

DESCRIPTION

Title of the invention

METHOD FOR CLEANING TOILET BOWL

Field of the invention

[0001]

The present invention relates to a method for cleaning a toilet bowl.

Background of the invention

[0002]

For cleaning a flush toilet bowl, there have been known detergent compositions that are placed in a toilet tank to slowly dissolve an active detergent component into flushing water in the tank, thereby continually removing dirt and stains from the bowl by every flush with the flushing water to keep the toilet bowl clean. Such a detergent composition is known as an automatic cleaner for toilet bowl.

[0003]

As a means to be applicable to any flush toilet bowl having any shape, there is also a known method of forming a slowly soluble coating on the surface of a toilet bowl and continually cleaning the toilet bowl. For example, JP-A-2005-187511 and JP-A-2006-206882 describe a cleaning method such that a component dispensed from a container is attached and solidified on any part and is slowly dissolved in water to gradually release

an active component for cleaning.

[0004]

There is also a known method of attaching a slowly dissolving gel on the surface of a toilet bowl to slowly release a detergent component, thereby continually cleaning the toilet bowl. For example, WO 2002/26925 describes an agent having a viscosity of not less than 15000 mPa·s and being directly applied to an object. US-B6323171 describes a microemulsion composition for removing oil stains and sticky stains.

Summary of the invention

[0005]

The present invention relates to a method for cleaning a toilet bowl, containing steps 1 to 3:

step 1: applying a detergent composition for toilet bowl to a toilet bowl, wherein the composition contains (a) a polyoxyethylene alkyl ether having an alkyl group having 14 to 22 carbon atoms and an average addition mole number of ethylene oxide of 20 to 80 in an amount of 14 to 64% by mass, (b) ethanol, and water, and has a viscosity of 50 to 3000 mPa·s at 25°C;

step 2: allowing the composition to stand for 1 minute to 3 hours from the end of step 1 for volatilization of the component (b) from the applied composition to form a gel having a higher viscosity than that of the composition before applied; and

step 3: applying water to the formed gel to generate a cleaning medium containing the component (a) and water to be applied to the toilet bowl.

Detailed Description of the Invention

[0006]

In cleaning a toilet bowl with a composition that can form a coating slowly releasing a detergent component, the composition desirably has properties for easy application to a toilet bowl (ease of putting out the composition from a container, ease of attaching to the toilet bowl, and ease of spreading the composition uniformly across a wide area) and a cleaning effect kept for a long time.

[0007]

The composition described in JP-A-2005-187511, containing a component for delaying dissolution into water and a detergent component, may decrease water-solubility or cause falling of an applied composition, and result in impaired properties for slow dissolution of components after a long period of drying. The composition described in JP-A-2006-206882, containing a component for delaying dissolution into water, a chemical agent, and a solvent, has a small content of compositions contributing for detergency, and thus insufficient detergency. In addition, the composition has insufficient properties for slow dissolution of components. The composition described in WO 02/26925 has very high viscosity and is designed for local application and retention of the composition on the surface of a toilet bowl. The composition is thus not suitable for spreading uniformly across the surface of a toilet bowl.

[0008]

The present invention provides a method for cleaning a toilet bowl with a detergent composition for toilet bowl having good properties for easy application to a toilet bowl and prolonged detergency, comprising applying the composition to the toilet bowl. The present invention is excellent in easiness of application to a toilet bowl and sustainability of detergency.

[0009]

<Detergent composition>

The detergent composition of the present invention has a viscosity at 25°C (hereinafter, referred to as initial viscosity) of 50 to 3000 mPa·s, preferably 100 to 2500 mPa·s, and more preferably 150 to 2000 mPa·s. From the viewpoint of adhesion of the detergent composition to a toilet bowl, the viscosity is not less than 50 mPa·s, and from the viewpoint of workability such as an easy dispensing from a used container, the viscosity is not more than 3000 mPa·s.

[0010]

The detergent composition of the present invention contains a polyoxyethylene alkyl ether having an alkyl group having 14 to 22 carbon atoms and an average ethylene oxide addition mole number of 20 to 80 as the component (a). The component (a) serves as a detergent, also contributing to the initial viscosity and the formation of the more viscous gel through evaporation of ethanol. In the component (a), the alkyl group has 14 to 22 carbon atoms, and more preferably 16 to 18 carbon atoms. From the viewpoints of adhesion to a toilet bowl

and prolonged detergency, the number of carbon atoms is not less than 14. For dispensing the composition easily from a container, the number is not more than 22. In the component (a), an average addition mole number of ethylene oxide is 20 to 80, more preferably 25 to 70, and even more preferably 30 to 60. From the viewpoint of prolonged detergency, the number is not less than 20, and from the viewpoint of adhesion to a toilet bowl, the number is not more than 80. The detergent composition of the present invention preferably comprises the component (a) in an amount of 14 to 64% by mass, more preferably 15 to 60% by mass, and even more preferably 20 to 50% by mass. From the viewpoints of prolonged detergency and adhesion to a toilet bowl, the content is preferably not less than 14% by mass, and for dispensing the composition easily from a container, the content is not more than 64% by mass.

[0011]

The detergent composition of the present invention can further contain a detergent component other than the component (a). The other detergent component is preferably a surfactant, more preferably a nonionic surfactant. A nonionic surfactant other than the component (a) is preferably a surfactant having a polyoxyethylene chain (average ethylene oxide addition mole number: 1 to 6). Specific examples of the surfactant include polyoxyethylene alkenyl ethers having an alkenyl group having 8 to 18 carbon atoms and an average ethylene oxide addition mole number of 1 to 6; polyoxyethylene alkylphenyl ethers having an alkyl group having 8 to 18 carbon atoms and an average ethylene

oxide addition mole number of 1 to 6; a nonionic surfactant mixture containing an alkyl or alkenyl group having 8 to 18 carbon atoms and an alkyl or alkenyl group with added ethylene oxide in an average moles of 1 to 6 moles; alkylamine oxides having an alkyl group having 8 to 18 carbon atoms and a polyoxyethylene group having an average ethylene oxide addition mole number of 1 to 6; and fatty acid(8 to 18 carbon atoms)alkanolamides having an acyl group having 8 to 18 carbon atoms and a polyoxyethylene group having an average ethylene oxide addition mole number of 1 to 6.

[0012]

The detergent composition of the present invention contains ethanol as the component (b). The component (b) also contributes to the foregoing initial viscosity with the component (a). The component (b) is also a volatile material, and thus can increase the viscosity of the composition through volatilization thereof from the composition. The detergent composition of the present invention preferably contains the component (b) in an amount of 2 to 30% by mass, and more preferably 3 to 15% by mass. For dispensing the composition easily from a container and enabling to spread uniformly across a wide area, the content is preferably not less than 2% by mass, and from the viewpoints of adhesion to a toilet bowl and prolonged detergency, the content is not more than 30% by mass.

[0013]

The detergent composition of the present invention can further contain a volatile alcohol other than the component (b).

As used herein, the "volatile ingredient" refers to a substance having a saturated vapor pressure of not less than 1 kPa at 20°C, and volatilizing at 20°C under ordinary pressure.

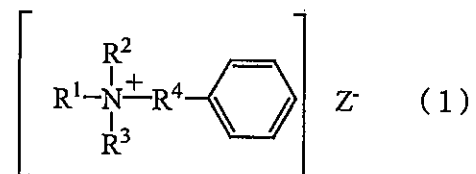
[0014]

The detergent composition of the present invention may further contain a bactericidal quaternary ammonium salt cationic surfactant having 1 or 2 hydrocarbon groups having 6 to 16 and preferably 8 to 14 carbon atoms in order to have bactericidal properties.

[0015]

The cationic surfactant is preferably composed of one or more cationic surfactants selected from those represented by the formulae (1) and (2):

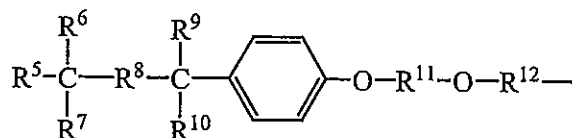
[0016]



[0017]

wherein, R¹ represents a hydrocarbon group having 8 to 18 carbon atoms or a group represented by:

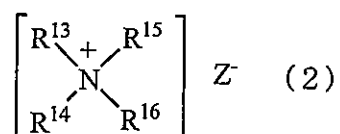
[0018]



[0019]

(wherein, R^5 , R^6 , R^7 , R^9 , and R^{10} each independently represent an alkyl group having 1 to 3 carbon atoms; and R^8 , R^{11} , and R^{12} each independently represent an alkylene group having 1 to 3 carbon atoms); R^2 and R^3 each independently represent an alkyl group having 1 to 3 carbon atoms; R^4 represents an alkylene group having 1 to 3 carbon atoms; Z^- represents an anionic group, preferably a halogen ion, an amino acid ion, an anionic group of fatty acid soap, an anionic group of a phosphate, a phosphonate, a sulfonate or a sulfate, which has a linear or branched alkyl or alkenyl groups having 1 to 30 carbon atoms, or an anionic oligomer or a polymer, having a formalin condensate with a sulfonated polycyclic aromatic compound, optionally containing a polymerized styrenesulfonate ion having a polymerization degree of not less than 3 or optionally having a hydrocarbon group as a substituent).

[0020]



[0021]

wherein, R^{13} and R^{14} each independently represent a long-chain alkyl group, a long-chain alkenyl group or a long-chain hydroxyalkyl group, each having 6 to 14 carbon atoms, with the

proviso that the total number of the carbon atoms of R^{13} and R^{14} is 16 to 26; R^{15} and R^{16} each independently represent an alkyl group or a hydroxyalkyl group, having 1 to 3 carbon atoms, or a group represented by $-(OR^{18})_n-OH$ (wherein, R^{18} represents an alkenyl group having 2 to 4 carbon atoms; and n represents the number of 1 to 10); and Z^- represents the same meanings as above.

In the formula (1), from the viewpoint of detergency, R^1 preferably represents an alkyl group having 6 to 18 carbon atoms, and more preferably 8 to 14 carbon atoms. In the formula (2), R^{13} and R^{14} each independently preferably represent an alkyl group having 8 to 12 carbon atoms. In the formulae (1) and (2), each Z^- preferably represents a halogen ion.

From the viewpoint of bactericidal properties, the composition preferably comprises the cationic surfactant in an amount of 0.1 to 8% by mass, and more preferably 1 to 5% by mass.

The detergent composition of the present invention may further contain a builder component.

Examples of the builder component include:

(i) amino acids and salts thereof with alkaline metals and alkanolamines such as aspartic acid, glutamic acid, and glycine;

(ii) aminocarboxylic acids and salts thereof with alkaline metals and alkanolamines such as nitrilotriacetic acid, iminodiacetic acid, ethylenediaminetetraacetic acid, hydroxyethylethylenediaminetriacetic acid, diethylenetriaminepentaacetic acid, glycol-ether-diaminetetraacetic acid,

hydroxyethyliminodiacetic acid,

triethylenetetraminehexaacetic acid, and djenkolic acid;

(iii) organic acids and salts thereof with alkaline metals and alkanolamines such as diglycolic acid, oxydisuccinic acid, carboxymethyloxysuccinic acid, citric acid, lactic acid, tartaric acid, oxalic acid, malic acid, oxydisuccinic acid, gluconic acid, carboxymethylsuccinic acid, and carboxymethyltartaric acid.

Among them, preferred are hydroxycarboxylic acids such as citric and malic acids, aminocarboxylic acids such as ethylenediaminetetraacetic and hydroxyethylethylenediaminetriacetic acids, and salts thereof. The type of salt is preferably selected from sodium salt, potassium salt, ammonium salt and alkanolamine salt.

[0022]

From the viewpoint of detergency, a content of the builder component in the composition is preferably 0.1 to 5% by mass, more preferably 0.2 to 3% by mass.

In the present invention, use of a combination of at least one cationic surfactant selected from those represented by the formulae (1) and (2) and the builder component selected from (i) to (iii) enhances effects of the composition to prevent a ring-like stain appearing at the top of a water-line of water maintained in a toilet bowl. The cationic surfactant and the builder component are thus preferably used together. A weight ratio of the cationic surfactant to the builder component, cationic surfactant/builder component, is preferably within

the range of 10/1 to 1/10. No reason is clear for this, but it is assumed that the builder component interacts weakly with the cationic surfactant to prevent the cationic surfactant from stably adhering onto the surface of a toilet bowl, thereby allowing the cationic surfactant to exert the bactericidal effect thereof at the top of a water-line of water maintained in a toilet bowl causing a ring-like stain.

[0023]

The detergent composition of the present invention comprises water as well as these components. The amount of water is adjustable such that the detergent composition becomes 100% by mass in total. In other words, the balance other than the components of the detergent composition is water.

[0024]

The detergent composition of the present invention forms a gel having a higher viscosity than the viscosity before volatilization of the composition by volatilization of the ethanol (b). The gel formed through the volatilization preferably has a viscosity not less than 10 Pa·s, more preferably not less than 100 Pa·s, and even more preferably not less than 1000 Pa·s at 25°C. Such viscosity of the gel is that formed after the volatilization of component (b) from the detergent composition, and can be measured, for example, with TOKIMEC VISCOMETER MODEL BM (TOKIMEC INC, now TOKYO KEIKI INC). The viscosity of the gel is referred to as "post-volatilization viscosity" for convenience. Such a gel having a post-volatilization viscosity can be formed by a sufficient

volatilization of ethanol from the composition. One of simpler methods of forming a gel is applying the composition on the surface of a toilet bowl as described above and drying it for 1 minute to 3 hours at a temperature of the environment where a toilet bowl is installed, (e.g., room temperature). From the viewpoint of prolonged detergency of the gel, the post-volatilization viscosity is preferably not less than 10 Pa.s. The detergent composition of the present invention for toilet bowl preferably forms a gel having a viscosity of not less than 10 Pa.s at 25°C through volatilization of the component (b) when 10 g of the composition is spread uniformly on a glass petri dish having an inner diameter of 85 mm and dried for 3 hours at 40°C at 50% humidity.

[0025]

The gel formed through volatilization of the ethanol i.e. the component (b) is preferably slowly water-soluble. The "being slowly water-soluble" refers to a physical property such that part of the component (a) is dissolved in tap water, when a gel formed by applying uniformly 10 g of the detergent composition on a glass petri dish having an inner diameter of 85 mm and drying it for 3 hours at 40°C at 50% humidity is allowed to stand for one minute after a gentle addition of 10 g of tap water to the formed gel.

[0026]

The composition of the present invention can be dispensed from a squeeze container or sprayed from a spray container to be applied to the surface of a toilet bowl. The composition

adhered on the surface of the toilet bowl can be allowed to stand until ethanol has volatilized to form a gel having the post-volatilization viscosity and preferably dissolving slowly in water.

[0027]

The detergent composition of the present invention preferably has pH of 2 to 13, more preferably 3 to 11, and more preferably 3 to 7 at 25°C. A pH value is measured using a Horiba pH meter D-52S with a pH electrode 6367-10D.

[0028]

<Method for cleaning a toilet bowl>

The method for cleaning a toilet bowl is for cleaning the toilet bowl by applying the detergent composition of the present invention to a toilet bowl, volatilizing the ethanol (b) from the applied composition to form a gel having a high viscosity, preferably slowly water-soluble, and applying water to the gel to dissolve the polyoxyethylene alkyl ether (a) out. More specifically, the method of the present invention includes the following steps 1 to 3:

step 1: applying the detergent composition of the present invention for toilet bowl to a toilet bowl;

step 2: allowing the composition to stand, as it is, for 1 minute to 3 hours from the end of step 1 for volatilization of the component (b) from the applied composition to form a gel having a higher viscosity than that of the composition before applied; and

step 3: applying water to the gel formed in step 2 to

generate a cleaning medium containing the component (a) and water to be applied to the toilet bowl.

[0029]

In step 1, the detergent composition may be applied to the surface of a toilet bowl by dispensing the liquid from a squeeze container or spraying the liquid from a spray container, or the like. An amount of the detergent composition applied is preferably 2 g to 50 g and more preferably 5 to 40 g per use on the surface of a toilet bowl. From the viewpoint of sustainability of detergency, the amount is preferably not less than 2 g, and from the viewpoint of efficiency in the use of the detergent composition, the amount is preferably not more than 50 g.

[0030]

Any squeeze container can be used. Preferred examples of the container include that described in JP-A-2009-298426.

The squeeze container comprising a container body having flexibility, and a press restriction member that is provided inside the container body and that restricts, from inside the container body, deformation of the container body due to pressing of a side surface of the container body from outside thereof, a content liquid of the container being discharged by pressing the side surface of the container body from outside thereof.

[0031]

Any spray container can be used, preferably including a spray container equipped with a trigger sprayer (referred to

as trigger spray container). The trigger spray container has a container containing a liquid detergent composition and a trigger device for spraying the liquid attached on a mouth of the container. The trigger device further includes a vertical pipeline and a horizontal pipeline in the trigger sprayer and a valve installed in the vertical pipeline for blocking a flow between the vertical and the horizontal pipelines (referred to as spray container (I)). In the spray container (I), the horizontal pipeline preferably has a volume of 0.1 to 0.28 cm³, and the vertical pipeline preferably has a volume of a part under the valve of 0.06 to 0.19 cm³. The spray container (I) has a cylinder provided below the horizontal pipeline, a spinning element attached to the fore-end of the horizontal pipeline, and a nozzle part having a nozzle hole, inserted and fixed on the top of the spinning element. The spray container (I) works such that the air is expelled from the cylinder by pulling the trigger; as the trigger is returned, a liquid detergent composition is sucked up through the vertical pipeline, the end of which is submerged in the liquid detergent composition in the housing of the spray container (I), to fill the cylinder with the liquid; another pulling of the trigger pushes the liquid out of the cylinder through the vertical pipeline, the horizontal pipeline and then the spinning element, applying spinning to the flow of the liquid, to finally jet the liquid out of the nozzle. The trigger spray container may be an applied product such as a reused trigger spray bottle for "Bath Magiclean Bubble Spray" (Kao Corporation) by being cleaned and

dried.

[0032]

In step 2, the ethanol (b) is volatilized from the composition to form a gel having a higher viscosity than the initial viscosity of the composition. In step 2, a gel having a viscosity of not less than 10 Pa·s at 25°C is preferably formed through volatilization of the ethanol (b) from the composition. It is preferable that the gel formed in step 2 is slowly soluble in water. The composition applied in step 1 in an amount of the range described above generally forms a gel having a higher viscosity than the initial viscosity of the composition, preferably being slowly soluble in water, by standing it for a few minutes to a few hours, specifically from 1 minute to 3 hours, about at room temperatures.

[0033]

In step 3, water is applied to the gel formed in step 2 (e.g., flowing water on the gel in contact) to form a cleaning medium containing the component (a) and water, the cleaning medium being applied to a toilet bowl. The application of water to the gel in step 3 can be started when the viscosity of the gel formed in step 2 has reached 10 Pa·s or higher at 25°C. The gel formed from the detergent composition of the present invention in step 2 will not fall off, nor have excess dissolution, nor have reduction in viscosity with flush of water in a general flushing toilet, but will remain at the position applied and release part of the detergent component including the component (a) through the contact with water to clean a

toilet bowl. Thus, a cleaning medium containing the component (a) and water contacts with the toilet bowl to clean the toilet bowl. The cleaning medium containing the component (a) and water can optionally comprise a water-soluble component derived from the gel.

[0034]

In the present invention, the detergent composition is preferably applied to the rim (an underside of the bowl edge) of a stool type flush toilet bowl (i.e., Western style toilet bowl). In general, a stool type flush toilet bowl has a supply port of cleaning water for cleaning an inner wall of a bowl, which is a main body of the toilet bowl, and a water outlet port typically along with the rim of the bowl. In the present invention, the detergent composition is preferably applied at a downstream site of a passage of cleaning water discharged from the stool type flush toilet bowl, and forms a gel at that position in steps 1 and 2.

Examples

[0035]

The following Examples demonstrate the present invention. Examples are intended to illustrate the present invention and not to limit the present invention.

[0036]

Detergent compositions of Examples and Comparative Examples were prepared with components shown in Tables 1 and 2. In Table 2, Comparative Examples 13 and 14 are same to those

described in Example 6 of JP-A-2005-187511 and Example 10 of JP-A-2006-206882, respectively. The pH was adjusted with aqueous 6N sodium hydroxide solution or 6N hydrochloric acid if needed. Detergent compositions were tested for easiness of application, sustainability of detergency, and prevention of ring-like stain according to the methods described below. Detergent compositions were also measured about initial viscosity and post-volatilization viscosity according to the methods described below. Results are shown in Tables 1 and 2.

[0037]

(Measurement of viscosity)

The initial viscosity was measured with TOKIMEC VISCOMETER MODEL BM (TOKIMEC INC.) as a measuring apparatus. In the measurement, a No.3 rotor was used at rotation speed of 30 rpm at 25°C. A measured value after 1 minute from the start of measurement was used as the initial viscosity.

The post-volatilization viscosity was measured using a sample prepared by spreading 10 g of a composition uniformly over a glass petri dish having an inner diameter of 85 mm and drying for 3 hours at 40°C in an atmosphere of 50% humidity. Ethanol is volatilized from the composition containing ethanol under this condition. A measurement was performed with Physica MCR-301 (Anton Paar) using a plate CP50-1 (series 3275) under the condition of a shear rate of 0.1s⁻¹ at 25°C.

[0038]

(Easiness of application)

Each of the detergent compositions in Table 1 was

dispensed from a 500 ml squeeze container to apply to an underside of the bowl edge, and then evaluated for easiness of application. An easy application is defined as that a detergent composition is dispensed from the squeeze container just by squeezing the container, is applied to the underside of the bowl edge of a Western toilet bowl, and adheres to the bowl. 10 operators applied detergent compositions to a toilet bowl at an underside of the bowl edge. Detergent compositions were ranked for easiness of application according to the following rating.

- 1: 0 to 2 operators said that it was easy to apply.
- 2: 3 to 5 operators said that it was easy to apply.
- 3: 6 to 8 operators said that it was easy to apply.
- 4: 9 to 10 operators said that it was easy to apply.

[0039]

(Sustainability of detergency)

For each of detergent compositions, 20 g of detergent composition was dispensed from a 500 ml squeeze container to be applied to an underside of the bowl edge of a Western toilet bowl, and dried for 1 hour at room temperature to form a gel. Detergent compositions of Examples formed a gel having a higher viscosity than the initial viscosity and dissolving slowly in water. 20 μ l of a model stain (oleic acid: 49.95% by mass, triolein: 49.95% by mass, Sudan III: 0.10% by mass) was applied to the surface of a toilet bowl using a pipette, and then, the bowl was flushed every one hour from 9 a.m. to 5 p.m. each day. This operation was continued for 5 days from Monday to Friday,

and interrupted on Sunday and Saturday. This cycle was repeated. The bowl subjected to the operation was ranked according to the following rating.

- 1: A stain remained after 1st to 10th flushing.
- 2: A stain remained after 11th to 30th flushing.
- 3: A stain remained after 31st to 50th flushing.
- 4: No stain remained after 50th flushing.

[0040]

(Prevention of ring-like stain)

During the evaluation for sustainability of detergency, a bowl was also monitored for appearance or development of a ring-like stain at the top of a water-line of water maintained in a toilet bowl, and ranked for a period of the development according to the following rating. Once a ring-like stain developed, it is difficult to be removed by flushing. A test was thus ended when a ring-like stain developed.

- 1: A ring-like stain developed after the 50th flushing.
- 2: A ring-like stain did not develop after 50th flushing, but developed no later than the 70th flushing.
- 3: A ring-like stain did not develop after 70th flushing, but developed no later than the 90th flushing.
- 4: A ring-like stain did not develop after 90th flushing, but developed no later than the 110th flushing.
- 5: A ring-like stain did not develop after 110th flushing.

[0041]

Table 1

Detergent composition		Example							
		1	2	3	4	5	6	7	8
(a) Component (mass %)	Polyoxyethylene(p=30)cetyl ether	25	60	-	-	-	-	-	-
	Polyoxyethylene(p=30)stearyl ether	-	-	60	-	-	-	-	-
	Polyoxyethylene(p=30)behenyl ether	-	-	-	50	60	-	-	-
	Polyoxyethylene(p=30) cetyl/stearyl ether*1	-	-	-	-	-	15	20	30
	(b) Ethanol	15	12.5	15	25	24	15	15	3
Component	Benzalkonium chloride*2	-	-	-	-	-	-	-	5
	Citric acid	-	-	-	-	-	-	-	4
	deionized water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Total	100	100	100	100	100	100	100	100
	pH(25°C)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	4.0
Initial viscosity [mPa·s (25°C)]		220	1840	1200	2280	2840	60	140	880
Post-volatilization viscosity [Pa·s (25°C)]		Not less than 10	Not less than 10	Not less than 10	Not less than 10	Not less than 10	Not less than 10	Not less than 10	Not less than 10
Easiness of application		4	4	4	4	4	4	4	4
Sustainability of detergency		4	4	4	4	4	4	4	4
Prevention of ring-like stain		2	3	3	3	3	2	2	5

Table 2

Detergent composition	Component (mass %)	Comparative example													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
(a)	Polyoxyethylene (p=30) cetyl ether	-	60	-	-	-	-	-	-	-	-	-	-	-	-
	Polyoxyethylene (p=30) stearyl ether	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Polyoxyethylene (p=30) behenyl ether	-	-	-	65	60	-	-	60	-	12.5	-	-	-	-
	Polyoxyethylene (p=30) cetyl/stearyl ether ^{*1}	-	-	-	-	-	10	13	-	30	12.5	-	-	-	-
(b)	Polyoxyethylene (p=15) lauryl ether	-	-	-	-	-	-	-	-	-	-	30	-	80	-
	Polyoxyethylene (p=30) lauryl ether	-	-	-	-	-	-	-	-	-	-	-	30	-	-
	Ethanol	-	-	10	24	23	15	15	30	1	-	10	5	-	-
	Glycerine	-	-	-	-	-	-	-	-	-	10	-	-	-	-
	Benzalkonium chloride ^{*2}	-	-	-	-	-	-	-	-	5	-	-	-	-	-
	Citric acid	-	-	-	-	-	-	-	-	4	-	-	-	-	-
	Triethanolamine polyoxyethylene (p=2) laurylether sulfate	-	-	-	-	-	-	-	-	-	6	-	-	-	-
	l-limonene	-	-	-	-	-	-	-	-	-	10	-	-	3	-
	Hydroxyethyl cellulose ^{*3}	-	-	-	-	-	-	-	-	-	-	-	-	-	10
	Didecyl dimethyl ammonium chloride ^{*4}	-	-	-	-	-	-	-	-	-	-	-	-	-	3
	deionized water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100
pH (25°C)		7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0
Initial viscosity [mPa·s (25°C)]		Less than 1	Unmeasurable	Less than 1	Unmeasurable	3500	Less than 1	30	Unmeasurable	Unmeasurable	Unmeasurable	80	120	240	Unmeasurable
Post-volatilization viscosity [Pa·s (25°C)]		Less than 1	Not less than 10	Less than 1	Unmeasurable	Not less than 10	Less than 1	Less than 1	Unmeasurable	Not less than 10	Not less than 10	Not less than 10	Not less than 10	Not less than 10	Not less than 10
Easiness of application		1	1	4	Depositio n of solid	2	4	4	Depositio n of solid	1	1	4	4	3	1
Sustainability of detergency		4	4	1	-	4	1	1	-	4	4	1	1	1	1
Prevention of ring-like stain		1	3	1	-	3	1	1	-	5	3	1	1	1	1

In Tables, components were as follows. "p" represents an average addition mole number.

*1 cetyl/stearyl=13/87 (mass ratio)

*2 Sanisol C (Kao Corporation)

*3 HEC Daicel SE-900 (Daicel Corporation)

*4 Quaternium D10E (Kao Corporation)

Claims

1. A method for cleaning a toilet bowl, comprising steps 1 to 3:

step 1: applying a detergent composition for a toilet bowl to a toilet bowl, wherein the composition comprises (a) a polyoxyethylene alkyl ether having an alkyl group having 14 to 22 carbon atoms and an average addition mole number of ethylene oxide of 20 to 80 in an amount of 14 to 64% by mass, (b) ethanol, and water, and has a viscosity of 50 to 3000 mPa·s at 25°C;

step 2: allowing the composition to stand for 1 minute to 3 hours from the end of step 1 for volatilization of the component (b) from the applied composition to form a gel having a higher viscosity than that of the composition before applied; and

step 3: applying water to the formed gel to generate a cleaning medium comprising the component (a) and water to be applied to the toilet bowl.

2. The method for cleaning a toilet bowl according to claim 1, wherein the content of the component (b) is 2 to 30% by mass.

3. The method for cleaning a toilet bowl according to claim 1 or 2, wherein the detergent composition forms a gel having a viscosity of not less than 10 Pa·s at 25°C through the volatilization of the component (b) when 10 g of the composition is spread uniformly across a glass petri dish having an inner diameter of 85 mm and dried for 3 hours at 40°C under 50% humidity.

4. The method for cleaning a toilet bowl according to

any one of claims 1 to 3, wherein the gel formed in step 2 has a viscosity of not less than 10 Pa·s at 25°C.