DESCRIPTION

Title of the Invention: BLEACHING DETERGENT COMPOSITION AND METHOD FOR BLEACH-CLEANING MOLD STAINS

Field of the Invention

[0001]

The present invention relates to a bleaching detergent composition and a method for bleach-cleaning mold stains.

Background of the Invention

[0002]

In household water-related facilities such as bathrooms, toilets, and kitchens, water splashes from faucets or showers during use. As a result, water droplets adhere to facility surfaces and keep the surfaces wet, thereby creating environments favorable for bacterial and mold growth. In particular, since mold stains are difficult to sufficiently remove with detergents composed mainly of surfactants, chelating agents, abrasives, and the like, bleaching compositions containing hypochlorite are commonly used against mold stains.

Since such bleaching compositions are used on various hard surfaces including not only horizontal surfaces but also vertical surfaces, inclined surfaces,

and the like, various product forms, such as foam spray-type products using trigger sprayers and gel-type products containing thickened compositions, have been investigated for improving the adhesion and retention of bleaching components on such surfaces.

[0003]

JP-A 2013-67806 discloses a chlorine-based bleaching composition containing (b) an alkali metal oxide and (c) a specific water-soluble solvent, and the Examples disclose that compositions further containing a specific cationic surfactant exhibit superior effects against mold growing on silicone resin-based sealant.

JP-A 2003-277796 discloses a bleaching composition containing (c) a tertiary amine oxide and (d) an n-octyl sulfate, wherein the contents of components (c) and (d) and the mass ratio of component (c) to component (d) are controlled within specified ranges such that the composition exhibits excellent thickening ability, storage stability, and viscosity controllability.

JP-A 2007-137930 discloses a thickened bleaching composition containing an organic thickener, an alkaline agent, a sulfonic acid compound, and an alkali metal salt thereof, wherein the viscosity at 25°C is controlled to be 1,000 to 10,000 mPa·s such that the composition exhibits excellent storage stability, bleaching ability, ability to adhere to surfaces, and rinsability.

EP-A 0298172 discloses a technique for thickening a bleach composition using a viscoelastic surfactant comprising a hexadecyltrimethylammonium ion having 16 carbons as a surfactant ion and a p-toluenesulfonate ion as an organic counterion, wherein the surfactant ion and the organic counterion associate in sodium hypochlorite to form the viscoelastic surfactant. The literature further discloses that the bleach composition exhibits bleach stability, phase stability, and viscosity stability at acceptable levels over a long period of time, and that the composition, in product form, can be employed as non-misting sprays and liquid streams that adhere to vertical surfaces without substantial dripping and can be applied to various substrates using a dispensing device.

[0004]

Conventional chlorine-based bleaching agents exhibit sufficient effectiveness against mold stains adhering to tiles and joints. However, in recent years, there has been an increasing number of cases in which mold grows on silicone resin-based sealant used for joints in walls, bathtubs, and the like, and it has been difficult for such agents to bleach or clean mold formed on such resin portions.

The liquid bleaching detergent composition of JP-A 2013-67806 exhibits excellent bleaching performance against mold growing on silicone resin-based sealant.

However, in recent years, further improvements in performance have been required.

As techniques for increasing the viscosity of compositions to 1,000 mPa·s or more, JP-A 2003-277796 discloses combined use of an amine oxide with another component, and JP-A 2007-137930 discloses use of an organic thickener. The thickening technique of EP-A 0298172 is intended for use in spray products using a dispensing device, and, from the viewpoint of ease of dispensing and the like, the target viscosity is 500 mPa·s or less, as measured at room temperature and a shear rate of 15.85 s^{-1}. However, these techniques have been found to be insufficient in terms of the recently required properties, namely, effects against mold formed on hydrophobic resin portions. Furthermore, compositions thickened to improve the ability to adhere to and remain on target objects are also required to have storage stability of the viscosity, that is, to maintain the viscosity during distribution, during storage at retail stores, and during household use. To date, no composition has been found that achieves both excellent bleaching effects against mold formed on hydrophobic resin portions and viscosity stability over time.

Summary of the Invention

[0005]

As a result of diligent study, the present inventors have found that, since resin materials such as silicone resin-based materials are hydrophobic, they create environments in which hydrophilic sodium hypochlorite has difficulty acting on mold present on the surface or interior thereof. Furthermore, the present inventors have discovered that, in order to solve this issue, it is important to achieve two objectives, namely, improvement in the retention of bleach-cleaning components on hydrophobic surfaces and improvement in the activity of bleach-cleaning components against mold, thereby leading to the present invention.

[0006]

An objective of the present invention is to provide a thickened bleaching detergent composition that provides further improvements over the prior arts. The bleaching detergent composition exhibits excellent ability to adhere to and remain on target objects, and has excellent bleach-cleaning performance in cleaning (decomposing and removing) mold stains occurring on hydrophobic resin portions such as portions made of silicone resin-based material, and in bleaching discoloration caused by mold on target objects. The composition further has excellent storage stability of the bleach-cleaning component and of the viscosity, whereby the effects thereof are maintained over a long period of time.

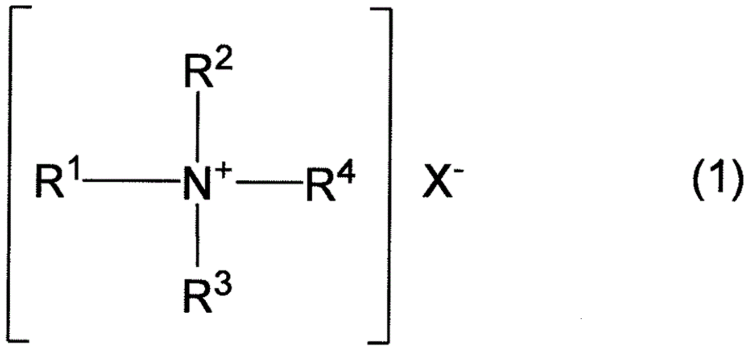
It should be noted that, as used herein, the term "bleach-cleaning" refers to both cleaning mold stains and bleaching discoloration caused by mold. Furthermore, such performance is referred to as "bleach-cleaning performance." For example, the mold removal rate described in paragraph [0142] may be used as an indicator of the bleach-cleaning performance. The mold removal rate encompasses, as effects of a mold remover, both the effect of cleaning mold stains and the effect of bleaching discoloration caused by mold.

[0007]

The present invention relates to a bleaching detergent composition comprising:

component (a): 0.1 mass% or more and 10 mass% or less of an alkali metal hypochlorite;

component (b): 0.1 mass% or more and 10 mass% or less of one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salts represented by the following general formula (1):



(1)

wherein R^1 represents a linear or branched alkyl group having 8 or more and 22 or less carbons; R^2 represents a linear or branched alkyl group having 1 or more and 12 or less carbons, or an aralkyl group having 7 or more and 12 or less carbons; R^3 and R^4 are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X^- represents a counter anion;

component (c): an aromatic sulfonic acid or a salt thereof;

component (d): an alkaline agent; and

water,

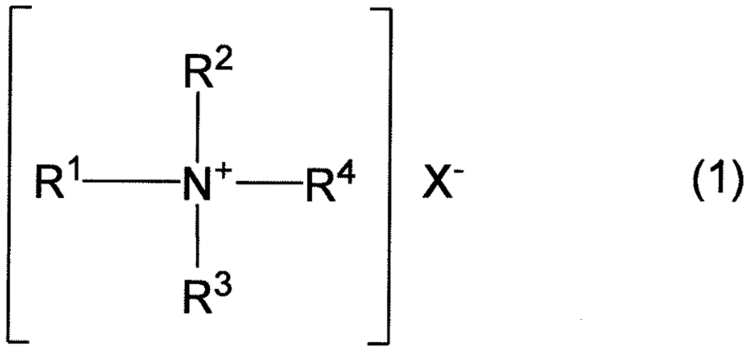
wherein the bleaching detergent composition has a viscosity at 25°C of 1,000 mPa·s or more and 100,000 mPa·s or less, and a 10 mass% aqueous solution of the bleaching detergent composition has a pH at 25°C of 11 or more and 14 or less.

Furthermore, the present invention relates to a method for bleach-cleaning mold stains, comprising bringing the bleaching detergent composition into contact with mold stains occurring on hydrophobic resin portions such as portions made of silicone resin-based sealant.

In addition, the present invention relates to a bleaching detergent composition comprising a mixture of:

component (a): 0.1 mass% or more and 10 mass% or less of an alkali metal hypochlorite;

component (b): 0.1 mass% or more and 10 mass% or less of one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salts represented by the following general formula (1):



(1)

wherein R^1 represents a linear or branched alkyl group having 8 or more and 22 or less carbons; R^2 represents a linear or branched alkyl group having 1 or more and 12 or less carbons, or an aralkyl group having 7 or more and 12 or less carbons; R^3 and R^4 are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X^- represents a counter anion;

component (c): an aromatic sulfonic acid or a salt thereof;

component (d): an alkaline agent; and

water,

wherein the bleaching detergent composition has a viscosity at 25°C of 1,000 mPa·s or more and 100,000 mPa·s or less, and a 10 mass% aqueous solution of the

bleaching detergent composition has a pH at 25°C of 11 or more and 14 or less.

[0008]

The bleaching detergent composition of the present invention has excellent bleach-cleaning performance against mold stains occurring on hydrophobic resin portions such as portions made of silicone resin-based material, and further has excellent storage stability of the bleach-cleaning component and of the viscosity, whereby the effects thereof can be maintained over a long period of time.

Brief Description of the Drawings

[0009]

[FIG. 1] FIG. 1 shows a dispensing container according to one embodiment of the present invention equipped with a sealing cap and a nozzle, the sealing cap being removed in the figure.

[FIG. 2] FIG. 2 shows a dispensing container according to one embodiment of the present invention equipped with a sealing cap and a nozzle, the sealing cap being attached in the figure.

Embodiments of the Invention

[0010]

First, the bleaching detergent composition of the present invention is described.

The bleaching detergent composition of the present invention comprises, as component (a), an alkali metal hypochlorite as a bleach-cleaning component. Examples of alkali metals include lithium, sodium, potassium, and the like. In terms of availability, sodium is preferred.

Sodium hypochlorite may be used in the form of an aqueous solution. From a production standpoint, the aqueous sodium hypochlorite solution may contain sodium chloride in an amount equimolar to sodium hypochlorite. In order to ensure storage stability while maintaining the bleach-cleaning performance of sodium hypochlorite, the content of sodium chloride is preferably low. Specifically, the content of sodium chloride relative to the content of sodium hypochlorite is suitably 10 mol% or more and 60 mol% or less, preferably 10 mol% or more and 40 mol% or less. Sodium hypochlorite having such a low sodium chloride content is commercially available as low-salt sodium hypochlorite. Furthermore, commercially available aqueous sodium hypochlorite solutions may contain alkali metal hydroxides added in advance for the purpose of ensuring storage stability.

A commercially available aqueous sodium hypochlorite solution may be blended into the bleaching detergent composition of the present invention.

[0011]

The bleaching detergent composition of the present invention is a composition formulated with the alkali

metal hypochlorite as component (a). The formulation amount of the alkali metal hypochlorite is the amount formulated at the time of production of the composition, expressed in terms of the active ingredient, and, as used herein, is regarded as corresponding to the content of the alkali metal hypochlorite in the composition.

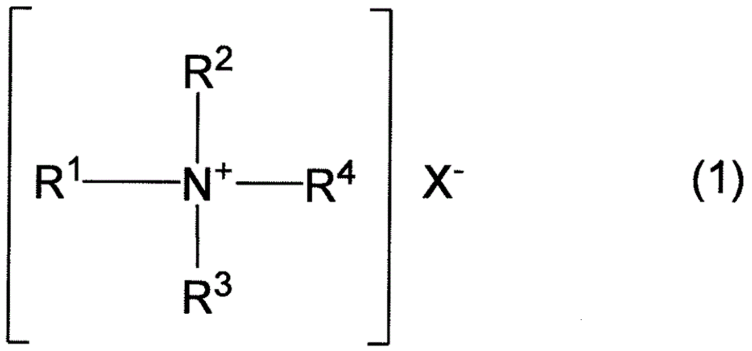
The content of the alkali metal hypochlorite in the total amount of the bleaching detergent composition is, from the viewpoint of improving bleach-cleaning performance, 0.1 mass% or more, preferably 0.5 mass% or more, more preferably 1 mass% or more, still more preferably 1.5 mass% or more, and, from the same viewpoint, 10 mass% or less, preferably 7.5 mass% or less, more preferably 5 mass% or less, still more preferably 3 mass% or less. In the present invention, the content of component (a) is a value obtained by measuring the effective chlorine concentration (Cl_2) by the method described in paragraph [0144] and converting the measured concentration into a value expressed in terms of sodium hypochlorite (NaOCl) on the basis of the formula weight of sodium hypochlorite.

[0012]

Next, a quaternary ammonium salt-type surfactant used as component (b) is described.

The bleaching detergent composition of the present invention comprises one or more quaternary ammonium salt-

type surfactants selected from quaternary ammonium salts represented by the following general formula (1):

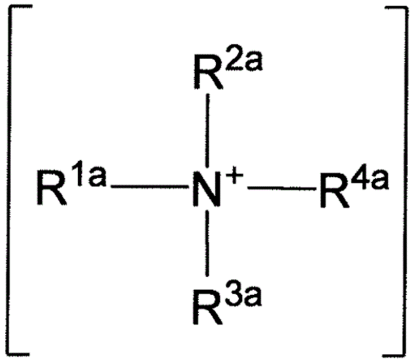


(1)

wherein R^1 represents a linear or branched alkyl group having 8 or more and 22 or less carbons; R^2 represents a linear or branched alkyl group having 1 or more and 12 or less carbons, or an aralkyl group having 7 or more and 12 or less carbons; R^3 and R^4 are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X^- represents a counter anion.

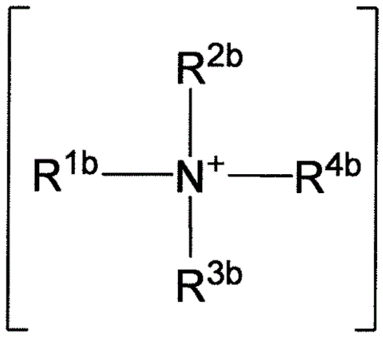
[0013]

Among these, from the viewpoint of improving bleach-cleaning performance against mold stains, one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salt-type surfactants represented by the following general formulas (1a) to (1c) are preferred:



(1a)

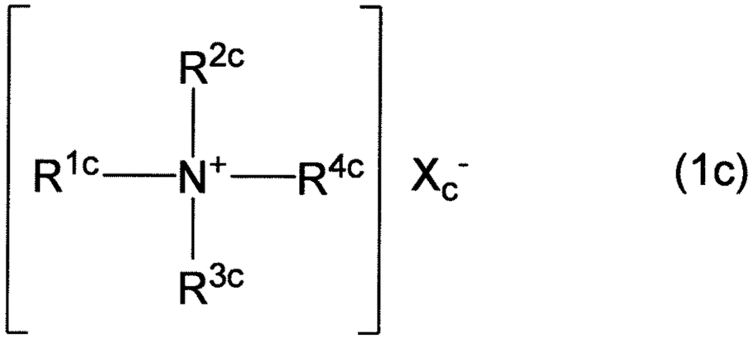
wherein R^{1a} represents a linear or branched alkyl or alkenyl group having 14 or more and 22 or less carbons; R^{2a}, R^{3a}, and R^{4a} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_a^- represents a counter anion;



(1b)

wherein R^{1b} and R^{2b} are the same or different and each represent a linear or branched alkyl or alkenyl group having 8 or more and 12 or less carbons; R^{3b} and R^{4b} are the same or different and each represent a linear or

branched alkyl group having 1 or more and 4 or less carbons; and X_b^- represents a counter anion;

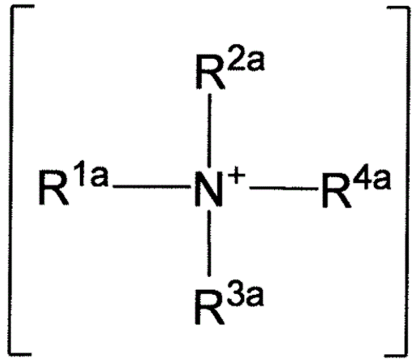


(1c)

wherein R^{1c} represents a linear or branched alkyl or alkenyl group having 8 or more and 18 or less carbons; R^{2c} represents an aralkyl group having 7 or more and 12 or less carbons; R^{3c} and R^{4c} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_c^- represents a counter anion.

[0014]

First, a quaternary ammonium salt-type surfactant represented by the following general formula (1a) is described.



(1a)

wherein R^{1a} represents a linear or branched alkyl or alkenyl group having 14 or more and 22 or less carbons; R^{2a}, R^{3a}, and R^{4a} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_a^- represents a counter anion.

[0015]

R^{1a} represents a linear or branched alkyl or alkenyl group having 14 or more and 22 or less carbons. From the viewpoint of improving bleach-cleaning performance, a linear alkyl group is preferred. Specific examples include a myristyl group (C14), a pentadecyl group (C15), a cetyl group (C16), a heptadecyl group (C17), a stearyl group (C18), a nonadecyl group (C19), an arachidyl group (C20), a henicosanyl group (C21), and a behenyl group (C22). Among these, from the viewpoints of improvement of bleach-cleaning performance and availability, one or more groups selected from a myristyl group (C14), a cetyl group (C16), and a stearyl group

(C18) are preferred, and one or more groups selected from a cetyl group and a stearyl group are more preferred.

[0016]

R^{2a}, R^{3a}, and R^{4a} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons. Specific examples include a methyl group, an ethyl group, a propyl group, a 1-methylethyl group, a butyl group, a 1-methylpropyl group, a 2-methylpropyl group, and a 1,1-dimethylethyl group. Among these, from the viewpoints of improvement of bleach-cleaning performance and availability, one or more groups selected from a methyl group and an ethyl group are preferred, and a methyl group is more preferred.

[0017]

X_a^- represents a counter anion. Examples of counter anions include inorganic anions such as a fluoride ion, a chloride ion, a bromide ion, an iodide ion, and a hydroxide ion, and organic anions such as a methyl sulfate ion, an ethyl sulfate ion, an acetate ion, and an acetylacetonate ion. From the viewpoint of availability, an inorganic anion is preferred, and a chloride ion is more preferred.

[0018]

Specific examples of compounds represented by the general formula (1a) include one or more compounds selected from myristyltrimethylammonium salts, cetyltrimethylammonium salts, and

stearyltrimethylammonium salts. The counter anion X_a^- of these salts may be a halide ion such as a chloride ion or a bromide ion, or an ethyl sulfate ion.

[0019]

The bleaching detergent composition may contain or be formulated with a single quaternary ammonium salt-type surfactant represented by the general formula (1a), or a combination of two or more quaternary ammonium salt-type surfactants represented by the general formula (1a). When two or more quaternary ammonium salt-type surfactants are used in combination, the mixing ratio (mass ratio) thereof is not limited.

[0020]

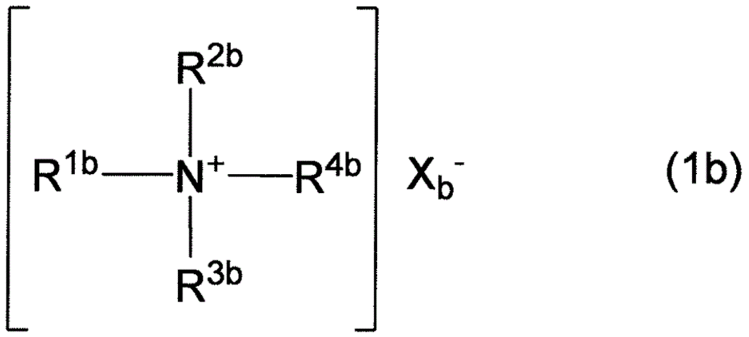
From the viewpoint of improving bleach-cleaning performance, the proportion of cetyltrimethylammonium salts and stearyltrimethylammonium salts among the quaternary ammonium salt-type surfactants represented by the general formula (1a) is preferably 50 mass% or more, more preferably 65 mass% or more, still more preferably 80 mass% or more, even more preferably 100 mass%.

[0021]

From the viewpoint of improving bleach-cleaning performance, a cetyltrimethylammonium salt and a stearyltrimethylammonium salt are preferably used in combination.

[0022]

Next, a quaternary ammonium salt-type surfactant represented by the following general formula (1b) is described.



(1b)

wherein R^{1b} and R^{2b} are the same or different and each represent a linear or branched alkyl or alkenyl group having 8 or more and 12 or less carbons; R^{3b} and R^{4b} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_b^- represents a counter anion.

[0023]

R^{1b} and R^{2b} are the same or different and each represent a linear or branched alkyl or alkenyl group having 8 or more and 12 or less carbons. From the viewpoint of improving bleach-cleaning performance, a linear alkyl group is preferred. Specific examples include an octyl group (C8), a nonyl group (C9), a decyl group (C10), an undecyl group (C11), and a lauryl group (C12). Among these, from the viewpoints of improvement of bleach-cleaning performance and availability, one or

more groups selected from an octyl group (C8), a decyl group (C10), and a lauryl group (C12) are preferred.

[0024]

R^{3b} and R^{4b} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons. Specific examples include a methyl group, an ethyl group, a propyl group, a 1-methylethyl group, a butyl group, a 1-methylpropyl group, a 2-methylpropyl group, and a 1,1-dimethylethyl group. Among these, from the viewpoints of improvement of bleach-cleaning performance and availability, one or more groups selected from a methyl group and an ethyl group are preferred, and a methyl group is more preferred.

[0025]

X_b^- represents a counter anion. Examples of counter anions include inorganic anions such as a fluoride ion, a chloride ion, a bromide ion, an iodide ion, and a hydroxide ion, and organic anions such as a methyl sulfate ion, an ethyl sulfate ion, an acetate ion, and an acetylacetonate ion. From the viewpoint of availability, an inorganic anion is preferred, and a chloride ion is more preferred.

[0026]

Specific examples of compounds represented by the general formula (1b) include one or more compounds selected from N,N-dioctyl-N,N-dimethylammonium salts, N,N-didecyl-N,N-dimethylammonium salts, and N,N-didecyl-

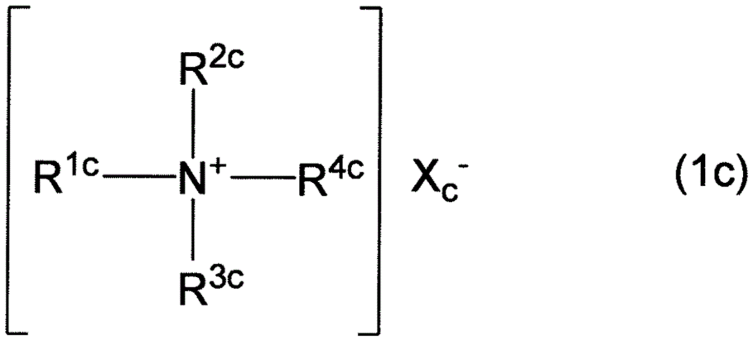
N-ethyl-N-methylammonium salts. The counter anion X_b^- of these salts is a halide ion such as a chloride ion or a bromide ion, or an ethyl sulfate ion.

[0027]

The bleaching detergent composition may contain or be formulated with a single quaternary ammonium salt-type surfactant represented by the general formula (1b), or a combination of two or more quaternary ammonium salt-type surfactants represented by the general formula (1b). When two or more quaternary ammonium salt-type surfactants are used in combination, the mixing ratio (mass ratio) thereof is not limited.

[0028]

Next, a quaternary ammonium salt-type surfactant represented by the following general formula (1c) is described.



(1c)

wherein R^{1c} represents a linear or branched alkyl or alkenyl group having 8 or more and 18 or less carbons; R^{2c} represents an aralkyl group having 7 or more and 12

or less carbons; R^{3c} and R^{4c} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_c^- represents a counter anion.

[0029]

R^{1c} represents a linear or branched alkyl or alkenyl group having 8 or more and 18 or less carbons. From the viewpoint of improving bleach-cleaning performance, a linear alkyl group is preferred. Specific examples include an octyl group (C8), a nonyl group (C9), a decyl group (C10), an undecyl group (C11), a lauryl group (C12), a tridecyl group (C13), a myristyl group (C14), a pentadecyl group (C15), a cetyl group (C16), a heptadecyl group (C17), a stearyl group (C18), a nonadecyl group (C19), an arachidyl group (C20), a henicosanyl group (C21), and a behenyl group (C22). Among these, from the viewpoints of improvement of bleach-cleaning performance and availability, one or more groups selected from an octyl group (C8), a decyl group (C10), a lauryl group (C12), a myristyl group (C14), a cetyl group (C16), and a stearyl group (C18) are preferred.

[0030]

R^{2c} represents an aralkyl group having 7 or more and 12 or less carbons. Specific examples include a benzyl group, a (2-methylphenyl)methyl group, a (4-methylphenyl)methyl group, a (1-naphthyl)methyl group, a

(2-naphthyl)methyl group, a phenylethyl group, a (2-methylphenyl)ethyl group, a (4-methylphenyl)ethyl group, a (1-naphthyl)ethyl group, a (2-naphthyl)ethyl group, and the like. Among these, from the viewpoints of improvement of bleach-cleaning performance and availability, a benzyl group is preferred.

[0031]

R^{3c} and R^{4c} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons. Specific examples include a methyl group, an ethyl group, a propyl group, a 1-methylethyl group, a butyl group, a 1-methylpropyl group, a 2-methylpropyl group, and a 1,1-dimethylethyl group. Among these, from the viewpoints of improvement of bleach-cleaning performance and availability, one or more groups selected from a methyl group and an ethyl group are preferred, and a methyl group is more preferred.

[0032]

X_c^- represents a counter anion. Examples of counter anions include inorganic anions such as a fluoride ion, a chloride ion, a bromide ion, an iodide ion, and a hydroxide ion, and organic anions such as an acetate ion and an acetylacetonate ion. From the viewpoint of availability, an inorganic anion is preferred, and a chloride ion is more preferred.

[0033]

Specific examples of compounds represented by the general formula (1c) are not particularly limited, and include alkyldimethylbenzylammonium salts. Examples include benzalkonium chloride, which is known as a mixture containing one or more alkyl groups selected from an octyl group, a lauryl group, a myristyl group, a cetyl group, and a stearyl group.

[0034]

The bleaching detergent composition may contain or be formulated with a single quaternary ammonium salt-type surfactant represented by the general formula (1c), or a combination of two or more quaternary ammonium salt-type surfactants represented by the general formula (1c). When two or more quaternary ammonium salt-type surfactants are used in combination, the mixing ratio (mass ratio) thereof is not limited.

[0035]

The bleaching detergent composition may contain or be formulated with, as component (b), a single quaternary ammonium salt-type surfactant selected from those represented by the general formulas (1a) to (1c), or a combination of two or more quaternary ammonium salt-type surfactants selected from those represented by the general formulas (1a) to (1c). When two or more quaternary ammonium salt-type surfactants are used in combination, the mixing ratio (mass ratio) thereof is not limited. In such a combination, for any one of the

surfactant groups represented by the general formulas (1a) to (1c), a single quaternary ammonium salt-type surfactant or a combination of two or more quaternary ammonium salt-type surfactants may be used. From the viewpoint of improving bleach-cleaning performance, one or more quaternary ammonium salt-type surfactants selected from those represented by the general formula (1a) are preferably used.

[0036]

The bleaching detergent composition of the present invention is a composition formulated with the quaternary ammonium salt-type surfactant as component (b). The formulation amount of the quaternary ammonium salt-type surfactant is the amount formulated at the time of production of the composition, expressed in terms of the active ingredient, and corresponds to the content of the quaternary ammonium salt-type surfactant in the composition.

The content of the quaternary ammonium salt-type surfactant used as component (b) in the total amount of the bleaching detergent composition is, from the viewpoint of improving bleach-cleaning performance, 0.1 mass% or more, preferably 0.5 mass% or more, more preferably 1 mass% or more, still more preferably 2 mass% or more, and, from the same viewpoint, 10 mass% or less, preferably 7.5 mass% or less, more preferably 5 mass% or less.

[0037]

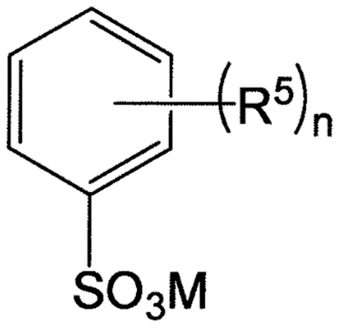
The bleaching detergent composition of the present invention may comprise a quaternary ammonium salt-type surfactant other than component (b) insofar as the effects of the present invention are not impaired. The content of quaternary ammonium salt-type surfactants other than component (b) in all quaternary ammonium salt-type surfactants is preferably 10 mass% or less, more preferably 1 mass% or less, and most preferably substantially 0 mass%.

[0038]

Next, an aromatic sulfonic acid or a salt thereof used as component (c) is described.

Examples of aromatic sulfonic acids or salts thereof used as component (c) include aromatic sulfonic acids such as a benzene derivative sulfonic acid, a naphthalene derivative sulfonic acid, a biphenyl derivative sulfonic acid, and a pyridine derivative sulfonic acid, and salts thereof. It should be noted that, in the present invention, a derivative refers to a compound in which one or more hydrogen atoms on a benzene ring-containing aromatic hydrocarbon group or the like are substituted with a hydrocarbon group having 1 or more and 3 or less carbons. From the viewpoints of improvement of bleach-cleaning performance and availability, a benzene derivative sulfonic acid or a salt thereof is preferred. Among these, a benzene

derivative sulfonic acid or a salt thereof represented by the following general formula (2) is preferred:



(2)

wherein n is an integer of 0 or more and 4 or less; R^5 represents an alkyl or alkenyl group having 1 or more and 3 or less carbons; when n is 2 or more, R^5 groups may be the same or different; and M represents a hydrogen atom or a counter cation.

[0039]

n is an integer of 0 or more and 4 or less, and, from the viewpoint of improving bleach-cleaning performance, n is preferably 0, 1, or 2.

[0040]

R^5 represents an alkyl or alkenyl group having 1 or more and 3 or less carbons. Specific examples include a methyl group, an ethyl group, a propyl group, a 1-methylethyl group, a vinyl group, a 1-propenyl group, and the like. From the viewpoint of improving bleach-cleaning performance, a methyl group or a vinyl group is preferred.

[0041]

M represents a hydrogen atom or a counter cation. When M is a counter anion, an aromatic sulfonic acid salt may also be referred to as an aromatic sulfonate. Examples of counter cations of aromatic sulfonates include monovalent inorganic cations such as a lithium ion, a sodium ion, and a potassium ion; divalent inorganic cations such as a magnesium ion and a calcium ion; trivalent inorganic cations such as aluminum; and organic cations such as mono-, di-, tri-, or tetra(C1-C4 alkyl)ammonium ions, and mono-, di-, tri-, or tetra(C6-C12 aryl)ammonium ions.

[0042]

From the viewpoint of improving bleach-cleaning performance, M is preferably an inorganic cation, more preferably a monovalent inorganic cation, still more preferably a sodium ion. The bleaching detergent composition may contain or be formulated with a single aromatic sulfonate or a combination of two or more aromatic sulfonates having the same or different counter cations. When two or more aromatic sulfonates are used in combination, the ratio of the contents thereof is not particularly limited.

[0043]

Furthermore, an aromatic sulfonic acid in which M is a hydrogen atom and the above-described aromatic sulfonate may be used in combination. When an aromatic

sulfonic acid and the above-described aromatic sulfonate are used in combination, the ratio of the contents thereof is not particularly limited.

[0044]

From the viewpoint of improving bleach-cleaning performance, the aromatic sulfonic acids or salts thereof used as component (c) are preferably one or more aromatic sulfonic acids or salts thereof selected from p-toluene sulfonic acid or a sodium salt thereof and m-xylene-4-sulfonic acid or a sodium salt thereof.

[0045]

The bleaching detergent composition of the present invention is a composition formulated with the aromatic sulfonic acid or a salt thereof as component (c). The formulation amount of the aromatic sulfonic acid or a salt thereof is the amount formulated at the time of production of the composition, expressed in terms of the active ingredient, and corresponds to the content of the aromatic sulfonic acid or a salt thereof in the composition.

The content of the aromatic sulfonic acid or a salt thereof used as component (c) in the total amount of the bleaching detergent composition is, from the viewpoint of improving bleach-cleaning performance, preferably 0.1 mass% or more, more preferably 0.3 mass% or more, still more preferably 0.5 mass% or more, even more preferably 0.8 mass% or more, and, from the same

viewpoint, preferably 10 mass% or less, more preferably 8 mass% or less, still more preferably 6 mass% or less.

It should be noted that, as used herein, the content of component (c) means the content expressed in terms of an aromatic sulfonic acid.

[0046]

The molar ratio of the content of component (c) to the content of component (b), (c)/(b), is, from the viewpoints of the viscosity immediately after preparation, storage stability of component (a) and of the viscosity of the bleaching detergent composition of the present invention, and improvement of bleach-cleaning performance, preferably 0.35 or more, more preferably 0.45 or more, still more preferably 0.5 or more, even more preferably 0.55 or more, still even more preferably 0.65 or more, and, from the same viewpoints, preferably 5 or less, more preferably 4.5 or less, still more preferably 4 or less, even more preferably 3.5 or less, still even more preferably 2.9 or less.

[0047]

Next, an alkaline agent used as component (d) is described. Examples of alkaline agents include inorganic alkaline agents such as sodium hydroxide, sodium silicate, sodium hydrogen carbonate, sodium carbonate, potassium hydroxide, potassium hydrogen carbonate, and potassium carbonate, and organic alkaline agents such as ammonium hydroxide, monoethanolamine, diethanolamine,

triethanolamine, and tris(hydroxymethyl)aminomethane. From the viewpoint of availability, component (d) is preferably an inorganic alkaline agent. From the viewpoints of storage stability of the alkaline agent in the bleaching detergent and improvement of the storage stability of component (a), component (d) is more preferably one or more alkaline agents selected from sodium hydroxide, sodium silicate, and potassium hydroxide. From the viewpoint of economy, component (d) is still more preferably sodium hydroxide. From the viewpoint of ease of production, these alkaline agents are preferably used in the form of aqueous solutions.

[0048]

The bleaching detergent composition of the present invention is a composition formulated with the alkaline agent as component (d). The formulation amount of the alkaline agent is the amount formulated at the time of production of the composition, expressed in terms of the active ingredient, and corresponds to the content of the alkaline agent in the composition.

The content of the alkaline agent used as component (d) relates to the amount of hydroxide ions (free alkali) present in the bleaching detergent composition of the present invention, and corresponds to the amount of free alkali necessary for the pH at 25°C of a 10 mass% aqueous solution of the bleaching detergent composition of the present invention to satisfy the range

specified below. That is, the content of the alkaline agent used as component (d) in the bleaching detergent composition is, from the viewpoints of storage stability of the viscosity described below and improvement of bleach-cleaning performance, preferably 0.2 mass% or more, more preferably 0.4 mass% or more, still more preferably 0.6 mass% or more, even more preferably 0.9 mass% or more, and, from the same viewpoints, preferably 6.0 mass% or less, more preferably 5.0 mass% or less, still more preferably 4.0 mass% or more. The content of component (d) in the bleaching detergent composition of the present invention is a value determined in accordance with the test method specified for free alkali in the standard for sodium hypochlorite for waterworks (JWWA K 120) (neutralization titration; expressed in terms of sodium hydroxide).

[0049]

From the viewpoint of improving bleach-cleaning performance, the pH at 25°C of the 10 mass% aqueous solution of the bleaching detergent composition of the present invention is 11 or more, preferably 11.5 or more, and 14 or less, preferably 13 or less.

[0050]

The viscosity at 25°C of the bleaching detergent composition of the present invention is, from the viewpoint of improving bleach-cleaning performance, 1,000 mPa·s or more, preferably 1,200 mPa·s or more, more

preferably 3,000 mPa·s or more, still more preferably 5,000 mPa·s or more, even more preferably 7,000 mPa·s or more, and, from the same viewpoint, 100,000 mPa·s or less, preferably 80,000 mPa·s or less, more preferably 50,000 mPa·s or less, still more preferably 30,000 mPa·s or less. Furthermore, from the viewpoint of achieving both bleach-cleaning performance and handleability, it is preferably 1,000 mPa·s or more and 10,000 mPa·s or less. It should be noted that, as used herein, "viscosity" refers to viscosity immediately after production, during distribution, during storage at retail stores, during household use, and the like, and is not limited in terms of an elapsed time. "Viscosity" may be viscosity at any point in time and, in particular, is not limited in terms of an elapsed time.

[0051]

The viscosity at 25°C can be measured using a B-type viscometer. Specifically, it can be measured by the method described in the Examples. When the bleaching detergent composition contains specific contents of a specific cationic surfactant (component (b)) and an aromatic sulfonic acid (component (c)) at a specific ratio, the viscosity can fall within the above-described range. Although the mechanism is not clear, it is presumed that the high viscosity results from the formation of a specific association state due to hydrophobic interactions, electrostatic interactions, and

the like between the compounds. Even when the target object on which mold stains are cleaned and discoloration caused by mold is bleached is a vertical surface or an inclined surface, the bleaching detergent composition having the above-described viscosity can be applied in gel form or sprayed from a trigger spray. Furthermore, after being applied or sprayed onto the target vertical surface or inclined surface, the bleaching detergent composition can be retained on the target surface for a period of time sufficient for the effect to be more fully exhibited.

[0052]

Furthermore, the bleaching detergent composition of the present invention has excellent storage stability of the bleach-cleaning component and of the viscosity, whereby the effects thereof are maintained over a long period of time. Conventional bleaching detergent compositions containing hypochlorite pose a problem that, even when the viscosity is increased, molecules contributing to the viscosity increase are cleaved by hypochlorite to cause a decrease in the viscosity; that is, low storage stability of the bleach-cleaning component and of the viscosity result in poor retention of the effect.

For example, in the present invention, the retention can be quantified by calculating the following ratio of the bleach-cleaning performance of the bleaching

detergent composition after storage to the bleach-cleaning performance thereof immediately after preparation:

Retention (%) = (bleach-cleaning performance after storage) / (bleach-cleaning performance immediately after preparation) × 100

For example, when the mold removal rate described in paragraph [0142] is used as an indicator of bleach-cleaning performance, the retention is calculated by the following formula:

Mold removal rate retention (%) = (mold removal rate after storage) / (mold removal rate immediately after preparation) × 100

[0053]

Furthermore, in order to adjust the viscosity of the bleaching detergent composition to fall within the above-described range, the composition may contain or be formulated with, as other components, thickeners such as polyacrylate, cellulose derivatives, xanthan gum, guar gum, carboxymethylcellulose, polyethylene glycol, and hydroxypropyl methylcellulose.

The bleaching detergent composition of the present invention may be substantially free of the above-described thickeners, that is, the content thereof may be 0 mass%. When the composition contains or is formulated with the thickeners, the formulation amount or content thereof is, from the viewpoints of storage stability of

the bleach-cleaning component and of the viscosity, preferably 0.5 mass% or less, more preferably 0.3 mass% or less, still more preferably 0.1 mass% or less. It should be noted that, when the thickener is an ionic compound, the formulation amount or content thereof is expressed as a value converted on the basis of the molecular weight of the corresponding nonionic compound in its acid form or basic form.

[0054]

The remainder of the bleaching detergent composition of the present invention, excluding components (a), (b), (c), and (d) and other components, may be water. That is, the bleaching detergent composition of the present invention is a composition formulated with water. The formulation amount of water is the amount formulated at the time of production of the composition, expressed in terms of the active ingredient, and corresponds to the content of water in the composition.

The content of water in the composition is, from the viewpoints of the viscosity specified in the present invention and the solubility of the composition in water, preferably 65 mass% or more, more preferably 75 mass% or more, still more preferably 80 mass% or more, and, from the same viewpoints, preferably 98 mass% or less, more preferably 96 mass% or less, still more preferably 94 mass% or less.

[0055]

The bleaching detergent composition of the present invention may further comprise, as additives, a foaming agent, a frothing agent, a penetrating agent, a chelating agent, a dispersant, a binder resin, a fragrance, an antifungal agent, an antibacterial agent, and the like. That is, the bleaching detergent composition of the present invention is a composition formulated with these additives. The formulation amount of the additive is the amount formulated at the time of production of the composition, expressed in terms of the active ingredient, and corresponds to the content of the additive in the composition.

When the composition comprises these additives, the content thereof in the composition is preferably 10 mass% or less, more preferably 5 mass% or less, still more preferably 3 mass% or less.

[0056]

The bleaching detergent composition of the present invention can be used as a mold remover for the purpose of cleaning mold stains and bleaching discoloration caused by mold. Examples of types of mold include black mold more likely to grow in wet areas and the like, green mold more likely to grow on wood, and yellow mold growing on glass, films, metal, and the like. Specific examples include one or more species of mold selected from fungi belonging to the genus *Cladosporium*, the genus

Aspergillus, the genus *Candida*, the genus *Penicillium*, the genus *Alternaria*, the genus *Phoma*, the genus *Exophiala*, and the genus *Aureobasidium*.

[0057]

Examples of target objects to which the mold remover can be applied include tile joints, walls, and floors in bathrooms; walls and floors in washrooms, kitchens, and toilets; wall paper; building materials; wood materials; flooring materials; decorative plywood for furniture and interior finishing materials; aluminum materials such as aluminum window frames and aluminum panels for construction; molded resin materials; articles for wet areas; feed containers; air duct members constituting air ducts of air conditioners; steel products; housewrap; roofing materials; insulation materials; kitchen articles; toilet articles; interior articles; bedding; filters; toys; leather products such as synthetic leather products and natural leather products; and the like. Furthermore, examples of target objects include textile products such as fabrics and towels; resin films attached to walls; laminates such as resin film-laminated tarpaulins; and the like.

[0058]

Among these, the mold remover is effectively used against black mold growing on fixed target objects such as tile joints, walls, floors, and the like in bathrooms, and walls, floors, and the like in washrooms, kitchens,

and toilets. Furthermore, the mold remover is effectively used against black mold on hydrophobic resin portions, including polymer films such as polyvinyl chloride films, olefin-based elastomer films, polyurethane films, and polyester films, portions made of silicone resin-based sealant, and the like.

[0059]

Next, a method for bleach-cleaning mold using the bleaching detergent composition of the present invention is described. Examples of types of mold and target objects in the method for bleach-cleaning mold using the bleaching detergent composition of the present invention include the types of mold and target objects described above in relation to the mold remover. That is, examples of types of mold include black mold, green mold, yellow mold, and the like, and specific examples include one or more species of mold selected from fungi belonging to the genus *Cladosporium*, the genus *Aspergillus*, the genus *Candida*, the genus *Penicillium*, the genus *Alternaria*, the genus *Phoma*, the genus *Exophiala*, and the genus *Aureobasidium*. Furthermore, the method is effectively applied to black mold growing on fixed target objects such as tile joints, walls, floors, and the like in bathrooms, and walls, floors, and the like in washrooms, kitchens, and toilets. Furthermore, the method is effectively applied to black mold on hydrophobic resin portions, including polymer films such as polyvinyl

chloride films, olefin-based elastomer films, polyurethane films, and polyester films, portions made of silicone resin-based sealant, and the like.

[0060]

The bleaching detergent composition of the present invention is also effective for bleaching discoloration caused by microorganisms other than mold, for example, pinkish discoloration caused by specific yeasts or bacteria. Examples of yeasts causing pinkish discoloration include one or more yeasts selected from those belonging to the genus *Rhodotorula*, the genus *Rhodosporidium*, the genus *Sporobolomyces*, the genus *Sporidiobolus*, and the like. Furthermore, examples of bacteria causing pinkish discoloration include one or more bacteria selected from those belonging to the genus *Methylobacterium*, the genus *Brevundimonas*, the genus *Microbacterium*, and the like.

[0061]

The bleaching detergent composition of the present invention has moderate viscosity. Therefore, since the composition is in gel form, it is particularly effective when applied to a fixed target object that is a vertical surface or an inclined surface. When the bleaching detergent composition of the present invention is brought into contact with mold on such a target object, a dispensing container capable of applying the contents in gel form to an exact spot on the target object can be

used. From the viewpoints of handleability in consideration of safety and ease of application, the dispensing container is preferably a tube container. When a tube container having a perfectly circular orifice is used, the hole diameter (diameter) of the orifice is, from the viewpoint of readily dispensing a required amount of the contents, preferably 0.4 mm or more, more preferably 0.7 mm or more, still more preferably 1.0 mm or more. Furthermore, from the viewpoint of preventing the contents from being dispensed in an amount larger than the required amount, the hole diameter is preferably 5.0 mm or less, more preferably 4.0 mm or less, still more preferably 3.0 mm or less. That is, the area of the perfectly circular orifice is preferably 0.13 mm^2 or more, more preferably 0.38 mm^2 or more, still more preferably 0.79 mm^2 or more, and preferably 19.6 mm^2 or less, more preferably 12.6 mm^2 or less, still more preferably 7.1 mm^2 or less.

Furthermore, when the orifice of the tube container is not perfectly circular but has another shape, such as an oval shape, a star shape, a square shape, or the like, the area of the orifice may fall within the suitable range described above in relation to the area of the perfectly circular orifice.

[0062]

A dispensing container having the above-described orifice can be filled with the bleaching detergent

composition of the present invention to provide a bleaching detergent article.

As shown in FIG. 1, a dispensing container 1 equipped with a nozzle 2 having the above-described hole diameter can be filled with the bleaching detergent composition of the present invention to provide the bleaching detergent article. From the viewpoint of convenience, providing the bleaching detergent article as a product comprising the dispensing container 1 filled with 60 to 500 g of the composition, wherein the dispensing container 1 has a length 4 from the bottom of the dispensing container to the tip of the nozzle of 60 to 250 mm, a maximum width 5 of the dispensing container of 20 to 70 mm, and a capacity of 60 to 500 cm^3, is preferable in that one container can be used multiple times. Furthermore, in order to suppress changes over time in the performance and physical property values of the bleaching detergent composition, the container is preferably equipped with a sealable sealing cap 3 and can be hermetically sealed as shown in FIG. 2.

The container is preferably made of one or more materials selected from high-density polyethylene (HDPE) and low-density polyethylene (LDPE), and is more preferably made of high-density polyethylene. A single material or a combination of two or more materials may be used, and may be molded into a single-layer or multilayer container.

[0063]

Furthermore, the bleaching detergent composition of the present invention can be applied to a target object in an amount of 0.5 to 3 mL/cm^2, thereby effectively cleaning mold stains and bleaching discoloration caused by mold.

[0064]

The bleaching detergent composition of the present invention can be applied to a target object and thereafter left to stand for a predetermined period of time to allow the bleaching detergent composition to remain on the target object, thereby further effectively cleaning mold stains and bleaching discoloration caused by mold. From the viewpoint of improving the bleach-cleaning performance, the leaving time is preferably 5 minutes or more, more preferably 30 minutes or more, still more preferably 50 minutes or more, even more preferably 120 minutes or more, still even more preferably 720 minutes (half a day) or more.

[0065]

After the bleaching detergent composition of the present invention is applied to a target object on which mold grows and thereafter left to stand for a predetermined period of time to allow the bleaching detergent composition to remain on the target object, the target object with the bleaching detergent composition applied thereon can be brought into contact with water to

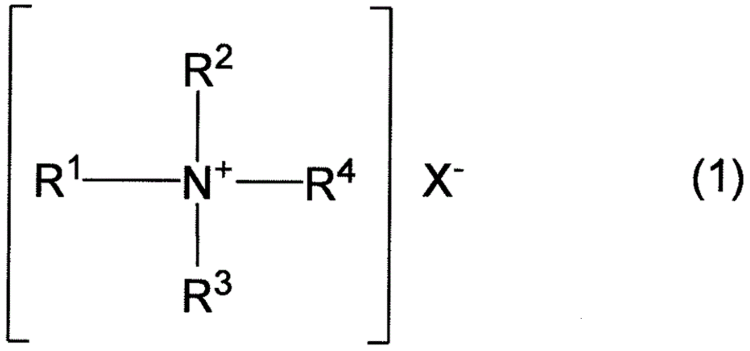
clean (e.g., remove) mold stains. Examples of methods for bringing the target object into contact with water include water rinsing, and the water rinsing may be performed by immersion or with running water.

[0066]

The present invention provides a bleaching detergent composition comprising a mixture of:

component (a): 0.1 mass% or more and 10 mass% or less of an alkali metal hypochlorite;

component (b): 0.1 mass% or more and 10 mass% or less of one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salts represented by the following general formula (1):



(1)

wherein R^1 represents a linear or branched alkyl group having 8 or more and 22 or less carbons; R^2 represents a linear or branched alkyl group having 1 or more and 12 or less carbons, or an aralkyl group having 7 or more and 12 or less carbons; R^3 and R^4 are the same or different and each represent a linear or branched alkyl

group having 1 or more and 4 or less carbons; and X^- represents a counter anion;

component (c): an aromatic sulfonic acid or a salt thereof;

component (d): an alkaline agent; and

water,

wherein the bleaching detergent composition has a viscosity at 25°C of 1,000 mPa·s or more and 100,000 mPa·s or less, and a 10 mass% aqueous solution of the bleaching detergent composition has a pH at 25°C of 11 or more and 14 or less.

[0067]

In the bleaching detergent composition comprising a mixture of components (a) to (d) and water, the embodiments described above in relation to the bleaching detergent composition comprising components (a) to (d) and water may be applied to components (a) to (d), water, and the formulation amounts and contents thereof, other components and the formulation amounts and contents thereof, the viscosity, and the pH.

Furthermore, the same embodiments as those described above in relation to the bleaching detergent composition comprising components (a) to (d) and water may be applied to a method for bleach-cleaning mold using the bleaching detergent composition comprising a mixture of components (a) to (d) and water, a bleaching detergent article comprising the dispensing container filled with

the bleaching detergent composition comprising a mixture of components (a) to (d) and water, and a method for using the same.

[0068]

<Embodiments of the present invention>

Embodiments of the present invention are illustrated below. The matters described in relation to the bleaching detergent composition and the method for bleach-cleaning mold stains of the present invention may be applied, with modifications as necessary, to these embodiments. Furthermore, the respective embodiments may be applied, with modifications as necessary, to other embodiments.

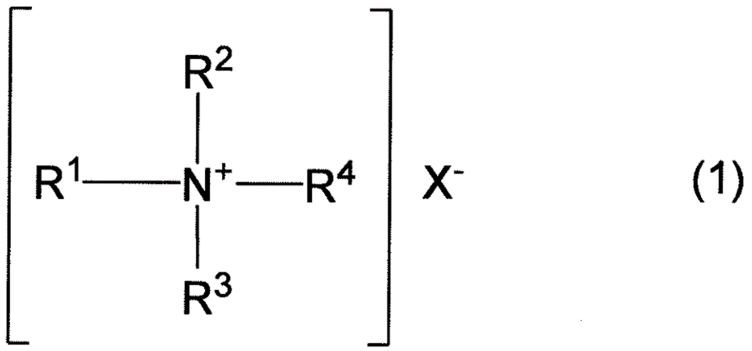
[0069]

<1>

A bleaching detergent composition comprising:

component (a): 0.1 mass% or more and 10 mass% or less of an alkali metal hypochlorite;

component (b): 0.1 mass% or more and 10 mass% or less of one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salts represented by the following general formula (1):



(1)

wherein R^1 represents a linear or branched alkyl group having 8 or more and 22 or less carbons; R^2 represents a linear or branched alkyl group having 1 or more and 12 or less carbons, or an aralkyl group having 7 or more and 12 or less carbons; R^3 and R^4 are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X^- represents a counter anion;

component (c): an aromatic sulfonic acid or a salt thereof;

component (d): an alkaline agent; and

water,

wherein the bleaching detergent composition has a viscosity at 25°C of 1,000 mPa·s or more and 100,000 mPa·s or less, and a 10 mass% aqueous solution of the bleaching detergent composition has a pH at 25°C of 11 or more and 14 or less.

[0070]

<2>

The bleaching detergent composition according to <1>, wherein the alkali metal in the alkali metal hypochlorite used as component (a) is selected from lithium, sodium, and potassium.

[0071]

<3>

The bleaching detergent composition according to <2>, wherein the alkali metal in the alkali metal hypochlorite used as component (a) is sodium.

[0072]

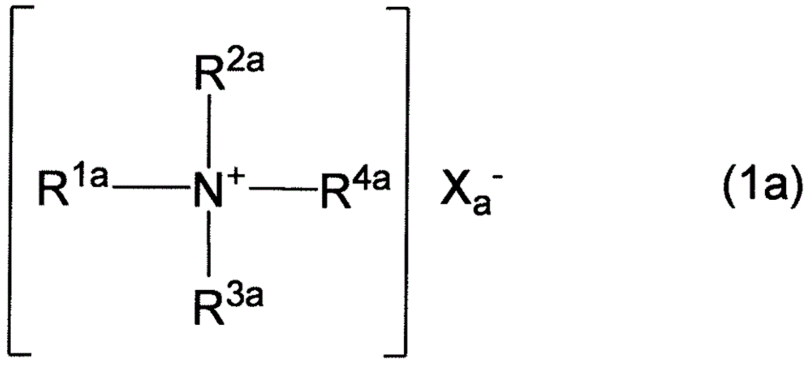
<4>

The bleaching detergent composition according to any one of <1> to <3>, wherein the content of component (a) in the bleaching detergent composition is, for example, 0.1 mass%, preferably 0.5 mass% or more, more preferably 1 mass% or more, still more preferably 1.5 mass% or more, and is, for example, 10 mass% or less, preferably 7.5 mass% or less, more preferably 5 mass% or less, still more preferably 3 mass% or less.

[0073]

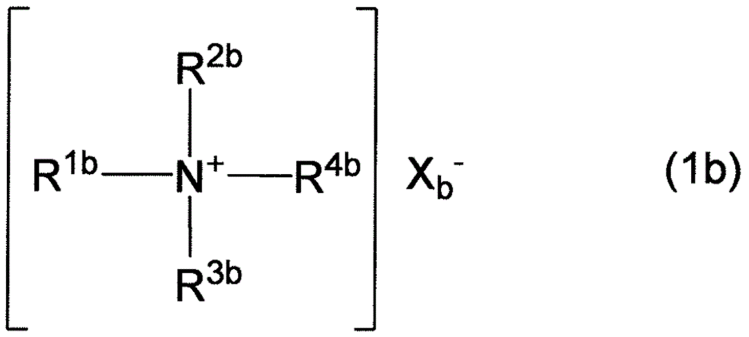
<5>

The bleaching detergent composition according to any one of <1> to <4>, wherein component (b) is one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salt-type surfactants represented by the following general formulas (1a) to (1c):



(1a)

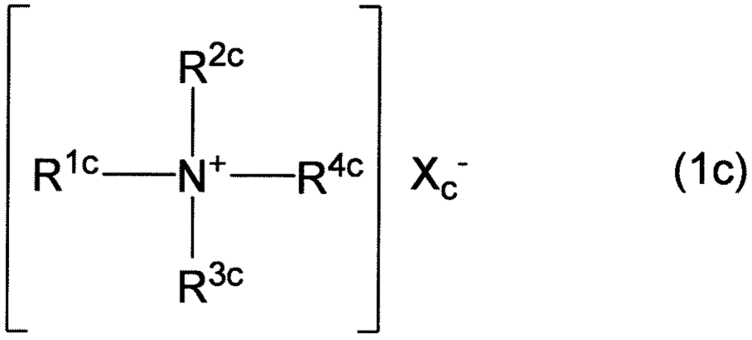
wherein R^{1a} represents a linear or branched alkyl or alkenyl group having 14 or more and 22 or less carbons; R^{2a}, R^{3a}, and R^{4a} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_a^- represents a counter anion;



(1b)

wherein R^{1b} and R^{2b} are the same or different and each represent a linear or branched alkyl or alkenyl group having 8 or more and 12 or less carbons; R^{3b} and R^{4b} are the same or different and each represent a linear or

branched alkyl group having 1 or more and 4 or less carbons; and X_b^- represents a counter anion;



(1c)

wherein R^{1c} represents a linear or branched alkyl or alkenyl group having 8 or more and 18 or less carbons; R^{2c} represents an aralkyl group having 7 or more and 12 or less carbons; R^{3c} and R^{4c} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_c^- represents a counter anion.

[0074]

<6>

The bleaching detergent composition according to <5>, wherein R^{1a} is a linear alkyl group having 14 or more and 22 or less carbons.

[0075]

<7>

The bleaching detergent composition according to <5> or <6>, wherein R^{1a} is a myristyl group (C14), a pentadecyl group (C15), a cetyl group (C16), a heptadecyl

group (C17), a stearyl group (C18), a nonadecyl group (C19), an arachidyl group (C20), a henicosanyl group (C21), or a behenyl group (C22).

[0076]

<8>

The bleaching detergent composition according to <5>, wherein R^{2a}, R^{3a}, and R^{4a} are the same or different and are each a linear or branched alkyl group having 1 or more and 4 or less carbons.

[0077]

<9>

The bleaching detergent composition according to any one of <5> to <8>, wherein R^{2a}, R^{3a}, and R^{4a} are the same or different and are each selected from a methyl group, an ethyl group, a propyl group, a 1-methylethyl group, a butyl group, a 1-methylpropyl group, a 2-methylpropyl group, and a 1,1-dimethylethyl group.

[0078]

<10>

The bleaching detergent composition according to any one of <5> to <9>, wherein X_a^- is selected from inorganic anions such as a fluoride ion, a chloride ion, a bromide ion, an iodide ion, and a hydroxide ion; and a methyl sulfate ion, an ethyl sulfate ion, an acetate ion, and an acetylacetonate ion.

[0079]

<11>

The bleaching detergent composition according to any one of <5> to <10>, wherein compounds represented by the general formula (1a) are one or more compounds selected from myristyltrimethylammonium salts, cetyltrimethylammonium salts, and stearyltrimethylammonium salts, and the counter anion X_a^- of these salts is a halide ion such as a chloride ion or a bromide ion, or an ethyl sulfate ion.

[0080]

<12>

The bleaching detergent composition according to any one of <5> to <11>, wherein the composition may contain or be formulated with a single quaternary ammonium salt-type surfactant represented by the general formula (1a), or a combination of two or more quaternary ammonium salt-type surfactants represented by the general formula (1a).

[0081]

<13>

The bleaching detergent composition according to any one of <5> to <12>, wherein the proportion of cetyltrimethylammonium salts and stearyltrimethylammonium salts among the quaternary ammonium salt-type surfactants represented by the general formula (1a) is preferably 50 mass% or more, more preferably 65 mass% or more, still more preferably 80 mass% or more, even more preferably 100 mass%.

[0082]

<14>

The bleaching detergent composition according to any one of <5> to <13>, wherein, as compounds represented by the general formula (1a), a cetyltrimethylammonium salt and a stearyltrimethylammonium salt are used in combination.

[0083]

<15>

The bleaching detergent composition according to any one of <5> to <14>, wherein R^{1b} and R^{2b} are the same or different and are each a linear alkyl group having 8 or more and 12 or less carbons.

[0084]

<16>

The bleaching detergent composition according to any one of <5> to <15>, wherein R^{1b} and R^{2b} are each selected from an octyl group (C8), a nonyl group (C9), a decyl group (C10), an undecyl group (C11), and a lauryl group (C12).

[0085]

<17>

The bleaching detergent composition according to any one of <5> to <16>, wherein R^{3b} and R^{4b} are each selected from a methyl group, an ethyl group, a propyl group, a 1-methylethyl group, a butyl group, a 1-

methylpropyl group, a 2-methylpropyl group, and a 1,1-dimethylethyl group.

[0086]

<18>

The bleaching detergent composition according to any one of <5> to <17>, wherein X_b^- is selected from inorganic anions such as a fluoride ion, a chloride ion, a bromide ion, an iodide ion, and a hydroxide ion, and organic anions such as a methyl sulfate ion, an ethyl sulfate ion, an acetate ion, and an acetylacetonate ion.

[0087]

<19>

The bleaching detergent composition according to any one of <5> to <18>, wherein, as compounds represented by the general formula (1b), one or more selected from N,N-dioctyl-N,N-dimethylammonium salts, N,N-didecyl-N,N-dimethylammonium salts, and N,N-didecyl-N-ethyl-N-methylammonium salts are used.

[0088]

<20>

The bleaching detergent composition according to any one of <5> to <19>, wherein the composition may contain or be formulated with a single quaternary ammonium salt-type surfactant represented by the general formula (1b), or a combination of two or more quaternary ammonium salt-type surfactants represented by the general formula (1b).

[0089]

<21>

The bleaching detergent composition according to any one of <5> to <20>, wherein R^{1c} is a linear alkyl group having 8 or more and 18 or less carbons.

[0090]

<22>

The bleaching detergent composition according to any one of <5> to <21>, wherein R^{1c} is selected from an octyl group (C8), a nonyl group (C9), a decyl group (C10), an undecyl group (C11), a lauryl group (C12), a tridecyl group (C13), a myristyl group (C14), a pentadecyl group (C15), a cetyl group (C16), a heptadecyl group (C17), a stearyl group (C18), a nonadecyl group (C19), an arachidyl group (C20), a henicosanyl group (C21), and a behenyl group (C22).

[0091]

<23>

The bleaching detergent composition according to any one of <5> to <22>, wherein R^{2c} is an aralkyl group having 7 or more and 12 or less carbons.

[0092]

<24>

The bleaching detergent composition according to any one of <5> to <23>, wherein R^{2c} is selected from a benzyl group, a (2-methylphenyl)methyl group, a (4-methylphenyl)methyl group, a (1-naphthyl)methyl group, a

(2-naphthyl)methyl group, a phenylethyl group, a (2-methylphenyl)ethyl group, a (4-methylphenyl)ethyl group, a (1-naphthyl)ethyl group, and a (2-naphthyl)ethyl group.

[0093]

<25>

The bleaching detergent composition according to any one of <5> to <24>, wherein R^{3c} and R^{4c} are each selected from a methyl group, an ethyl group, a propyl group, a 1-methylethyl group, a butyl group, a 1-methylpropyl group, a 2-methylpropyl group, and a 1,1-dimethylethyl group.

[0094]

<26>

The bleaching detergent composition according to any one of <5> to <25>, wherein X_c^- is selected from inorganic anions such as a fluoride ion, a chloride ion, a bromide ion, an iodide ion, and a hydroxide ion, and organic anions such as an acetate ion and an acetylacetonate ion.

[0095]

<27>

The bleaching detergent composition according to any one of <5> to <26>, wherein, as compounds represented by the general formula (1c), alkyldimethylbenzylammonium salts are used, and the alkyl groups are one or more alkyl groups selected from an octyl group, a lauryl

group, a myristyl group, a cetyl group, and a stearyl group.

[0096]

<28>

The bleaching detergent composition according to any one of <5> to <27>, wherein the composition may contain or be formulated with a single quaternary ammonium salt-type surfactant represented by the general formula (1c), or a combination of two or more quaternary ammonium salt-type surfactants represented by the general formula (1c).

[0097]

<29>

The bleaching detergent composition according to any one of <5> to <28>, wherein the composition may contain or be formulated with, as component (b), a single quaternary ammonium salt-type surfactant selected from those represented by the general formulas (1a) to (1c), or a combination of two or more quaternary ammonium salt-type surfactants selected from those represented by the general formulas (1a) to (1c).

[0098]

<30>

The bleaching detergent composition according to any one of <1> to <29>, wherein the content of the quaternary ammonium salt-type surfactant used as component (b) is preferably 0.5 mass% or more, more

preferably 1 mass% or more, still more preferably 2 mass% or more, and, from the same viewpoint, preferably 7.5 mass% or less, more preferably 5 mass% or less.

[0099]

<31>

The bleaching detergent composition according to any one of <1> to <30>, wherein, when the composition comprises a quaternary ammonium salt-type surfactant other than component (b), the content of quaternary ammonium salt-type surfactants other than component (b) in all quaternary ammonium salt-type surfactants is preferably 10 mass% or less, more preferably 1 mass% or less, and most preferably substantially 0 mass%.

[0100]

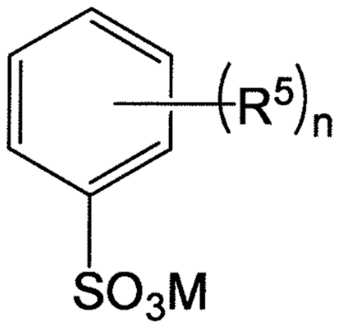
<32>

The bleaching detergent composition according to any one of <1> to <31>, wherein component (c) is selected from aromatic sulfonic acids such as a benzene derivative sulfonic acid, a naphthalene derivative sulfonic acid, a biphenyl derivative sulfonic acid, and a pyridine derivative sulfonic acid, and salts thereof.

[0101]

<33>

The bleaching detergent composition according to any one of <1> to <32>, wherein component (c) is a benzene derivative sulfonic acid or a salt thereof represented by the following general formula (2):



(2)

wherein n is an integer of 0 or more and 4 or less; R^5 represents an alkyl or alkenyl group having 1 or more and 3 or less carbons; when n is 2 or more, R^5 groups may be the same or different; and M represents a hydrogen atom or a counter cation.

[0102]

<34>

The bleaching detergent composition according to <33>, wherein n is 0, 1, or 2.

[0103]

<35>

The bleaching detergent composition according to <33> or <34>, wherein R^5 is selected from a methyl group, an ethyl group, a propyl group, a 1-methylethyl group, a vinyl group, and a 1-propenyl group.

[0104]

<36>

The bleaching detergent composition according to any one of <33> to <35>, wherein M is selected from

monovalent inorganic cations such as a lithium ion, a sodium ion, and a potassium ion; divalent inorganic cations such as a magnesium ion and a calcium ion; trivalent inorganic cations such as aluminum; and organic cations such as mono-, di-, tri-, or tetra(C1-C4 alkyl)ammonium ions, and mono-, di-, tri-, or tetra(C6-C12 aryl)ammonium ions.

[0105]

<37>

The bleaching detergent composition according to any one of <1> to <32>, wherein component (c) is one or more aromatic sulfonic acids or salts thereof selected from p-toluene sulfonic acid or a sodium salt thereof and m-xylene-4-sulfonic acid or a sodium salt thereof.

[0106]

<38>

The bleaching detergent composition according to any one of <1> to <37>, wherein the content of component (c) in the total amount of the bleaching detergent composition is preferably 0.1 mass% or more, more preferably 0.3 mass% or more, still more preferably 0.5 mass% or more, even more preferably 0.8 mass% or more, and preferably 10 mass% or less, more preferably 8 mass% or less, still more preferably 6 mass% or less.

[0107]

<39>

The bleaching detergent composition according to any one of <1> to <38>, wherein the molar ratio of the content of component (c) to the content of component (b), (c)/(b), is preferably 0.35 or more, more preferably 0.45 or more, still more preferably 0.5 or more, even more preferably 0.55 or more, still even more preferably 0.65 or more, and preferably 5 or less, more preferably 4.5 or less, still more preferably 4 or less, even more preferably 3.5 or less, still even more preferably 2.9 or less.

[0108]

<40>

The bleaching detergent composition according to any one of <1> to <39>, wherein the alkaline agent used as component (d) is selected from inorganic alkaline agents such as sodium hydroxide, sodium silicate, sodium hydrogen carbonate, sodium carbonate, potassium hydroxide, potassium hydrogen carbonate, and potassium carbonate, and organic alkaline agents such as ammonium hydroxide, monoethanolamine, diethanolamine, triethanolamine, and tris(hydroxymethyl)aminomethane.

[0109]

<41>

The bleaching detergent composition according to any one of <1> to <40>, wherein the content of the alkaline agent used as component (d) is preferably 0.2 mass% or more, more preferably 0.4 mass% or more, still

more preferably 0.6 mass% or more, even more preferably 0.9 mass% or more, and preferably 6.0 mass% or less, more preferably 5.0 mass% or less, still more preferably 4.0 mass% or more.

[0110]

<42>

The bleaching detergent composition according to any one of <1> to <41>, wherein the pH at 25°C of the 10 mass% aqueous solution of the bleaching detergent composition is 11 or more, preferably 11.5 or more, and 14 or less, preferably 13 or less.

[0111]

<43>

The bleaching detergent composition according to any one of <1> to <42>, wherein the viscosity at 25°C of the bleaching detergent composition is preferably 1,200 mPa·s or more, more preferably 3,000 mPa·s or more, still more preferably 5,000 mPa·s or more, even more preferably 7,000 mPa·s or more, and preferably 80,000 mPa·s or less, more preferably 50,000 mPa·s or less, still more preferably 30,000 mPa·s or less.

[0112]

<44>

The bleaching detergent composition according to any one of <1> to <43>, wherein the content of water in the bleaching detergent composition is more preferably 75 mass% or more, still more preferably 80 mass% or more,

and preferably 98 mass% or less, more preferably 96 mass% or less, still more preferably 94 mass% or less.

[0113]

<45>

The bleaching detergent composition according to any one of <1> to <44>, wherein the bleaching detergent composition may further comprise, as additives, a foaming agent, a frothing agent, a penetrating agent, a chelating agent, a dispersant, a binder resin, a fragrance, an antifungal agent, an antibacterial agent, and the like.

[0114]

<46>

The bleaching detergent composition according to any one of <1> to <45>, wherein, when the composition further comprises additives, the content thereof in the composition is preferably 10 mass% or less, more preferably 5 mass% or less, still more preferably 3 mass% or less.

[0115]

<47>

The bleaching detergent composition according to any one of <1> to <46> for use as a mold remover.

[0116]

<48>

The bleaching detergent composition according to <47>, wherein the mold remover is used against one or more types of mold selected from black mold more likely

to grow in wet areas and the like, green mold more likely to grow on wood, and yellow mold growing on glass, films, metal, and the like.

[0117]

<49>

The bleaching detergent composition according to <47>, wherein the mold remover is used against one or more species of mold selected from fungi belonging to the genus *Cladosporium*, the genus *Aspergillus*, the genus *Candida*, the genus *Penicillium*, the genus *Alternaria*, the genus *Phoma*, the genus *Exophiala*, and the genus *Aureobasidium*.

[0118]

<50>

The bleaching detergent composition according to any one of <47> to <49>, wherein the mold remover is used against black mold growing on fixed target objects such as tile joints, walls, floors, and the like in bathrooms, and walls, floors, and the like in washrooms, kitchens, and toilets.

[0119]

<51>

The bleaching detergent composition according to any one of <47> to <50>, wherein the mold remover is used against black mold on hydrophobic resin portions, including polymer films such as polyvinyl chloride films, olefin-based elastomer films, polyurethane films, and

polyester films, portions made of silicone resin-based sealant, and the like.

[0120]

<52>

A method for bleach-cleaning mold using the bleaching detergent composition according to any one of <1> to <51>, wherein the method is applied to one or more species of mold selected from fungi belonging to the genus *Cladosporium*, the genus *Aspergillus*, the genus *Candida*, the genus *Penicillium*, the genus *Alternaria*, the genus *Phoma*, the genus *Exophiala*, and the genus *Aureobasidium*.

[0121]

<53>

A method for bleach-cleaning mold using the bleaching detergent composition according to any one of <1> to <51>, wherein the method is applied to black mold growing on fixed target objects such as tile joints, walls, floors, and the like in bathrooms, and walls, floors, and the like in washrooms, kitchens, and toilets.

[0122]

<54>

The method for bleach-cleaning mold according to <52> or <53>, wherein the method is applied to black mold on hydrophobic resin portions, including polymer films such as polyvinyl chloride films, olefin-based elastomer

films, polyurethane films, and polyester films, portions made of silicone resin-based sealant, and the like.

[0123]

<55>

The method for bleach-cleaning mold according to any one of <52> to <54>, wherein the bleaching detergent composition is applied to a target object in an amount of 0.5 to 3 mL/cm^2, thereby effectively cleaning mold stains and bleaching discoloration caused by mold.

[0124]

<56>

The method for bleach-cleaning mold according to any one of <52> to <55>, wherein the bleaching detergent composition is applied to a target object and thereafter left to stand for a predetermined period of time to allow the bleaching detergent composition to remain on the target object, thereby cleaning mold stains and bleaching discoloration caused by mold, and the leaving time is preferably 5 minutes or more, more preferably 30 minutes or more, still more preferably 50 minutes or more, even more preferably 120 minutes or more, still even more preferably 720 minutes (half a day) or more.

[0125]

<57>

A method for bleach-cleaning pinkish discoloration caused by yeasts or bacteria using the bleaching

detergent composition according to any one of <1> to <51>.

[0126]

<58>

The method for bleach-cleaning pinkish discoloration according to <57>, wherein the yeasts causing pinkish discoloration are one or more yeasts selected from those belonging to the genus *Rhodotorula*, the genus *Rhodosporidium*, the genus *Sporobolomyces*, the genus *Sporidiobolus*, and the like.

[0127]

<59>

The method for bleach-cleaning pinkish discoloration according to <57>, wherein the bacteria causing pinkish discoloration are one or more bacteria selected from those belonging to the genus *Methylobacterium*, the genus *Brevundimonas*, the genus *Microbacterium*, and the like.

[0128]

<60>

A bleaching detergent article comprising a dispensing container filled with the bleaching detergent composition according to any one of <1> to <51>, the dispensing container being equipped with a nozzle.

[0129]

<61>

The bleaching detergent article according to <60>, wherein the dispensing container is a tube container.

[0130]

<62>

The bleaching detergent article according to <60> or <61>, wherein the area of the orifice of the nozzle on a tube container is preferably 0.13 mm^2 or more, more preferably 0.38 mm^2 or more, still more preferably 0.79 mm^2 or more, and preferably 19.6 mm^2 or less, more preferably 12.6 mm^2 or less, still more preferably 7.1 mm^2 or less.

[0131]

<63>

The bleaching detergent article according to any one of <60> to <62>, wherein the bleaching detergent article is provided as a product comprising the dispensing container filled with 60 to 500 g of the composition, the dispensing container having a length from the bottom of the dispensing container to the tip of the nozzle of 60 to 250 mm, a maximum width of the dispensing container of 20 to 70 mm, and a capacity of 60 to 500 cm^3, whereby one container can be used multiple times.

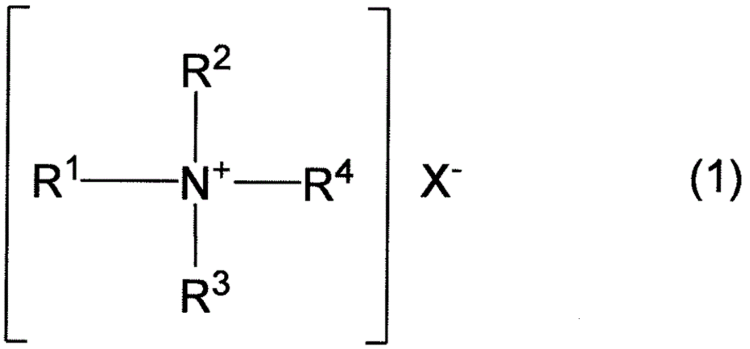
[0132]

<64>

A bleaching detergent composition comprising a mixture of:

component (a): 0.1 mass% or more and 10 mass% or less of an alkali metal hypochlorite;

component (b): 0.1 mass% or more and 10 mass% or less of one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salts represented by the following general formula (1):



(1)

wherein R^1 represents a linear or branched alkyl group having 8 or more and 22 or less carbons; R^2 represents a linear or branched alkyl group having 1 or more and 12 or less carbons, or an aralkyl group having 7 or more and 12 or less carbons; R^3 and R^4 are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X^- represents a counter anion;

component (c): an aromatic sulfonic acid or a salt thereof;

component (d): an alkaline agent; and

water,

wherein the bleaching detergent composition has a viscosity at 25°C of 1,000 mPa·s or more and 100,000 mPa·s or less, and a 10 mass% aqueous solution of the bleaching detergent composition has a pH at 25°C of 11 or more and 14 or less.

Examples

[0133]

The present invention is described in detail below with reference to Examples and Comparative Examples; however, the present invention is not limited to the following description.

[0134]

The components used are as follows.

Component (a)

(a-1) sodium hypochlorite: "Low-Salt Sodium Hypochlorite" (sodium hypochlorite content: 12.5 mass%), manufactured by Nankai Chemical Co., Ltd.

[0135]

Component (b)

(b-1) myristyltrimethylammonium chloride: manufactured by Tokyo Chemical Industry Co., Ltd.

(b-2) cetyltrimethylammonium chloride: manufactured by Tokyo Chemical Industry Co., Ltd.

(b-3) stearyltrimethylammonium chloride: manufactured by Tokyo Chemical Industry Co., Ltd.

[0136]

Component (c)

(c-1) p-toluenesulfonic acid: manufactured by Meiyusangyo Co., Ltd., PTS-70

(c-2) m-xylene-4-sulfonic acid: manufactured by ITOCHU CHEMICAL FRONTIER Corporation, SXA-60

(c-3) p-toluenesulfonic acid sodium salt: manufactured by FUJIFILM Wako Pure Chemical Corporation

Component (d): sodium hydroxide

Component (e): thickener; acrylates/C10-C30 alkyl acrylate copolymer: manufactured by Lubrizol, Carbopol ETD 2020

[0137]

The bleaching detergent compositions shown in Table 1 were produced using the above-described components, and the pH and viscosity immediately after production were measured. Furthermore, a tube container (orifice diameter: φ5 mm) was filled with 200 g of each composition and hermetically sealed, and then left to stand at room temperature for one week. The tube was then uncapped with the orifice directed vertically downward, and it was confirmed that the composition did not drip under gravity for 1 minute or more, thereby visually confirming that the composition was a gel-like liquid. The contents of the components shown in Table 1 are the contents of the respective components expressed in mass% on an active ingredient basis per 100 parts by mass of the bleaching detergent composition.

<Production Example>

The preparation method is described below with reference to Example 1.

A predetermined amount of sodium hydroxide used as component (d) was added to and dissolved in ion-exchanged water in an amount necessary to make the total amount of the bleaching detergent composition 100 mass%. A predetermined amount of p-toluenesulfonic acid used as component (c) in the form of a 70 mass% aqueous solution, and cetyltrimethylammonium chloride and stearyltrimethylammonium chloride used as component (b) were sequentially added to the resulting aqueous sodium hydroxide solution, and the mixture was stirred to dissolve the components such that a uniform thickened composition was obtained. After confirming the pH of the composition before the addition of sodium hypochlorite, a predetermined amount of sodium hypochlorite used as component (a) was finally added, and the mixture was sufficiently stirred to obtain the bleaching detergent composition.

[0138]

<Appearance>

The appearance of each produced bleaching detergent composition was visually evaluated as a gel-like liquid, a low-viscosity liquid, or the like by judging whether the composition in the tube container

dripped when the orifice was directed vertically downward.

<pH measurement method>

A 10 mass% aqueous solution of each produced bleaching detergent composition was prepared using ion-exchanged water, and the pH of each aqueous solution was measured at 25°C. The pH values at 25°C are values measured using a pH meter (manufactured by DKK-TOA CORPORATION) 1 minute after the electrode of the pH meter was immersed in the above-described aqueous solutions.

[0139]

<Viscosity measurement method>

The viscosity of each produced bleaching detergent composition was measured using a B-type viscometer TVB-10M with an M4 rotor at 30 rpm for 1 minute at 25°C.

It should be noted that, for high-viscosity compositions having a viscosity of 20,000 mPa·s or more that could not be measured under the above-described conditions, values measured after changing the rotational speed to 12 rpm or 6 rpm were used. The measurement was performed after the compositions were kept at 25°C for 30 minutes. Furthermore, compositions in which bubbles were observed were measured after being left to stand overnight and defoamed.

[0140]

The compositions of Examples 1 to 7 and Comparative Examples 1 to 4 shown in Table 1 were

produced in accordance with the above-described Production Example.

As a result of the visual observation using the tube container, it was confirmed that the compositions of Examples 1 to 7 and Comparative Examples 3 and 4 were all gel-like liquids. On the other hand, in Comparative Examples 1 and 2, liquids dripped as soon as the tube was tilted so that the orifice was directed vertically downward, and the compositions were evaluated as low-viscosity liquids. It should be noted that, as described below, the viscosity of the compositions of Comparative Examples 3 and 4 decreased after storage at 50°C for 20 days, which is an accelerated test condition corresponding to long-term storage at room temperature.

[0141]

Using some of the bleaching detergent compositions shown in Table 1, the mold removal rates immediately after production were measured as indicators of bleach-cleaning performance. Furthermore, after each bleaching detergent composition was stored at 50°C for 20 days, the mold removal rate, viscosity, and residual rate of component (a) (sodium hypochlorite) were measured. In addition, the storage stability of the composition as a gel-like liquid was confirmed by evaluating, as described above, whether the composition in a tube container (orifice diameter: φ1 mm) dripped when the orifice was directed vertically downward.

[0142]

<Measurement of mold removal rate>

Test pieces were prepared by curing a silicone sealant for general household use (manufactured by Konishi Co., Ltd., trade name: Bond Silicone Sealant White, model: #55778) at room temperature (25°C) and cutting the cured body into approximately 1.5 cm square pieces. When *Cladosporium* sp. PA-4, an environmental isolate of a filamentous fungus belonging to the genus *Cladosporium*, which is prevalent in living environments, was cultured at 25°C for 1 month using potato dextrose agar medium prepared according to the instructions from Potato Dextrose Agar reagent manufactured by Becton, Dickinson and Company, the test pieces were placed on the medium, and mold was grown so as to cover one entire surface of each silicone sealant piece. Test pieces in which mold stains had penetrated from the surface into the interior of the silicone sealant were collected and cut into approximately 5 mm square pieces to prepare evaluation samples.

A tube container (orifice diameter: φ1 mm) was filled with each bleaching detergent composition, and 100 μL of the composition was squeezed out and applied to the evaluation sample prepared by the above-described method. After being left to stand for 60 minutes, the evaluation sample was rinsed with water and air-dried, and the removal rate was determined by image analysis before and

after the treatment. It should be noted that the image analysis was performed by capturing images of the sample using the scanner function of a printer manufactured by Ricoh Co., Ltd. (MP C5504), measuring the gray values using ImageJ, and calculating the mold removal rate using the following formula:

Mold removal rate (%) = [(gray value after treatment) − (gray value before treatment)] / [(gray value of unused silicone sealant piece) − (gray value before treatment)] × 100

The mold removal rate after the bleaching detergent composition was stored in a hermetically sealed state at 50°C for 20 days was also measured in the same manner. A larger value indicates superior mold removability.

Furthermore, the retention of the mold removal rate was calculated by the following formula:

Mold removal rate retention (%) = (mold removal rate after storage) / (mold removal rate immediately after preparation) × 100

[0143]

<Residual rate of component (a) after 20-day storage at 50°C>

For the purpose of predicting the residual amount of the bleach-cleaning component after long-term storage at room temperature, an accelerated test was conducted by storing each bleaching detergent composition at 50°C for

20 days and measuring the residual effective chlorine concentration by the method described below. Furthermore, the ratio of the residual effective chlorine concentration after storage to the initial effective chlorine concentration was taken as the residual rate of component (a). A larger value indicates superior storage stability of the bleach-cleaning component.

[0144]

<Method for measuring effective chlorine concentration>

0.3 g of each bleaching detergent composition was mixed with 100 mL of ion-exchanged water, and the mixture was stirred for about 10 minutes to completely dissolve the composition. 0.2 g of potassium iodide (manufactured by FUJIFILM Wako Pure Chemical Corporation), 20 mL of 10% sulfuric acid (manufactured by FUJIFILM Wako Pure Chemical Corporation), and 5 drops of a starch indicator (manufactured by Sigma-Aldrich) were added to the solution and completely dissolved, and titration was performed with 0.1 M sodium thiosulfate (manufactured by FUJIFILM Wako Pure Chemical Corporation) using a titration burette. The effective chlorine concentration in the detergent solution was calculated from the amount of sodium thiosulfate used for titration.

[0145]

It should be noted that the viscosity of each bleaching detergent composition after storage at 50°C for 20 days was measured in accordance with the method for

measuring the viscosity of the bleaching detergent composition immediately after production.

[0146]

The respective measurement and evaluation results are shown in Table 1.

It should be noted that the contents of component (d) (sodium hydroxide) shown in the table are values determined in accordance with the test method specified for free alkali in the standard for sodium hypochlorite for waterworks (JWWA K 120) (neutralization titration; expressed in terms of sodium hydroxide). The values shown in parentheses are the formulation amounts of component (d) (mass%).

[Table 1]

			Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Comparative example 1	Comparative example 2	Comparative example 3	Comparative example 4
Component [mass%]	(a)		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	(b)	(b-1)		1.32									
		(b-2)	1.8	1.45	1.8	1.8	1.8	2.4	1.8	1.8		1.8	
		(b-3)	1.2		1.2	1.2	1.2	1.6	1.2	1.2		1.2	
	(c)	(c-1)	2.34	2.34	1.57	3.12	4.68	3.12	0.94		2.34		
		(c-2)											
		(c-3)										2.64	
	(d)*		0.96 (1.5)	0.96 (1.5)	0.96 (1.3)	0.96 (1.7)	0.96 (2.1)	0.96 (1.7)	0.96 (1.2)	0.96 (0.96)	0.96 (1.5)	0.005 (0)	0.96 (1.0)
	(e)												2
	Water		Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
(c)/(b) [molar ratio]			1.5	1.5	1.0	2.0	3.0	1.5	0.6	0	—	1.5	—
pH			12	12	12	12	12	12	12	12	12	10	12
Immediately after production	Mold removal rate [%]		71	58	67	64	63	62	62	—	—	69	58
	Viscosity [mPa ·s]		7,500	1,300	9,000	7,000	2,000	11,000	13,000	<5	<5	7,300	14,000
After 20-day storage at 50°C	Mold removal rate [%]		57	42	53	47	45	50	32	—	—	0	0
	Viscosity [mPa ·s]		7,400	1,200	8,500	7,100	1,400	13,000	6,000	—	—	32	<5
	Component (a) residual rate [%]		60	58	60	62	65	56	48	—	—	0	0
Mold removal rate retention [%]			80	72	79	73	71	81	52	—	—	0	0

*Values expressed in terms of sodium hydroxide are shown. The formulation amounts [mass%] are shown in parentheses.

[0147]

As shown in Table 1, in the Examples, high mold removal rates were obtained by using bleaching detergent compositions containing predetermined amounts of components (a), (b), (c), and (d) and water. The mold removal rate retention after storage at 50°C for 20 days ranged from 52% (Example 7) to 81% (Example 6), and was confirmed to be markedly excellent.

No marked decrease in the viscosity was observed, and it was confirmed that the compositions were all gel-like liquids in the evaluation of dripping using the tube container. Furthermore, 48% or more of sodium hypochlorite used as component (a) remained after storage at 50°C for 20 days.

[0148]

In Comparative Examples 1 and 2, as described above, the viscosity of the bleaching detergent compositions immediately after production was less than 5 mPa·s.

In Comparative Example 3, in which component (d) (alkaline agent) was not added and the pH of the 10 mass% aqueous solution immediately after production was 10, the mold removal rate and viscosity immediately after production showed favorable values. However, after storage at 50°C for 20 days, component (a) did not remain at all, and the mold removal rate became 0%. In Comparative Example 4, in which components (b) and (c)

were not added and a polymer-based thickener was added instead, the same tendency as in Comparative Example 3 was also observed. Furthermore, in Comparative Examples 3 and 4, the viscosity drastically decreased after storage, and, in the evaluation of dripping using the tube container, liquids dripped when the tube was tilted so that the orifice was directed vertically downward, and the compositions were evaluated as low-viscosity liquids.

[0149]

Table 2 shows the pH and viscosity immediately after production of compositions produced in accordance with the above-described Production Example.

[Table 2]

			Example 8	Example 9	Example 10
Component [mass%]	(a)		2.5	2.5	2.5
	(b)	(b-1)			
		(b-2)	2.9		1.8
		(b-3)		3.16	1.2
	(c)	(c-1)	2.34	2.34	
		(c-2)			2.53
		(c-3)			
	(d)*		0.96 (1.5)	0.96 (1.5)	0.96 (1.5)
	Water		Balance	Balance	Balance
(c)/(b) [molar ratio]			1.5	1.5	1.5
pH			12	12	12
Viscosity [mPa ·s]			6,600	6,500	6,900

*Values expressed in terms of sodium hydroxide are shown. The formulation amounts [mass%] are shown in parentheses.

[0150]

Table 2 shows the pH and viscosity immediately after production of compositions produced in accordance with the above-described Production Example. As a result of the visual observation using the tube container, it was confirmed that the compositions were all gel-like liquids. With these compositions, high mold removal rates, excellent viscosity stability, high residual rates of component (a), and high mold removal rate retention can also be obtained.

Reference Signs List

[0151]

1 Dispensing container

2 Nozzle

3 Sealing cap

4 Length from the bottom of the dispensing container to the tip of the nozzle

5 Maximum width of the dispensing container

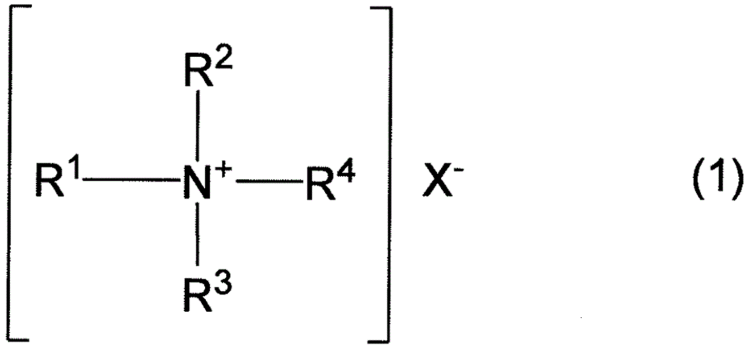
CLAIMS

[Claim 1]

A bleaching detergent composition comprising:

component (a): 0.1 mass% or more and 10 mass% or less of an alkali metal hypochlorite;

component (b): 0.1 mass% or more and 10 mass% or less of one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salts represented by the following general formula (1):



(1)

wherein R^1 represents a linear or branched alkyl group having 8 or more and 22 or less carbons; R^2 represents a linear or branched alkyl group having 1 or more and 12 or less carbons, or an aralkyl group having 7 or more and 12 or less carbons; R^3 and R^4 are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X^- represents a counter anion;

component (c): an aromatic sulfonic acid or a salt thereof;

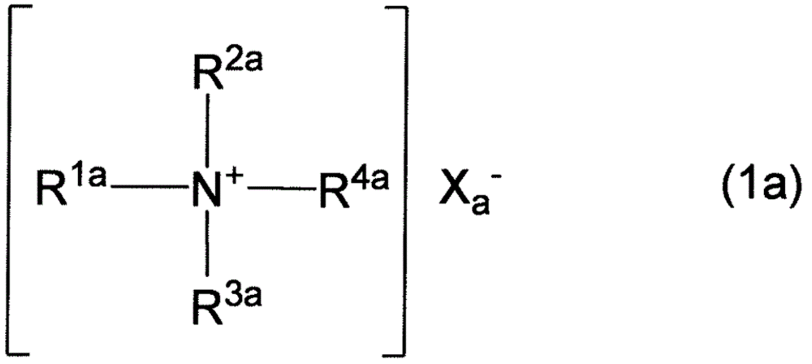
component (d): an alkaline agent; and

water,

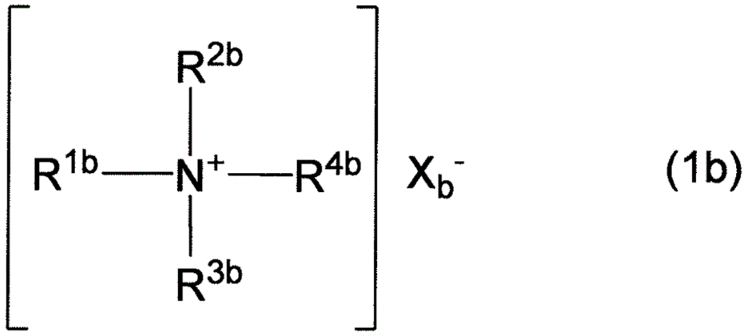
wherein the bleaching detergent composition has a viscosity at 25°C of 1,000 mPa·s or more and 100,000 mPa·s or less, and a 10 mass% aqueous solution of the bleaching detergent composition has a pH at 25°C of 11 or more and 14 or less.

[Claim 2]

The bleaching detergent composition according to claim 1, wherein the quaternary ammonium salt-type surfactants represented by the general formula (1) are one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salt-type surfactants represented by the following general formulas (1a) to (1c):

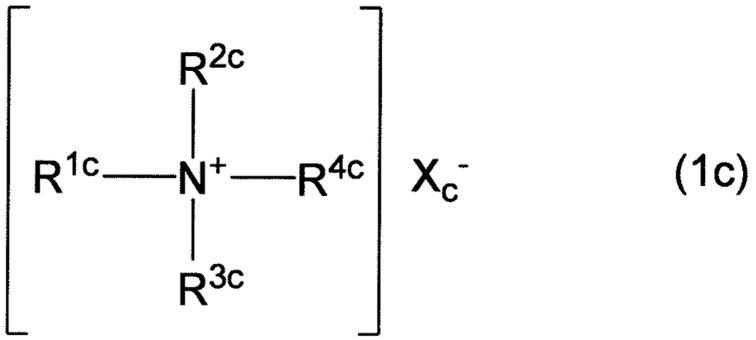


wherein R^{1a} represents a linear or branched alkyl group having 14 or more and 22 or less carbons; R^{2a}, R^{3a}, and R^{4a} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_a^- represents a counter anion;



(1b)

wherein R^{1b} and R^{2b} are the same or different and each represent a linear or branched alkyl group having 8 or more and 12 or less carbons; R^{3b} and R^{4b} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_b^- represents a counter anion;



(1c)

wherein R^{1c} represents a linear or branched alkyl group having 8 or more and 18 or less carbons; R^{2c} represents an aralkyl group having 7 or more and 12 or less carbons; R^{3c} and R^{4c} are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X_c^- represents a counter anion.

[Claim 3]

The bleaching detergent composition according to claim 2, wherein the component (b) is one or more quaternary ammonium salt-type surfactants selected from quaternary ammonium salt-type surfactants represented by the general formula (1a).

[Claim 4]

The bleaching detergent composition according to claim 2, wherein the component (b) is one or two quaternary ammonium salt-type surfactants selected from quaternary ammonium salt-type surfactants represented by the general formula (1a) in which R^{1a} is a linear or branched alkyl group having 16 or 18 carbons.

[Claim 5]

The bleaching detergent composition according to claim 2, wherein, as the component (b), a quaternary ammonium salt-type surfactant represented by the general

formula (1a) in which R^{1a} is a linear or branched alkyl group having 16 carbons and a quaternary ammonium salt-type surfactant represented by the general formula (1a) in which R^{1a} is a linear or branched alkyl group having 18 carbons are used in combination.

[Claim 6]

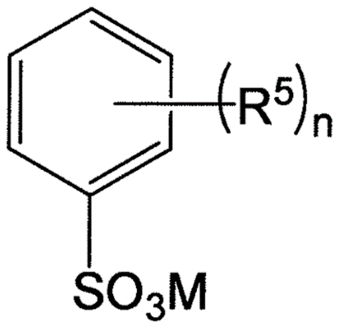
The bleaching detergent composition according to any one of claims 1 to 5, wherein, as the component (b), a cetyltrimethylammonium salt and a stearyltrimethylammonium salt are used in combination.

[Claim 7]

The bleaching detergent composition according to any one of claims 1 to 6, wherein the component (c) is a benzene derivative sulfonic acid or a salt thereof.

[Claim 8]

The bleaching detergent composition according to claim 7, wherein the benzene derivative sulfonic acid or a salt thereof is a benzenesulfonic acid or a salt thereof represented by the following general formula (2):



(2)

wherein R^5 represents an alkyl or alkenyl group having 1 or more and 3 or less carbons; n is an integer of 0 or more and 4 or less, and when n is 2 or more, R^5 groups may be the same or different; and M represents a hydrogen atom or a counter cation.

[Claim 9]

The bleaching detergent composition according to any one of claims 1 to 8, wherein a molar ratio of the content of the component (c) to the content of the component (b), (c)/(b), is 0.35 or more and 5 or less.

[Claim 10]

The bleaching detergent composition according to any one of claims 1 to 9, wherein the content of the component (d) in the bleaching detergent composition is 0.5 mass% or more and 5.0 mass% or less.

[Claim 11]

The bleaching detergent composition according to any one of claims 1 to 10, wherein the viscosity at 25°C is 3,000 mPa·s or more and 100,000 mPa·s or less.

[Claim 12]

The bleaching detergent composition according to any one of claims 1 to 11 for use as a mold remover.

[Claim 13]

A method for bleach-cleaning mold stains, comprising bringing the bleaching detergent composition according to any one of claims 1 to 12 into contact with mold formed on a hydrophobic resin portion.

[Claim 14]

A method for bleach-cleaning mold stains, comprising bringing the bleaching detergent composition according to any one of claims 1 to 12 into contact with mold and allowing the composition to remain in contact with the mold for 5 minutes or more.

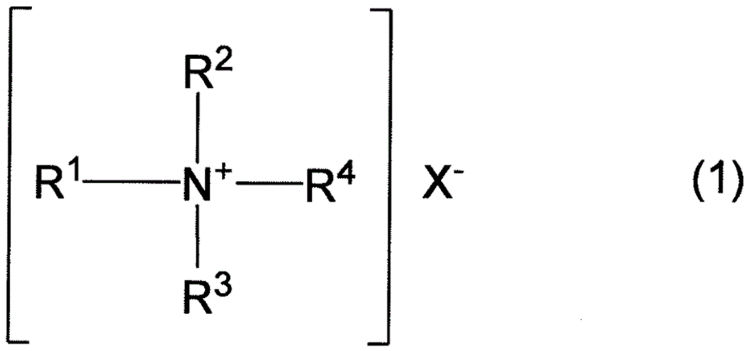
[Claim 15]

A bleaching detergent composition comprising a mixture of:

component (a): 0.1 mass% or more and 10 mass% or less of an alkali metal hypochlorite;

component (b): 0.1 mass% or more and 10 mass% or less of one or more quaternary ammonium salt-type

surfactants selected from quaternary ammonium salts represented by the following general formula (1):



(1)

wherein R^1 represents a linear or branched alkyl group having 8 or more and 22 or less carbons; R^2 represents a linear or branched alkyl group having 1 or more and 12 or less carbons, or an aralkyl group having 7 or more and 12 or less carbons; R^3 and R^4 are the same or different and each represent a linear or branched alkyl group having 1 or more and 4 or less carbons; and X^- represents a counter anion;

component (c): an aromatic sulfonic acid or a salt thereof;

component (d): an alkaline agent; and

water,

wherein the bleaching detergent composition has a viscosity at 25°C of 1,000 mPa·s or more and 100,000 mPa·s or less, and a 10 mass% aqueous solution of the bleaching detergent composition has a pH at 25°C of 11 or more and 14 or less.