type sprayer for jetting the composition is attached to an opening of a container main body, a vertical conduit and a horizontal conduit are formed inside the trigger-type sprayer, and a valve for blocking communication between the vertical conduit and the horizontal conduit is provided in the vertical conduit (hereinafter,

referred to as spray container (I)). The volume of the horizontal conduit in the spray container (I) is preferably 0.1 to 0.28 cm³, and the volume of the vertical conduit under the valve is preferably 0.06 to 0.19 cm³. The spray container (I) includes a cylinder at a position below the horizontal conduit, in addition, a spin element is attached to a tip end of the horizontal conduit, and further a nozzle unit having a nozzle aperture is securely fixed to a tip end of the spin element. The spray container (I) is a container of a type in which a trigger is pulled to exhaust air in the cylinder to the outside; when the trigger is gotten back, the detergent composition for hard surfaces of the present invention is sucked through the vertical conduit immersed in the composition of the container main body, and the cylinder is filled with the liquid; and when the trigger is pulled again, the liquid in the cylinder is pushed out and guided to the vertical conduit, further through the horizontal conduit and the spin element, the liquid flow is given a spin, and finally the liquid jets out from the nozzle. As the trigger-type spray container, for example, a trigger-type spray container of the "*Basu Magikkurin Awadachi Supure* (Bath Magiclean Forming Spray)" (Kao Corporation) which is washed and dried can be used.

In the method for washing a floor of the present invention, it is preferred that the detergent composition for

hard surfaces of the present invention is sprayed with a spray and deposited on a floor. As the spray, the detergent article for hard surfaces of the present invention is preferably used.

[0075]

The present invention relates to a use of a composition containing (a) ethanol in an amount of 5% by mass or more and 23% by mass or less, (b) a polyether-modified silicone, (c) a surfactant, and water as a detergent composition for hard surfaces. That is, the present invention relates to a use of a composition having a composition and mode described in the detergent composition for hard surfaces of the present invention as a detergent composition for hard surfaces. In the composition used for the use, the matters described in the detergent composition for hard surfaces of the present invention can be entirely applied.

[0076]

Regarding the foregoing embodiments, the present invention further discloses the following detergent compositions for hard surfaces, detergent articles for hard surfaces, and methods for washing a floor.

[0077]

<1>

A detergent composition for hard surfaces, containing (a) ethanol [hereinafter, referred to as component (a)] in an amount of 5% by mass or more and 23% by mass or less, (b)

a polyether-modified silicone [hereinafter, referred to as component (b)], (c) a surfactant [hereinafter, referred to as component (c)], and water.

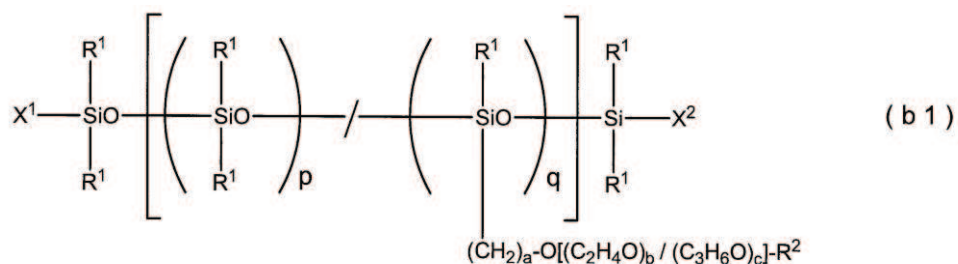
[0078]

<2>

The detergent composition for hard surfaces according to the above <1>, wherein component (b) is a compound represented by the following general formula (b1):

[0079]

[Chem. 5]



[0080]

wherein, R¹s may be the same or different, and each represent an alkyl group having 1 or more and 4 or less carbon atoms; p represents a number of 0 or more and 1000 or less, and q represents a number of 1 or more and 1000 or less; X¹ and X² may be the same or different, and each represent a hydroxy group, or an alkyl group or an alkoxy group having 1 or more and 4 or less carbon atoms; R² represents a hydrogen atom, an alkyl group having 1 or more and 4 or less carbon atoms, or an acyl group having 2 or more and 4 or less carbon

atoms; a represents a number of 1 or more and 4 or less, b represents a number of 1 or more and 100 or less, and c represents a number of 0 or more and 50 or less; and / indicates that the constituting units with p and q, and the constituting units with b and c may be in a random form or a block form.

[0081]

<3>

The detergent composition for hard surfaces according to the above <2>, wherein the compound represented by (b1) has an HLB value of preferably 4 or more, more preferably 6 or more, further preferably 8 or more, and furthermore preferably 10.5 or more, and preferably 20 or less, more preferably 18 or less, further preferably 16 or less, furthermore preferably 15 or less, and furthermore preferably 14.5 or less.

[0082]

<4>

The detergent composition for hard surfaces according to any one of the above <1> to <3>, wherein component (b) has a kinematic viscosity (mm²/s) of preferably 1 or more, more preferably 5 or more, and further preferably 10 or more, and preferably 1500 or less, more preferably 1000 or less, further preferably 500 or less, and furthermore preferably 100 or less.

[0083]

<5>

The detergent composition for hard surfaces according to any one of the above <1> to <4>, wherein component (c) is one or more surfactants selected from a nonionic surfactant, an anionic surfactant, an amphoteric surfactant, and a cationic surfactant, and preferably one or more surfactants selected from a nonionic surfactant, an anionic surfactant, and an amphoteric surfactant.

[0084]

<6>

The detergent composition for hard surfaces according to any one of the above <1> to <5>, which contains, as component (c), one or more surfactants selected from a nonionic surfactant, an anionic surfactant, and an amphoteric surfactant, preferably one or more selected from nonionic surfactants, and more preferably a glycoside-type nonionic surfactant.

[0085]

<7>

The detergent composition for hard surfaces according to the above <5> or <6>, wherein the nonionic surfactant is one or more nonionic surfactants selected from (1) polyoxyalkylene mono-alkyl or alkenyl ethers, (2) glycoside-type nonionic surfactants, (3) fatty acid alkanol amides, (4) sorbitan-based nonionic surfactants, (5) alkyl

monoglyceryl ethers, (6) fatty acid glycerol monoesters, (7) sucrose fatty acid esters, and (8) amine oxides, preferably one or more nonionic surfactants selected from (1) polyoxyalkylene mono-alkyl or alkenyl ethers, (2) glycoside-type nonionic surfactants, and (8) amine oxides, more preferably one or more nonionic surfactants selected from (1) polyoxyalkylene mono-alkyl or alkenyl ethers and (2) glycoside-type nonionic surfactants, and further preferably (2) glycoside-type nonionic surfactants.

[0086]

<8>

The detergent composition for hard surfaces according to the above <7>, wherein the alkyl group or alkenyl group in the polyoxyalkylene mono-alkyl or alkenyl ether has a carbon number of 6 or more, preferably 8 or more, more preferably 10 or more, and further preferably 12 or more, and 22 or less, preferably 18 or less, more preferably 16 or less, further preferably 14 or less.

[0087]

<9>

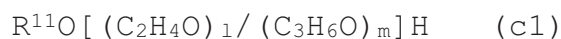
The detergent composition for hard surfaces according to the above <7> or <8>, wherein the polyoxyalkylene mono-alkyl or alkenyl ether has an average number of moles of added alkylene oxide of more than 0, preferably 1 or more, more preferably 3 or more, and further preferably 5 or more,

and 50 or less, preferably 30 or less, more preferably 20 or less, and further preferably 15 or less.

[0088]

<10>

The detergent composition for hard surfaces according to the above <7>, wherein the polyoxyalkylene mono-alkyl or alkenyl ether is a nonionic surfactant represented by the following general formula (c1)



wherein, R^{11} represents a hydrocarbon group having 6 or more and 22 or less carbon atoms; l and m represent an average number of added moles, l represents a number of 0 or more and 30 or less, m represents a number of 0 or more and 30 or less, and l and m are not simultaneously 0; and "/" indicates that the ethyleneoxy group and the propyleneoxy group may be added either in a random or block form regardless of the order thereof.

[0089]

<11>

The detergent composition for hard surfaces according to any one of the above <7> to <10>, wherein the polyoxyalkylene mono-alkyl or alkenyl ether has an HLB value of 5 or more, preferably 7 or more, and more preferably 10 or more, and 20 or less, preferably 18 or less, and more preferably 16 or less.

[0090]

<12>

The detergent composition for hard surfaces according to the above <7>, wherein the glycoside-type nonionic surfactant is a nonionic surfactant represented by the following general formula (c2).



wherein, R^{21} is a linear or branched alkyl group or alkenyl group having 6 or more and 18 or less carbon atoms, or an alkylphenyl group, and preferably an alkyl group; R^{22} represents an alkylene group having 2 or more and 4 or less carbon atoms, and G is a residue derived from a reducing sugar having 5 or 6 carbon atoms; x represents an average number of added moles, and is 0 or more and 5 or less; and y represents numbers having an average of 1 or more and 5 or less.

[0091]

<13>

The detergent composition for hard surfaces according to the above <5> or <6>, wherein the anionic surfactant is an anionic surfactant having a polyoxyalkylene group, preferably one or more selected from a polyoxyalkylene alkyl ether sulfate salt, a polyoxyalkylene alkenyl ether sulfate salt, a polyoxyalkylene alkylaryl ether sulfate salt, a polyoxyalkylene alkenylaryl ether sulfate salt, a polyoxyalkylene alkyl ether carboxylate salt, and a

polyoxyalkylene alkenyl ether carboxylate salt, more preferably one or more selected from a polyoxyalkylene alkyl ether sulfate salt, a polyoxyalkylene alkenyl ether sulfate salt, and a polyoxyalkylene alkyl ether carboxylate salt, further preferably a polyoxyalkylene alkyl ether sulfate salt, or an alkylsulfate salt, an alkylsulfate salt in which the alkyl group has 10 or more and 14 or less carbon atoms.

[0092]

<14>

The detergent composition for hard surfaces according to the above <5> or <6>, wherein the amphoteric surfactant is one or more selected from
alkylamidepropyl-N,N-dimethylacetic acid betaine,
alkylamidepropyl-N,N-dimethyl-2-hydroxypropyl sulfobetaine,
and alkylamidepropyl-N,N-dimethyl-propyl sulfobetaine,
preferably one or more selected from
lauramidepropyl-N,N-dimethylacetic acid betaine,
hydroxylauryl sulfobetaine, and
lauramidepropyl-N,N-dimethyl-2-hydroxypropylbetaine, and
more preferably hydroxylauryl sulfobetaine.

[0093]

<15>

The detergent composition for hard surfaces according to any one of the above <1> to <14>, wherein component (a) is contained in an amount of 6% by mass or more, preferably

8% by mass or more, and more preferably 10% by mass or more, and 20% by mass or less, preferably 18% by mass or less, and more preferably 15% by mass or less.

[0094]

<16>

The detergent composition for hard surfaces according to any one of the above <1> to <15>, wherein component (b) is contained in an amount of preferably 0.0008% by mass or more, more preferably 0.001% by mass or more, and further preferably 0.003% by mass or more, and preferably 3% by mass or less, more preferably 0.8% by mass or less, further preferably 0.5% by mass or less, furthermore preferably 0.1% by mass or less, furthermore preferably 0.08% by mass or less, furthermore preferably 0.05% by mass or less, and furthermore preferably 0.03% by mass or less.

[0095]

<17>

The detergent composition for hard surfaces according to any one of the above <1> to <16>, wherein component (c) is contained in an amount of 0.005% by mass or more, preferably 0.008% by mass or more, more preferably 0.01% by mass or more, and further preferably 0.05% by mass or more, and 5% by mass or less, preferably 3% by mass or less, more preferably 1% by mass or less, further preferably 0.8% by mass or less, and furthermore preferably 0.5% by mass or less.

[0096]

<18>

The detergent composition for hard surfaces according to any one of the above <1> to <17>, wherein a mass ratio of component (a) to component (b), $(a)/(b)$, is 20 or more, preferably 50 or more, more preferably 100 or more, further preferably 300 or more, furthermore preferably 500 or more, and furthermore preferably 800 or more, and 20000 or less, preferably 15000 or less, more preferably 10000 or less, and further preferably 6000 or less.

[0097]

<19>

The detergent composition for hard surfaces according to any one of the above <1> to <18>, wherein a mass ratio of component (b) to component (c), $(b)/(c)$, is 0.001 or more, preferably 0.003 or more, more preferably 0.005 or more, further preferably 0.01 or more, and furthermore preferably 0.03 or more, and 10 or less, preferably 5 or less, more preferably 1 or less, and further preferably 0.5 or less.

[0098]

<20>

The detergent composition for hard surfaces according to any one of the above <1> to <18>, which contains, as component (c), a nonionic surfactant, and a mass ratio of component (b) to the nonionic surfactant, $(b)/(\text{nonionic})$

surfactant), is 0.001 or more, preferably 0.003 or more, more preferably 0.005 or more, further preferably 0.01 or more, and furthermore preferably 0.03 or more, and 10 or less, preferably 5 or less, more preferably 1 or less, and further preferably 0.5 or less.

[0099]

<21>

The detergent composition for hard surfaces according to any one of the above <1> to <18>, which contains a glycoside-type nonionic surfactant as component (c), and a mass ratio of component (b) to the glycoside-type nonionic surfactant, $(b)/(\text{glycoside-type nonionic surfactant})$, is 0.001 or more, preferably 0.003 or more, more preferably 0.005 or more, further preferably 0.01 or more, and furthermore preferably 0.03 or more, and 10 or less, preferably 5 or less, more preferably 1 or less, and further preferably 0.5 or less.

[0100]

<22>

The detergent composition for hard surfaces according to any one of the above <1> to <21>, wherein water is contained in an amount of 75% by mass or more, preferably 80% by mass or more, more preferably 82% by mass or more, and further preferably 84% by mass or more, and 94.8% by mass or less, preferably 94% by mass or less, more preferably 92% by mass or less, and further preferably 90% by mass or less.

[0101]

<23>

The detergent composition for hard surfaces according to any one of the above <1> to <22>, wherein a pH at 20°C is 5 or more, preferably 6 or more, and more preferably 6.5 or more, and 8 or less, and preferably 7.5 or less.

[0102]

<24>

The detergent composition for hard surfaces according to any one of the above <1> to <23>, for use in wipe-washing.

[0103]

<25>

The detergent composition for hard surfaces according to any one of the above <1> to <24>, wherein the hard surface is a hard surface made of one or more materials selected from a ceramic, a plastic, a wood, a stone, and a metal.

[0104]

<26>

A method for washing a floor, including depositing the detergent composition for hard surfaces according to any one of the above <1> to <25> on the floor and then wiping off the composition.

[0105]

<27>

The method for washing a floor according to the above

<26>, wherein the detergent composition for hard surfaces is deposited on the floor, and then the composition is wiped off with a dishcloth, a floorcloth, a nonwoven fabric, a mop, or a paper.

[0106]

<28>

The method for washing a floor according to the above <26> or <27>, wherein the detergent composition for hard surfaces is deposited on the floor as a washing liquid in which the detergent composition is diluted in water at 10 times or more, and preferably 50 times or more, and 200 times or less, and preferably 150 times or less.

[0107]

<29>

The method for washing a floor according to any one of the above <26> to <28>, wherein the detergent composition for hard surfaces is deposited on the floor in an amount of 0.5 g or more and preferably 1 g or more, and 50 g or less and preferably 20 g or less, per m² floor area.

[0108]

<30>

The method for washing a floor according to any one of to the above <26> to <29>, wherein the detergent composition for hard surfaces is deposited on the floor by spraying.

[0109]

<31>

The method for washing a floor according to any one of the above <26> to <30>, wherein the detergent composition for hard surfaces is deposited on the floor, then allowed to stand for 60 seconds or less, and preferably 30 seconds or less, and then the composition is wiped off.

[0110]

<32>

The method for washing a floor according to any one of the above <26> to <31>, wherein the detergent composition for hard surfaces is deposited on a floor by spraying with a spray.

[0111]

<33>

A detergent article for hard surfaces, containing the detergent composition for hard surfaces according to any one of the above <1> to <25> filled in a spray container.

[0112]

<34>

The detergent article for hard surfaces according to the above <33>, wherein the spray-type container is a spray container having a trigger-type sprayer attached thereto.

[0113]

<35>

A method for reducing wiping lines on a ceramic tile floor, including using the detergent composition for hard

surfaces according to any one of the above <1> to <25>.

[0114]

<36>

A method for reducing wiping lines on a ceramic tile floor after washing, including washing the ceramic tile floor using a detergent composition and then wiping off the detergent composition, wherein the detergent composition for hard surfaces according to any one of <1> to <25> is used as the detergent composition.

[0115]

<37>

The method for reducing wiping lines according to the above <35> or <36>, wherein the detergent composition for hard surfaces is deposited on the floor, and then the composition is wiped off with a dishcloth, a floorcloth, a nonwoven fabric, a mop, or a paper.

[0116]

<38>

The method for reducing wiping lines according to any one of the above <35> to <37>, wherein the detergent composition for hard surfaces is deposited on the floor as a washing liquid in which the detergent composition is diluted in water at 10 times or more, and preferably at 50 times or more, and at 200 times or less, and preferably at 150 times or less.

[0117]

<39>

The method for reducing wiping lines according to any one of the above <35> to <38>, wherein the detergent composition for hard surfaces is deposited on the floor in an amount of 0.5 g or more and preferably 1 g or more, and 50 g or less and preferably 20 g or less, per m² floor area.

[0118]

<40>

The method for reducing wiping lines according to any one of the above <35> to <39>, wherein the detergent composition for hard surfaces is deposited on the ceramic tile floor by spraying.

[0119]

<41>

The method for reducing wiping lines according to any one of the above <35> to <40>, wherein the detergent composition for hard surfaces is deposited on the ceramic tile floor, then allowed to stand for 60 seconds or less, and preferably 30 seconds or less, and then the composition is wiped off.

[0120]

<42>

The method for reducing wiping lines according to any one of the above <35> to <41>, wherein the detergent

composition for hard surfaces is deposited on the ceramic tile floor by spraying with a spray.

[0121]

<43>

Use of the composition according to any one of claims 1 to 23 as a detergent composition for hard surfaces.

[0122]

<43>

Use of a composition including (a) ethanol in an amount of 5% by mass or more and 23% by mass or less, (b) a polyether-modified silicone, (c) a surfactant, and water, as a detergent composition for hard surfaces.

[0123]

<44>

Use of an article obtained by filling the detergent composition for hard surfaces according to any one of <1> to <25> in a spray container, as a detergent article for hard surfaces.

[0124]

<45>

The use according to <44>, wherein the spray-type container is a spray container having a trigger-type sprayer attached thereto.

[0125]

Examples

Hereinunder, examples of the present invention are shown. The examples are intended to exemplify the present invention, and not intended to limit the present invention.
[0126]

Examples 1 to 18 and Comparative Examples 1 to 4

Detergent compositions for hard surfaces shown in Table 1 were prepared, and evaluated for the following items. The results are shown in Table 1. Incidentally, pH adjustment (20°C) of the compositions was performed using sodium hydroxide and hydrochloric acid.

[0127]

<Evaluation methods>

(1) Detergency

On a porcelain tile (manufacturer: Foshan XiangYu Ceramic Co., Ltd., product name: POLISHED PORCELAIN TILE, grade: Premium, color: white, size 100 mm × 100 mm), 0.5 g of oleic acid (manufactured by Wako Pure Chemical Industries, Ltd., Grade 1) colored by adding Sudan III (manufactured by Wako Pure Chemical Industries, Ltd., Grade 1) so as to give a concentration of 0.05% by mass is added dropwise as model dirt (about 1 cm²). 2 g of each of the detergent compositions for hard surfaces shown in table 1 was deposited in uniform contact with the area over and around the model dirt.

A paper wiper (manufactured by Daio Paper Corporation, ProWipe Soft Wiper S200, size: 195 mm × 125 mm) was folded

4 times (size: about 24 mm × 63 mm), and this was brought into contact with the center of the model dirt. While pushing the folded paper wiper with a second finger and a first finger of an adult man, the model dirt was subjected to wipe-cleaning so as to draw a circle of about 50 mm diameter around the model dirt under a load of 1 ± 0.1 kg 10 times. After the wipe-cleaning, the extent of the residual dirt after drying was visually observed, and determined according to the following determination criteria.

5 points: the dirt being mostly removed

4 points: a level with a colored area remaining very slightly but is not at all noticeable

3 points: a level with a colored area remaining slightly but is not noticeable

2 points: a colored area remaining much

1 point: the dirt being not removed at all

[0128]

(2) Finishing property of washed surface (presence or absence of wiping lines)

A paper wiper (manufactured by Daio Paper Corporation, ProWipe Soft Towel 4P, size: 405 mm × 315 mm) was cut into a size of 30 mm × 100 mm to prepare a paper strip.

The paper strip was placed on a porcelain tile (manufacturer: Foshan XiangYu Ceramic Co., Ltd., product name: POLISHED PORCELAIN TILE, grade: Premium, color: black,

size: 100 mm × 100 mm) with one side of the tile matched with a longitudinal side of the paper strip.

The paper strip was impregnated with 1 g of each of the detergent compositions for hard surfaces shown in Table 1, a load tile of 100 g having the same size as the paper strip (30 mm × 100 mm) was placed thereon, the load tile was moved over 3 seconds by pulling the load tile together with the paper strip toward the opposite side of the porcelain tile. After that, the load tile and the paper strip were removed, and finishing property on the tile surface after drying was visually observed and determined according to the following determination criteria.

5 points: a level with almost no wiping line

4 points: a level with wiping lines remaining very slightly but is not at all noticeable

3 points: a level with wiping lines remaining slightly but is not noticeable

2 points: a level with many wiping lines remaining

1 point: a level with wiping lines remaining throughout the surface

[0129]

[Table 1]

Detergent composition for hard surfaces																		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								
(a)	Ethanol	12	12	12	12	12	12	12	12	6	18	12	12	12	12	12	12	12	12	12	3	25	12								
	Polyether-modified silicone 1	0.01	0.01	0.01						0.01	0.01	0	0.3	0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01									
	Polyether-modified silicone 2				0.01																										
	Polyether-modified silicone 3				0.01																										
	Polyether-modified silicone 4					0.01																									
	Polyether-modified silicone 5						0.01																								
	Polyether-modified silicone 6							0.01																							
	Cyclic silicone																			0.01											
	Anion-modified silicone																							0.01							
	Nonionic surfactant 1	0.1			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8	0.01	0.01	3			0.1	0.1	0.1	0.1								
(b)	Nonionic surfactant 2		0.1																												
	Nonionic surfactant 3			0.1																											
	Amphoteric surfactant																	0.1													
	Anionic surfactant																		0.1												
(c)	Ion exchange water	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance								
	Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100								
	pH (20°C)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0								
	(a)/(b) (mass ratio)	1200	1200	1200	1200	1200	1200	1200	1200	600	1800	4000	40	1200	1200	1200	1200	1200	1200	1200	1200	300	2500								
(d)	(b)/(c) (mass ratio)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.03	3	0.013	1	1.25	0.003	0.1	0.1	0.1	0.1	0.1	0.1								
	Detergency	5	5	5	5	5	5	5	5	5	5	5	5	5	4	3	5	4	5	4	5	5	5								
Finishing property (wiping lines)		5	3	3	4	3	4	3	4	4	4	5	3	4	4	4	4	3	3	3	1	2	2								

[0130]

The components in the table are as described below.

Component (a)

· Ethanol: manufactured by Wako Pure Chemical Industries, Ltd.,
Grade 1
[0131]

Component (b)

· Polyether-modified silicone 1: PEG6 methyl ether
dimethicone [polyether-modified silicone in which in the
general formula (b1), R^2 is a methyl group and b is 6],
manufactured by Shin-Etsu Chemical Co., Ltd., KF618, HLB 11
(catalogue value), kinematic viscosity 20 mm²/s

· Polyether-modified silicone 2: PEG11 methyl ether
dimethicone [polyether-modified silicone in which in the
general formula (b1), R^2 is a methyl group and b is 11],
manufactured by Shin-Etsu Chemical Co. Ltd., KF6011, HLB 12
(catalogue value), kinematic viscosity 130 mm²/s

· Polyether-modified silicone 3: PEG9 methyl ether
dimethicone [polyether-modified silicone in which in the
general formula (b1), R^2 is a methyl group and b is 9],
manufactured by Shin-Etsu Chemical Co., Ltd., KF6016, HLB 4.5
(catalogue value), kinematic viscosity 150 mm²/s

· Polyether-modified silicone 4: PEG/PPG-27/9 butyl ether
dimethicone [polyether-modified silicone in which in the
general formula (b1), R^2 is a butyl group, b is 27, and c is
9], manufactured by Shin-Etsu Chemical Co., Ltd., KF615A, HLB
10 (catalogue value), kinematic viscosity 920 mm²/s

· Polyether-modified silicone 5: PEG/PPG-20/22 butyl ether dimethicone [polyether-modified silicone in which in the general formula (b1), R^2 is a butyl group, b is 20, and c is 22], manufactured by Shin-Etsu Chemical Co., Ltd., KF6012, HLB 7 (catalogue value), kinematic viscosity 1500 mm²/s

· Polyether-modified silicone 6: PEG10 dimethicone [polyether-modified silicone in which in the general formula (b1), R^2 is a hydrogen atom and b is 10], manufactured by Shin-Etsu Chemical Co., Ltd., KF6043, HLB 15 (catalogue value), kinematic viscosity 400 mm²/s

Incidentally, the viscosity of component (b) is a kinematic viscosity measured at 25°C by an Ubbelohde viscometer (manufactured by Sibata Scientific Technology, Ltd.).

[0132]

Component (b') (Comparative Components of component (b))

· Cyclic silicone: cyclopentasiloxane, manufactured by Shin-Etsu Chemical Co., Ltd., KF995, non-polyether-modified silicone, kinematic viscosity 4 mm²/s

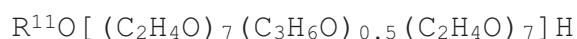
· Anion-modified silicone: carboxy group-containing modified silicone (manufactured by Shin-Etsu Chemical Co., Ltd., X-22-3701E, kinematic viscosity 2,000 mm²/s, functional group equivalent: 4,000 g/mol)

[0133]

Component (c)

· Nonionic surfactant 1: alkyl polyglycoside [nonionic surfactant in which in the general formula (c2), R^{21} is a linear alkyl group having 6 or more and 16 or less carbon atoms, x is 0, G is a residue derived from glucose, and y is 1.1], manufactured by BASF, Plantacare 2000UP

· Nonionic surfactant 2: polyoxyalkylene alkyl ether [nonionic surfactant in which in the general formula (c1), R^{11} is a linear primary alkyl group having 12 or more and 14 or less carbon atoms, l is 14, and m is 0.5, and having the following structure], HLB 15.3



· Nonionic surfactant 3: polyoxyethylene alkyl ether [nonionic surfactant in which in the general formula (c1), R^{11} is a branched secondary alkyl group having 12 or more and 14 or less carbon atoms, l is 7, and m is 0], manufactured by Nippon Shokubai, Co. Ltd., Softanol 70H, HLB 12.1

· Amphoteric surfactant: lauramidepropyl betaine, manufactured by Kao Corporation, Anhitol 20AB

· Anionic surfactant: sodium dodecylsulfate, manufactured by Wako Pure Chemical Industries, Ltd., Wako grade 1

[0134]

(Consideration)

It is found from Table 1 that Examples 1 to 18 of the present invention can achieve both the detergency and the finishing property, as compared with Comparative Examples 1

to 4.

In comparison of Examples 1 and 4 to 8 with Comparative Examples 1 and 4, it is found that Examples 1 and 4 to 8 using a polyether-modified silicone of component (b) as a silicone compound are superior in the finishing property.

In comparison among Examples 1 and 4 to 8, it is found that Example 1 using polyether-modified silicone 1 having a HLB of 11 and a kinematic viscosity of 20 mm²/s as the polyether-modified silicone of component (b) is superior in the finishing property.

In comparison among Examples 1 to 3, 17, and 18, it is found that Example 1 using, as component (c), a nonionic surfactant 1 which is a glycoside-type nonionic surfactant is superior in the finishing property.

In comparison among Examples 1, 9, 10, Comparative Examples 2, and 3, it is found that Example 1 in which the content of component (a) is 12 % by mass is superior in the finishing property.

In comparison among Examples 1, 11, and 12, it is found that Example 1 and Example 11 having a content of component (b) of 0.01 % by mass and 0.003% by mass, respectively, are superior in the finishing property.

In comparison among Examples 1 and 13 to 16, it is found that Example 1 having a content of component (c) of 0.1% by mass is superior in the finishing property.

In comparison among Examples 1, 11, and 12 in which the contents of component (a) and component (c) are the same and a mass ratio (a)/(b) is different, it is found that Example 1 and Example 11 having the mass ratio (a)/(b) of 1200 and 4000, respectively, are superior in the detergency and the finishing property.

In comparison among Examples 1 and 13 to 16 in which the contents of component (a) and component (b) are the same and a mass ratio (b)/(c) is different, it is found that Example 1 having the mass ratio (b)/(c) of 0.1 is superior in the detergency and the finishing property.

[0135]

Examples 19

On a floor in a living room in an ordinary home (of a family of four), a porcelain tile (manufacturer: Foshan XiangYu Ceramic Co., Ltd., product name: POLISHED PORCELAIN TILE, grade: Premium, color: black, size: 60 mm × 60 mm) was placed for 3 days, and all the family members ran on the floor with bare feet ten times a day for 3 days, whereby two dirty tiles were prepared.

The detergent composition for hard surfaces of Example 1 shown in Table 1 was filled in a trigger-type spray container of the "*Basu Magikkurin Awadachi Supurei* (Bath Magiclean Forming Spray)" (manufactured by Kao Corporation). The jet opening was set to the "*Hiroi Awa* (wide foam)," and the

composition was sprayed 5 times per tile (jet amount: 4.5 g). Immediately after the spraying, the tile was subjected to reciprocating cleaning 6 times with a mop (attached mop: Tsukihoshi mop refile threads, standard: 24 cm #190, manufactured by MIYAKO CO., LTD.), and the finishing property (presence or absence of wiping lines) after drying was determined according to the aforementioned determination criteria. The results were as follows.

- Example 19 (the composition of Example 1): 5 points

CLAIMS

1. A detergent composition for hard surfaces, comprising (a) ethanol [hereinafter, referred to as component (a)] in an amount of 5% by mass or more and 23% by mass or less, (b) a polyether-modified silicone [hereinafter, referred to as component (b)], (c) a surfactant [hereinafter, referred to as component (c)], and water.

2. The detergent composition for hard surfaces according to claim 1, which contains a nonionic surfactant as component (c).

3. The detergent composition for hard surfaces according to claim 2, wherein the nonionic surfactant is one or more selected from polyoxyalkylene alkyl or alkenyl ethers and alkyl polyglycosides.

4. The detergent composition for hard surfaces according to any one of claims 1 to 3, wherein a mass ratio of component (b) to component (c), $(b)/(c)$, is 0.001 or more and 10 or less.

5. The detergent composition for hard surfaces according to any one of claims 1 to 4, wherein a mass ratio of component (a) to component (b), $(a)/(b)$, is 20 or more and 20000 or less.

6. The detergent composition for hard surfaces according to any one of claims 1 to 5, wherein component (b) is contained in an amount of 0.0008% by mass or more and 3% by mass or less.

7. The detergent composition for hard surfaces according to any one of claims 1 to 6, wherein component (c) is contained in an amount of 0.005% by mass or more and 5% by mass or less.

8. The detergent composition for hard surfaces according to any one of claims 1 to 7, for use in wipe-washing.

9. A detergent article for hard surfaces, comprising the detergent composition for hard surfaces according to any one of claims 1 to 8 filled in a spray container.

10. A method for washing a floor, comprising depositing the detergent composition for hard surfaces according to any one of claims 1 to 8 on the floor, and then wiping off the composition.

11. The method for washing a floor according to claim 10, wherein the detergent composition for hard surfaces is deposited on the floor by spraying with a spray.

12. A method for reducing wiping lines on a ceramic tile floor, comprising using the detergent composition for hard surfaces according to any one of claims 1 to 8.