

DESCRIPTION

TITLE OF THE INVENTION: GEL DETERGENT COMPOSITION

TECHNICAL FIELD

[0001]

The present invention relates to a gel detergent composition used as attached to a hard surface of a toilet bowl, glass, a window, a door, a bathroom wall or the like.

BACKGROUND ART

[0002]

Conventionally, various cleaning agents have been used to remove stains adhering to a hard surface of toilet bowl or the like and create a hygienic environment. For example, as a cleaning agent for flush toilets, an on-tank or in-tank toilet cleaner has been used, which is designed so that the cleaner can be eluted into flush water by installing the cleaner in a hand-washing part or water storage tank of a flush toilet. However, in recent years, tankless flush toilets have become widespread, and there is a drawback that the on-tank or in-tank toilet cleaner cannot be applied to tankless flush toilets.

[0003]

On the other hand, there is known a toilet cleaner for a rim portion, which is installed on a rim portion of a toilet bowl and causes the cleaner to flow out into the flush water flowing through the toilet bowl. Although the toilet cleaner for a rim portion can be applied to tankless flush toilets, the cleaner needs to be removed to the rim portion before and after use, and a current situation is that the toilet cleaner for a rim portion is not widely used due to its drawbacks in terms of hygiene.

[0004]

Thus, in recent years, a gel detergent has been developed which is used as

attached to the surface of a toilet bowl. For example, Patent Document 1 reports that a gel detergent for toilets containing polyoxyethylene having a degree of polymerization of 15 to 50 and polyoxyethylene alkyl ether composed of an alkyl group having 12 to 18 carbon atoms is attached to the surface of a toilet bowl, so that even if the cleaning agent comes into contact with running water, the cleaning agent can be continuously released into the running water while maintaining the state of being attached to the surface of the toilet bowl.

[0005]

The gel detergent is contained in a container, discharged from a discharge port of the container, and then used as attached to an attached surface. However, the conventional gel detergent has less glossiness, and a further improvement in appearance is desired.

[0006]

In addition, conventionally, a gel detergent has been developed of a type which is attached to an attached surface to have a desired shape by devising the shape of a discharge port of the container containing the cleaning agent in order to capture consumer orientation. However, the conventional gel detergent has a drawback that if the shape of the discharge port of the container is devised and designed to form a complicated shape on the attached surface, the complicated shape as designed cannot be formed. In addition, in the conventional gel detergent, the cleaning agent may be in a state of stringing from the discharge port of the container when being discharged onto the attached surface, and there is also a problem that it is more difficult to form a complicated shape on the attached surface as designed.

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0007]

Patent Document 1: Japanese Patent Laid-open Publication No. 2011-57780

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0008]

An object of the present invention is to provide a gel detergent composition which has a glossy appearance, is unlikely to be in a state of stringing from a discharge port of a container when being discharged onto an attached surface, and can form a complicated shape as designed on the attached surface onto which the composition is discharged.

MEANS FOR SOLVING THE PROBLEM

[0009]

As a result of diligent studies to solve the above problems, the present inventor has found that a gel detergent composition having a storage modulus (G') at 25°C of 10000 Pa or more has a glossy appearance and is unlikely to be in a state of stringing from a discharge port of a container when being discharged onto an attached surface. The present inventor has further found that the shape of the gel detergent composition having the above-mentioned characteristics does not collapse on the attached surface onto which the composition discharged from the container is attached and can be formed as designed even if the shape is complicated. The present invention was completed as a result of further research conducted based on these findings.

[0010]

In summary, the present invention provides aspects of invention as itemized below.

Item 1. A gel detergent composition having a storage modulus (G') at 25°C of

10000 Pa or more.

Item 2. The gel detergent composition according to item 1, wherein the storage modulus (G') at 25°C is 17000 Pa or more.

Item 3. The gel detergent composition according to item 1 or 2, wherein a loss modulus (G'') at 25°C is 100 to 400 Pa.

Item 4. The gel detergent composition according to any one of items 1 to 3, further comprising a polyoxyalkylene block polymer.

Item 5. The gel detergent composition according to item 4, further comprising polyoxyalkylene alkyl ether.

Item 6. The gel detergent composition according to any one of items 1 to 5, which is used as attached onto an attached surface so as to form a shape having two or more convex portions on the attached surface.

Item 7. The gel detergent composition according to item 6, wherein the shape having two or more convex portions has a rotationally symmetric shape having two or more convex portions extending radially and a concave portion formed between the convex portions, and

a ratio ($D1/D2$) of a distance $D1$ from a center to a vertex of the convex portion and a distance $D2$ from the center to one of the concave portions adjacent to the convex portion is 1.2 or more.

Item 8. The gel detergent composition according to item 6, wherein the shape having two or more convex portions has a nonrotationally symmetric shape having two or more convex portions and a concave portion formed between the convex portions, and

a vertical distance $D3$ from a straight line connecting vertices of two of the convex portions, which are adjacent to each other, to the concave portion formed

between the two convex portions is 1.2 cm or more.

Item 9. The gel detergent composition according to any one of items 1 to 8, which is used as attached to a surface of a toilet bowl.

ADVANTAGES OF THE INVENTION

[0011]

The gel detergent composition of the present invention has a glossy appearance, is unlikely to be in a state of stringing from the discharge port of the container when being discharged onto the attached surface, and can form a complicated shape as designed on the attached surface onto which the composition is discharged, so that it is possible to attach the gel detergent composition having an excellent appearance and a novel shape on the attached surface.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is a schematic diagram of an example of a rotationally symmetric shape formed on an attached surface by a gel detergent composition of the present invention.

Fig. 2 is a schematic diagram of an example of a nonrotationally symmetric shape formed on an attached surface by a gel detergent composition of the present invention.

Fig. 3 is a picture obtained by observing a shape of the gel detergent composition after each of the gel detergent compositions of Examples 1, 4 and 5 and Comparative Examples 1 and 3 is discharged to the attached surface.

EMBODIMENT OF THE INVENTION

[0013]

A gel detergent composition of the present invention is characterized by having a storage modulus (G') at 25°C of 10000 Pa or more. The gel detergent composition

of the present invention will be hereinafter described in detail.

[0014]

[Viscoelastic properties]

The gel detergent composition of the present invention has a storage modulus (G') at 25°C of 10000 Pa or more. By providing such a storage modulus, it is possible to achieve a glossy appearance, suppress stringing from a discharge port of a container, and form a complicated shape on an attached surface. From the viewpoint of further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, the storage modulus (G') at 25°C is preferably 15000 Pa or more, more preferably 16000 to 40000 Pa, and particularly preferably 17000 to 32000 Pa.

[0015]

In the present invention, the storage modulus (G') at 25°C is a value obtained by performing measurement using a rheometer under the conditions of a parallel plate (25.5 mm ϕ), a gap of 0.5 mm, a frequency of 1 Hz, and a strain of 0.01 to 100% and determining the value of the storage modulus (G') when the strain is 0.1%.

[0016]

In the gel detergent composition of the present invention, a value of the loss modulus (G'') at 25°C is not particularly limited as long as the range of the storage modulus (G') can be satisfied, and is, for example, 100 to 400 Pa, preferably 130 to 350 Pa, and more preferably 170 to 270 Pa. By satisfying such a range of the loss modulus (G''), it becomes possible to further improve the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface. In a method of measuring the loss modulus (G'') at 25°C, the value of the loss modulus (G'') is obtained by performing

measurement under the same conditions as in the case of the storage modulus (G') and determining the value of the loss modulus (G'') when the strain is 0.1%.

[0017]

In the gel detergent composition of the present invention, a value of a loss tangent $\tan \delta$ (loss modulus G'' /storage modulus G') at 25°C is not particularly limited as long as the range of the storage modulus (G') can be satisfied, and is, for example, 0.020 or less, preferably 0.015 or less, more preferably 0.005 to 0.0015, and particularly preferably 0.008 to 0.01. The loss tangent $\tan \delta$ at 25°C is a value obtained by dividing the loss modulus (G'') at 25°C by the storage modulus (G') at 25°C.

[0018]

Since the viscoelastic properties of the gel detergent composition changes depending on the type and content of components to be blended, the combination of the components to be blended, and the like, in order to provide the viscoelastic properties in the gel detergent composition of the present invention, the type and content of the components to be blended, the combination of the components to be blended, and the like may be appropriately adjusted. A person skilled in the art can provide desired viscoelastic properties by adjusting the type and content of the components to be blended, the combination of the components to be blended, and the like if the viscoelastic properties to be achieved are determined.

[0019]

[Contained components]

- Polyoxyalkylene block polymer

The components contained in the gel detergent composition of the present invention are not particularly limited as long as they have the viscoelastic properties, and preferably contains a polyoxyalkylene block polymer. The polyoxyalkylene block

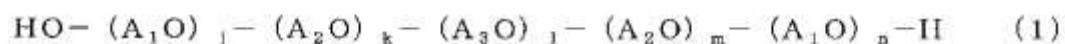
polymer can play a role as a cleaning component by a surface active action as well as a role as a gelling agent for forming a gel state. The inclusion of the polyoxyalkylene block polymer makes it possible to suitably provide the viscoelastic properties.

[0020]

The polyoxyalkylene block polymer may be a block polymer containing two or more types of polyoxyalkylenes among g such as polyoxyethylene, polyoxypropylene and polyoxybutylene, and from the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, preferred examples thereof include a polyoxyalkylene block polymer represented by the following general formula (1).

[0021]

[Chem. 1]



[0022]

In the general formula (1), j, k, l, m and n each indicate the number of added moles. j + n is greater than or equal to 1, k is greater than or equal to 0, l is greater than or equal to 1, and m is greater than or equal to 0. A₁O represents alkylene oxide having 2 to 4 carbon atoms. A₂O has 2 to 4 carbon atoms and represents alkylene oxide having a different carbon number from A₁O. A₃O has 2 to 4 carbon atoms and represents alkylene oxide having a different carbon number from A₂O. At least one of A₁O, A₂O and A₃O is ethylene oxide.

[0023]

In the general formula (1), A₁O represents alkylene oxide having 2 to 4 carbon atoms, that is, ethylene oxide, propylene oxide or butylene oxide. From the viewpoint

of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, A_1O is preferably ethylene oxide.

[0024]

In the general formula (1), $j + n$ represents the total number of moles of alkylene oxide (A_1O) added, $j + n$ may be greater than or equal to 1, and either j or n may be 0. From the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, j and n are each preferably greater than or equal to 1. j and n are preferably substantially the same in the number of added moles. The upper limit of $j + n$ is not particularly limited, and is, for example, 400. From the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, $j + n$ is preferably greater than or equal to 30, more preferably 30 to 350, and particularly preferably 70 to 350. More specifically, j is preferably greater than or equal to 15, more preferably 15 to 175, particularly preferably 35 to 175, and n is preferably greater than or equal to 15, more preferably 15 to 175, and particularly preferably 35 to 175.

[0025]

In the general formula (1), A_2O represents alkylene oxide having 2 to 4 carbon atoms, that is, ethylene oxide, propylene oxide or butylene oxide. However, A_2O is alkylene oxide having a different carbon number from A_1O . That is, when A_1O is ethylene oxide, A_2O is propylene oxide or butylene oxide. When A_1O is propylene

oxide, A_2O is ethylene oxide or butylene oxide. When A_1O is butylene oxide, A_2O is ethylene oxide or propylene oxide. From the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, A_2O is preferably propylene oxide or butylene oxide, and more preferably butylene oxide.

[0026]

In the general formula (1), k and m represent the number of moles of alkylene oxide (A_2O) added and are each greater than or equal to 0. When k is 0, it is preferable that m be also 0. However, from the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, k and m are more preferably greater than or equal to 1. k and m are preferably substantially the same in the number of added moles. The upper limits of k and m are not particularly limited. The upper limit value of k is, for example, 30, and the upper limit value of m is, for example, 30. The upper limit of $k + m$ is not particularly limited, and is, for example, 60. From the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, $k + m$ is preferably 0 to 60, more preferably 0 to 40, and particularly preferably 10 to 40. More specifically, k is 0 to 30, preferably 0 to 20, more preferably 5 to 20, and m is 0 to 30, preferably 0 to 20, and more preferably 5 to 20.

[0027]

In the general formula (1), A_3O represents alkylene oxide having 2 to 4 carbon

atoms, that is, ethylene oxide, propylene oxide or butylene oxide. However, A_3O is alkylene oxide having a different carbon number from A_2O . That is, when k and m are 0 (without A_2O), A_3O is ethylene oxide, propylene oxide or butylene oxide. When k and/or m is 1 or more, if A_2O is ethylene oxide, A_3O is propylene oxide or butylene oxide. If A_2O is propylene oxide, A_3O is ethylene oxide or butylene oxide. If A_2O is butylene oxide, A_3O is ethylene oxide or propylene oxide. From the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, A_3O is preferably propylene oxide or butylene oxide, and more preferably propylene oxide.

[0028]

In the general formula (1), I represents the number of moles of alkylene oxide (A_3O) added and is greater than or equal to 1. The upper limit of I is not particularly limited, and is, for example, 60. From the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, I is 1 to 60 and preferably 15 to 60. More specifically, when k and m are 0, I is more preferably 1 to 60, particularly preferably 15 to 60, and most preferably 30 to 60. When k and m are greater than or equal to 1, I is more preferably 1 to 60, particularly preferably 15 to 60, and most preferably 15 to 30.

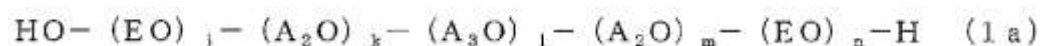
[0029]

In the general formula (1), at least one of A_1O , A_2O and A_3O is ethylene oxide. From the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached

surface, at least A₁O is preferably ethylene oxide. When A₁O is ethylene oxide, a block polymer of the general formula (1) has the structure shown in the following general formula (1a).

[0030]

[Chem. 2]



[0031]

In the general formula (1a), j, k, l, m and n are the same as described above. EO represents ethylene oxide. A₂O represents alkylene oxide having 3 or 4 carbon atoms. A₃O has 2 to 4 carbon atoms and represents alkylene oxide having a different carbon number from A₂O.

[0032]

In the block polymer of the general formula (1), the molecular weight of a portion occupied by alkylene oxide having 3 to 4 carbon atoms may fall within a range that satisfies the above-mentioned condition of the general formula (1). However, from the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, the molecular weight is preferably 1400 or more, more preferably 1700 or more, and particularly preferably 1700 to 3500.

[0033]

The molecular weight of the block polymer of the general formula (1) may be any value as long as it falls within a range that satisfies the above-mentioned condition of the general formula (1). However, from the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of

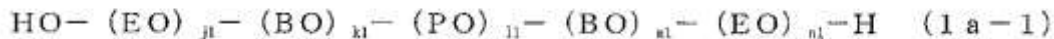
suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, the molecular weight is preferably 4600 or more, more preferably 6500 or more, and particularly preferably 6500 to 20000.

[0034]

Among the block polymers of the general formula (1), from the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, preferred specific examples thereof include polyoxyalkylene block polymers represented by the following general formulas (1a-1) to (1a-3).

[0035]

[Chem. 3]



[0036]

In the general formula (1a-1), EO represents ethylene oxide, BO represents butylene oxide, and PO represents propylene oxide. Furthermore, in the general formula (1a-1), $j1$, $k1$, $l1$, $m1$ and $n1$ each represent the number of added moles. $j1$ and $n1$ each represent greater than or equal to 1, preferably greater than or equal to 15, more preferably 15 to 175, and particularly preferably 35 to 175. $j1$ and $n1$ are preferably substantially the same in the number of added moles. $j1 + n1$ (the number of moles of ethylene oxide added) is preferably greater than or equal to 30, more preferably 30 to 350, and particularly preferably 70 to 350. $k1$ and $m1$ each represent greater than or equal to 0, preferably 0 to 30, more preferably 0 to 20, and particularly preferably 5 to 20. $k1$ and $m1$ are preferably substantially the same in the number of added moles. $k1 + m1$ (the number of moles of butylene oxide added) is greater than

or equal to 0, preferably 0 to 60, more preferably 0 to 40, and particularly preferably 10 to 40. l_1 represents greater than or equal to 1, preferably 1 to 60, more preferably 15 to 60, and particularly preferably 15 to 30.

[0037]

[Chem. 4]

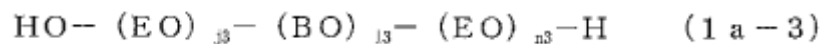


[0038]

In the general formula (1a-2), EO represents ethylene oxide, and PO represents propylene oxide. Furthermore, in the general formula (1a-2), j_2 , l_2 and n_2 each represent the number of added moles. j_2 and n_2 each represent greater than or equal to 1, preferably 15 to 150, and more preferably 35 to 150. j_2 and n_2 are preferably substantially the same in the number of added moles. $j_2 + n_2$ (the number of moles of ethylene oxide added) is greater than or equal to 2, preferably 30 to 300, and more preferably 70 to 300. l_2 represents greater than or equal to 1, preferably 1 to 60, more preferably 15 to 60, and particularly preferably 30 to 60.

[0039]

[Chem. 5]



[0040]

In the general formula (1a-3), EO represents ethylene oxide, and BO represents butylene oxide. Furthermore, in the general formula (1a-3), j_3 , l_3 and n_3 each represent the number of added moles. j_3 and n_3 each represent greater than or equal to 1, preferably 15 to 150, and more preferably 35 to 150. j_3 and n_3 are preferably substantially the same in the number of added moles. $j_3 + n_3$ (the number of moles of ethylene oxide added) is greater than or equal to 2, preferably 30 to 300, and more

preferably 70 to 300. λ represents greater than or equal to 1, preferably 1 to 50, and more preferably 20 to 50.

[0041]

Among the polyoxyalkylene block polymers represented by the general formulas (1a-1) to (1a-3), from the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, preferred examples thereof include polyoxyalkylene block polymer represented by the general formula (1a-1).

[0042]

In the gel detergent composition of the present invention, the polyoxyalkylene block polymer represented by the general formula (1) may be used alone, or two or more kinds of them may be used in combination.

[0043]

In the gel detergent composition of the present invention, the content of the polyoxyalkylene block polymer may be appropriately set within a range capable of providing the viscoelastic properties, and is, for example, 10 to 50% by weight, preferably 12 to 40% by weight, and more preferably 15 to 25% by weight.

[0044]

- Polyoxyalkylene alkyl ether

The gel detergent composition of the present invention preferably contains polyoxyalkylene alkyl ether together with the polyoxyalkylene block polymer. By using the polyoxyalkylene block polymer and the polyoxyalkylene alkyl ether in combination, it is possible to suitably provide the viscoelastic properties and further improve the glossy appearance, the effect of suppressing stringing from the discharge

port of the container, and the effect of forming a complicated shape on the attached surface. In addition, when the polyoxyalkylene alkyl ether is contained, a cleaning action can be improved.

[0045]

The type of oxyalkylene group in the polyoxyalkylene alkyl ether is not particularly limited, and examples thereof include alkylene oxides having 2 to 4 carbon atoms, that is, ethylene oxide, propylene oxide, and butylene oxide. Among these oxyalkylene groups, ethylene oxide and propylene oxide are preferable, and ethylene oxide is more preferable, from the viewpoint of forming a gel state having a suitable gel strength more preferably. In the polyoxyalkylene alkyl ether, an oxyalkylene group having one kind of structure may be contained alone, one kind only of the oxyalkylene groups may be contained alone, or a combination of two or more of them may be contained.

[0046]

The number of moles of the oxyalkylene group added to the polyoxyalkylene alkyl ether is not particularly limited, and examples thereof include 10 to 100, preferably 25 to 75, and more preferably 40 to 60.

[0047]

The carbon number of the alkyl group in the polyoxyalkylene alkyl ether is not particularly limited, and examples thereof include 10 to 22, preferably 14 to 20, and more preferably 16 to 18. The alkyl group in the polyoxyalkylene alkyl ether may be linear or branched, but linear alkyl groups are preferred.

[0048]

Among the polyoxyalkylene alkyl ethers, polyoxyethylene (the number of added moles: 10 to 100) alkyl (10 to 22 carbon atoms) ethers are preferable, and

polyoxyethylene (the number of added moles: 40 to 60) alkyl (16 to 18 carbon atoms) ethers are more preferable, from the viewpoint of forming the gel state having a suitable gel strength more preferably, providing higher transparency, or further improving adhesion to a hard surface.

[0049]

The polyoxyalkylene alkyl ether may be used alone, or two or more kinds of them may be used in combination.

[0050]

When the polyoxyalkylene alkyl ether is contained in the gel detergent composition of the present invention, the content of the polyoxyalkylene alkyl ether may be appropriately set within a range capable of providing the viscoelastic properties, and is, for example, 1 to 40% by weight, preferably 2 to 15% by weight, and more preferably 3 to 7% by weight.

[0051]

In the gel detergent composition of the present invention, a ratio of the polyoxyalkylene block polymer and the polyoxyalkylene alkyl ether may be in a range corresponding to the content of each of the above-mentioned components. However, from the viewpoint of suitably providing the viscoelastic properties, the ratio is, for example, a ratio in which the total amount of the polyoxyalkylene alkyl ether is 1 to 100 parts by weight, preferably 3 to 70 parts by weight, and more preferably 4 to 60 parts by weight per 100 parts by weight of the total amount of the polyoxyalkylene block polymer.

[0052]

- Amphoteric surfactant

The gel detergent composition of the present invention may contain an

amphoteric surfactant in addition to the polyoxyalkylene block polymer and the polyoxyalkylene alkyl ether. When the amphoteric surfactant is contained in addition to the polyoxyalkylene block polymer and the polyoxyalkylene alkyl ether, it is possible to suitably provide the viscoelastic properties and further improve the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface. In addition, when the amphoteric surfactant is contained, the cleaning action can be improved.

[0053]

The type of amphoteric surfactant is not particularly limited, and examples thereof include betaine-type amphoteric surfactants such as coconut oil fatty acid amidopropyl dimethyl amino acetic acid betaine, lauryl dimethyl amino acetic acid betaine, lauramide propyl betaine, 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine, and laurylhydroxysulfobetaine; amino acid-type amphoteric surfactants such as sodium β -laurylaminopropionate and sodium lauryldiaminoethylglycine; and amine oxide-type amphoteric surfactants such as decyldimethylamine oxide and lauryldimethylamine oxide.

[0054]

Among these amphoteric surfactants, from the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, the betaine-type amphoteric surfactants are preferable, and coconut oil fatty acid amidopropyl dimethyl amino acetic acid betaine is more preferable.

[0055]

These amphoteric surfactants may be used alone or in combination of two or

more thereof.

[0056]

When the amphoteric surfactant is contained in the gel detergent composition of the present invention, the content of the amphoteric surfactant may be appropriately set within a range capable of providing the viscoelastic properties, and is, for example, 1 to 30% by weight, preferably 5 to 25% by weight, and more preferably 9 to 20% by weight.

[0057]

In the gel detergent composition of the present invention, a ratio of the polyoxyalkylene block polymer and the amphoteric surfactant may be in a range corresponding to the content of each of the above-mentioned components. However, from the viewpoint of suitably providing the viscoelastic properties, the ratio is, for example, a ratio in which the total amount of the amphoteric surfactant is 15 to 200 parts by weight, preferably 20 to 175 parts by weight, and more preferably 25 to 150 parts by weight per 100 parts by weight of the total amount of the polyoxyalkylene block polymer.

[0058]

- Hydrogen peroxide

As a preferred embodiment of the gel detergent composition of the present invention, hydrogen peroxide is contained in addition to the polyoxyalkylene block polymer and the polyoxyalkylene alkyl ether. By containing the hydrogen peroxide together with the polyoxyalkylene block polymer and the polyoxyalkylene alkyl ether, it is possible to suitably provide the viscoelastic properties and further improve the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface. Furthermore,

by containing the hydrogen peroxide, the gel detergent composition of the present invention can be provided with a bleaching action.

[0059]

When the hydrogen peroxide is contained in the gel detergent composition of the present invention, the content of the hydrogen peroxide may be appropriately set within a range capable of providing the viscoelastic properties, and is, for example, 1 to 15% by weight, preferably 1.5 to 12% by weight, and more preferably 2 to 10% by weight.

[0060]

In the gel detergent composition of the present invention, a ratio of the polyoxyalkylene block polymer and the hydrogen peroxide may be in a range corresponding to the content of each of the above-mentioned components. However, from the viewpoint of suitably providing the viscoelastic properties, the ratio is, for example, a ratio in which the total amount of the hydrogen peroxide is 5 to 100 parts by weight, preferably 7 to 75 parts by weight, and more preferably 10 to 60 parts by weight per 100 parts by weight of the total amount of the polyoxyalkylene block polymer.

[0061]

- Tetraalkylammonium salt

As a preferred embodiment of the gel detergent composition of the present invention, tetraalkylammonium salt is contained in addition to the polyoxyalkylene block polymer and the polyoxyalkylene alkyl ether.

By containing the tetraalkylammonium salt together with the polyoxyalkylene block polymer and the polyoxyalkylene alkyl ether, it is possible to suitably provide the viscoelastic properties and further improve the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming

a complicated shape on the attached surface. Furthermore, by containing the tetraalkylammonium salt, the gel detergent composition of the present invention can be provided with a sanitization action.

[0062]

In the tetraalkylammonium salt, the carbon number of each of the four alkyl groups is not particularly limited, and examples include dialkyl (6 to 18 carbon atoms) dialkyl (1 to 4 carbon atoms) ammonium salts and alkyl (12 to 20 carbon atoms) trialkyl (1 to 4 carbon atoms) ammonium salts.

[0063]

In the dialkyl (6 to 18 carbon atoms) dialkyl (1 to 4 carbon atoms) ammonium salts, the alkyl group having 6 to 18 carbon atoms (hereinafter, also referred to as long-chain alkyl group) may be linear or branched. The carbon number of the long-chain alkyl group may be in the range of 6 to 18, and is preferably 6 to 16 and more preferably 8 to 12. The two long-chain alkyl groups in the dialkyl (6 to 18 carbon atoms) dialkyl (1 to 4 carbon atoms) ammonium salt may have the same structure or different structures from each other, and preferably have the same structures as each other.

[0064]

In the dialkyl (6 to 18 carbon atoms) dialkyl (1 to 4 carbon atoms) ammonium salts, the alkyl group having 1 to 4 carbon atoms (hereinafter, also referred to as short-chain alkyl group) may be linear or branched. The carbon number of the short-chain alkyl group may be in the range of 1 to 4, and is preferably 1 to 3, more preferably 1 or 2, and particularly preferably 1. The two short-chain alkyl groups in the dialkyl (6 to 18 carbon atoms) dialkyl (1 to 4 carbon atoms) ammonium salt may have the same structure or different structures from each other, and preferably have the same structures as each other.

[0065]

Specific examples of the dialkyl (6 to 18 carbon atoms) dialkyl (1 to 4 carbon atoms) ammonium salt include didecyldimethylammonium salt, distearyldimethylammonium salt, and dioleyldimethylammonium salt.

[0066]

In the alkyl (12 to 20 carbon atoms) trialkyl (1 to 4 carbon atoms) ammonium salts, the alkyl group having 12 to 20 carbon atoms (hereinafter, also referred to as long-chain alkyl group) may be linear or branched. The carbon number of the long-chain alkyl group may be in the range of 12 to 20, and is preferably 14 to 20 and more preferably 16 to 18.

[0067]

In the alkyl (12 to 20 carbon atoms) trialkyl (1 to 4 carbon atoms) ammonium salts, the alkyl group having 1 to 4 carbon atoms (hereinafter, also referred to as short-chain alkyl group) may be linear or branched. The carbon number of the short-chain alkyl group may be in the range of 1 to 4, and is preferably 1 to 3, more preferably 1 or 2, and particularly preferably 1. The three short-chain alkyl groups in the alkyl (12 to 20 carbon atoms) trialkyl (1 to 4 carbon atoms) ammonium salt may have the same structure or different structures from each other, and preferably have the same structures as each other.

[0068]

Specific examples of the alkyl (12 to 20 carbon atoms) trialkyl (1 to 4 carbon atoms) ammonium salt include cetyltrimethylammonium salt, stearyltrimethylammonium salt, and lauryltrimethylammonium salt.

[0069]

Among these tetraalkylammonium salts, a dialkyl (6 to 18 carbon atoms)

dialkyl (1 to 4 carbon atoms) ammonium salt is preferable, a dialkyl (6 to 16 carbon atoms) dialkyl (1 to 3 carbon atoms) ammonium salt is more preferable, a dialkyl (8 to 12 carbon atoms) dialkyl (1 or 2 carbon atoms) ammonium salt is still more preferable, and a didecyldimethylammonium salt is particularly preferable.

[0070]

A salt form of the tetraalkylammonium salt is not particularly limited, and is, for example, halide salt such as fluoride salt, chloride salt, iodide salt or bromide salt; hydroxide salt; sulfonate such as methosulfate salt or ethosulfate salt; or carboxylate such as propionate or adipate. Among these, halide salts and sulfonates are preferable.

[0071]

The tetraalkylammonium salt may be used alone, or two or more kinds of them may be used in combination.

[0072]

When the tetraalkylammonium salt is contained in the gel detergent composition of the present invention, the content of the tetraalkylammonium salt may be appropriately set within a range capable of providing the viscoelastic properties, and is, for example, 0.1 to 40% by weight, preferably 0.5 to 25% by weight, more preferably 0.7 to 10% by weight, and particularly preferably 0.7 to 3.5% by weight.

[0073]

In the gel detergent composition of the present invention, a ratio of the polyoxyalkylene block polymer and the tetraalkylammonium salt may be in a range corresponding to the content of each of the above-mentioned components. However, from the viewpoint of suitably providing the viscoelastic properties, the ratio is, for example, a ratio in which the total amount of the tetraalkylammonium salt is 0.5 to 150 parts by weight, preferably 2.5 to 100 parts by weight, and more preferably 3.5 to 20

parts by weight per 100 parts by weight of the total amount of the polyoxyalkylene block polymer.

[0074]

- Water-soluble inorganic chloride

When the gel detergent composition of the present invention contains the tetraalkylammonium salt, it is preferable that a water-soluble inorganic chloride be further contained. By using the tetraalkylammonium salt and the water-soluble inorganic chloride in combination with each other, it becomes easy to provide the viscoelastic properties.

[0075]

The type of water-soluble inorganic chloride is not particularly limited as long as the water-soluble inorganic chloride can be dissolved in water at about 4°C, and specific examples include chlorides of alkali metals such as sodium chloride and potassium chloride; chlorides of divalent metals such as magnesium chloride, calcium chloride, and barium chloride; and ammonium chloride. Among these water-soluble inorganic chlorides, from the viewpoint of suitably providing the viscoelastic properties and further improving the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface, the chloride of alkali metal and the ammonium chloride are preferable, and sodium chloride and ammonium chloride are more preferable.

[0076]

These water-soluble inorganic chlorides may be used alone or in combinations of two or more.

[0077]

In particular, when the chloride of alkali metal and the ammonium chloride are

used in combination as the water-soluble inorganic chloride, it is possible to suitably provide the viscoelastic properties and further improve the glossy appearance, the effect of suppressing stringing from the discharge port of the container, and the effect of forming a complicated shape on the attached surface. When the chloride of alkali metal and the ammonium chloride are used in combination in this way, as the ratio of these, for example, the ammonium chloride is 10 to 1000 parts by weight, preferably 20 to 200 parts by weight, and more preferably 30 to 100 parts by weight per 100 parts by weight of the total amount of the chloride of alkali metal.

[0078]

When the water-soluble inorganic chloride is contained in the gel detergent composition of the present invention, the content of the water-soluble inorganic chloride may be appropriately set within a range capable of providing the viscoelastic properties, and is, for example, 0.1 to 10% by weight, preferably 0.3 to 5% by weight, and more preferably 0.5 to 3% by weight.

[0079]

In the gel detergent composition of the present invention, a ratio of the polyoxyalkylene block polymer and the water-soluble inorganic chloride may be in a range corresponding to the content of each of the above-mentioned components. However, from the viewpoint of suitably providing the viscoelastic properties, the ratio is, for example, a ratio in which the total amount of the water-soluble inorganic chloride is 0.5 to 50 parts by weight, preferably 2 to 40 parts by weight, and more preferably 2.5 to 30 parts by weight per 100 parts by weight of the total amount of the polyoxyalkylene block polymer.

[0080]

- Water

The gel detergent composition of the present invention preferably contains water to make the composition gel.

[0081]

In the gel detergent composition of the present invention, the content of water may be appropriately set within a range capable of forming the gel state, and is, for example, 20 to 80% by weight, preferably 30 to 70% by weight, and more preferably 40 to 60% by weight.

[0082]

- Solvents other than water

The gel detergent composition of the present invention may contain a solvent other than water, if necessary. By containing a solvent other than water in this way, it becomes possible to impart dispersibility and solubility to other additives such as perfumes.

[0083]

The type of solvent is not particularly limited, and examples thereof include a glycerol polyoxyethylene adduct (for example, a glycerol polyoxyethylene adduct in which three ethylene oxides in which the number of added moles is 5 to 80, preferably 10 to 40, and more preferably 15 to 30 are ester-bonded to glycerin); monohydric lower alcohols such as ethanol, propanol and butanol; and polyhydric alcohols such as ethylene glycol, propylene glycol, dipropylene glycol and glycerin.

[0084]

Among these solvents, the glycerol polyoxyethylene adduct is preferable.

[0085]

These solvents may be used alone or in combination of two or more thereof.

[0086]

When a solvent (other than water) is contained in the gel detergent composition of the present invention, the content of the solvent is not particularly limited, and is, for example, more than 0 to 30% by weight, preferably 3 to 20% by weight, and more preferably 5 to 10% by weight.

[0087]

- Perfume

The gel detergent composition of the present invention may contain a perfume, if necessary, in order to impart an aroma to a space to be used. As the perfume, a perfume component providing a desired aroma may be appropriately selected depending on the use of the gel detergent composition. Examples of the perfume contained in the gel detergent composition of the present invention include natural perfumes and synthetic perfumes such as hydrocarbon perfumes, ether perfumes, ester perfumes, alcohol perfumes, aldehyde perfumes, and ketone perfumes.

[0088]

Examples of the natural perfumes include lemon oil, orange oil, bergamot oil, ylang ylang oil, patchouli oil, citronella oil, lemongrass oil, boad rose oil, clove oil, eucalyptus oil, cedar oil, lavender oil, sandalwood oil, vetiver oil, geranium oil, labdanum oil, mint oil, peppermint oil, rose oil, jasmine oil, and Litsea cubeba oil. Examples of the hydrocarbon perfumes include limonene, α -pinene, camphene, p-cymene, and fenchon. Examples of the ether perfumes include tetrahydro-2,4-dimethyl-4-phenylfuran, 1,8-cineole, rose oxide, cedrol methyl ether (scedramber), p-cresyl methyl ether, isoamylphenyl ethyl ether, 4-phenyl-2,4,6-trimethyl-1,3-dioxane, and anethole. Examples of ester perfumes include geranyl acetate, ethyl acetate, ethyl propionate, methyl butyrate, ethyl isobutyrate, ethyl butyrate, butyl acetate, ethyl 2-methylbutyrate, isoamyl acetate, ethyl 2-methylpentanoate (manzanate), hexylacetate,

allyl hexanoate, tricyclodecenylpropionate (VERTOPRO; fluorocyclene), allylheptanoate, isobornyl acetate, linalyl acetate, citronellyl acetate, and 2-terbutylcyclohexyl acetate. Examples of the alcohol perfumes include linalool, 3-octanol, 2,6-dimethyl-heptanol, 10-undecenol, geraniol, nerol, citronellol, rhodinol, myrcenol, tetrahydrolinalool, terpineol, cedrol, 2,4-dimethyl-3-cyclohexane-1-methanol, 4-isopropylcyclohexanol, nerolidol, 9-decenol, cis-3-hexenol, trans-2-hexanol, and eugenol. Examples of the aldehyde perfumes include citronellal, octanal, paraaldehyde, benzaldehyde, aldehyde C-6, aldehyde C-7, aldehyde C-8, aldehyde C-9, aldehyde C-10, tripler, p-ethyldimethyl hydrocinnamic aldehyde (florazone), 2-tridecanal, and aldehyde C11. Examples of the ketone perfumes include 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one, acetoin, methylamylketone, ethylamylketone, methylhexylketone, methylnonylketone, methylheptenone, 3,5,6,6-tetramethyl-4-methylene-heptan, camphor, carvone, menthone, d-pulegone, pepiritone, fention, geranyl acetone, maltol, ethylmaltol, 2,5-dimethyl-4-hydroxyfuranone, plicatone, acetophenone, p-methylacetophenone, benzylacetone, and benzylketone.

[0089]

These perfumes may be used alone as a single perfume, or may be used in combination of two or more as a perfume formulation.

[0090]

When a perfume is contained in the gel detergent composition of the present invention, the content of the perfume is not particularly limited, and is, for example, more than 0 to 15% by weight, preferably 1 to 12% by weight, and more preferably 3 to 10% by weight.

[0091]

- Other additives

In addition to the above-mentioned components, the gel detergent composition of the present invention may further contain a suitable amount of additives such as nonionic surfactants (other than polyoxyalkylene block polymer and polyoxy alkylene alkyl ether), anionic surfactants, cationic surfactants (other than tetraalkylammonium salts), enzymes, bactericides, chelating agents, colorants, pigments, deodorants, emulsifiers, solubilizers, extenders, solubility adjusting agents, bleaching agents, water repellents, hydrophilic agents, fillers, pH adjusting agents, thickeners, buffering agents, and antifoaming agents, if necessary, as long as the effects of the present invention are not impaired.

[0092]

- Production method

The gel detergent composition of the present invention is produced by mixing a predetermined amount of components to be contained at room temperature.

[0093]

[Use]

The gel detergent composition of the present invention is used for cleaning and sanitizing a hard surface. Specifically, by attaching the gel detergent composition of the present invention onto the hard surface and bringing water into contact with the gel detergent composition attached onto the hard surface, the contained components flow out into the water, and the hard surface is cleaned and sanitized.

[0094]

In the gel detergent composition of the present invention, the hard surface to be cleaned may be any hard surface that can come into contact with water, and examples of the hard surface include a toilet bowl, a hand-washing part of a toilet, glass, a window, a door and a bathroom wall. Among these, a toilet bowl is preferable.

[0095]

When the gel detergent composition of the present invention is used for cleaning a toilet bowl, the gel detergent composition of the present invention may be attached to a portion that comes into contact with water supplied as flush water. Although the gel detergent composition is preferably attached onto the surface of the toilet bowl, in the case of a flush toilet having a hand-washing part on a water storage tank, the composition may be attached to a saucer of the hand-washing part (the surface of the upper lid of the water storage tank). Since the gel detergent composition of the present invention has excellent adhesion to the attached surface even when the composition is attached to such a site, the attached state can be maintained even if flush water flows or the composition comes into contact with water supplied as the flush water to the water storage tank.

[0096]

In order to attach the gel detergent composition of the present invention to a hard surface, the gel detergent composition of the present invention may be extruded or jetted from a container containing the gel detergent composition onto the attached surface and discharged.

[0097]

[Container]

The gel detergent composition of the present invention is supplied as contained in an extrusion container such as a tube container, a bottle container, or a syringe type container; or an injection container such as an aerosol container. An extrusion mechanism of the extrusion container is not particularly limited, and may be either a manual type, a compression type, or the like.

[0098]

In the container containing the gel detergent composition of the present invention, the shape of the discharge port for discharging the gel detergent composition may be designed so that the discharged gel detergent composition can form a desired shape on the attached surface.

[0099]

[Shape formed on attached surface]

In the gel detergent composition of the present invention, the shape formed on the attached surface after the gel detergent composition is discharged from the container is not particularly limited. Conventional gel detergent compositions have a drawback that even if an attempt is made to form a complicated shape on the attached surface, the shape cannot be formed as designed. However, the present invention can eliminate such a defect, and a complicated shape can be formed on the attached surface. In addition, in the present invention, the conventional gel detergent compositions have a drawback that if an attempt is made to form a complicated shape on the attached surface, a gap is generated between the gel detergent composition and the attached surface, and the adhesion is deteriorated. However, the present invention can eliminate such a defect, and even if a complicated shape is formed on the attached surface, it is possible to suppress generation of a gap between the gel detergent composition and the attached surface and to provide excellent adhesion. In view of such a significant effect of the present invention, it is preferable that the gel detergent composition of the present invention be set to form a complicated shape on the attached surface after the composition is discharged from the container.

[0100]

An example of a complicated shape formed on the attached surface is a shape having two or more convex portions. In the present specification, the shape of the gel

detergent composition formed on the attached surface is a shape as viewed from a direction perpendicular to the attached surface.

[0101]

One aspect of the shape having two or more convex portions is a rotationally symmetric shape having two or more convex portions extending radially and a concave portion formed between the convex portions. Rotational symmetry means that during rotation around a center point, when the rotation angle is less than 360° , a shape after the rotation matches an original shape. In the present invention, the rotationally symmetric shape allows a variation of $\pm 20\%$ from perfect rotational symmetry. In the rotational symmetric shape, for example, a floral pattern, a star pattern, and the like can be formed.

[0102]

As a preferable example of the rotationally symmetric shape, a ratio ($D1/D2$) of a distance D1 from a center C to a vertex T of the convex portion and a distance D2 from the center to one concave portion B adjacent to the convex portion is 1.2 or more. Fig. 1 schematically shows the distances D1 and D2 by giving an example of a rotationally symmetric shape having six convex portions extending radially and six concave portions formed between the convex portions. In the conventional gel detergent composition, even if the rotationally symmetric shape is designed so that a difference between the distances D1 and D2 increases, the shape cannot be maintained as designed, the ratio ($D1/D2$) is reduced, and the shape of the convex portion tends to be difficult to be conspicuous. However, in the present invention, even if the rotationally symmetric shape is designed so that the difference between the distances D1 and D2 increases, the shape can be formed on the attached surface as designed, the ratio ($D1/D2$) is as large as the range described above, and the shape of the convex portion

can be made conspicuous.

[0103]

The ratio ($D1/D2$) is preferably about 1.2 to 4 and more preferably about 1.3 to 3.5, from the viewpoint of providing an excellent appearance by making the shape of the convex portion conspicuous as the rotationally symmetric shape.

[0104]

In the rotationally symmetric shape, when there are two or more convex portions having different sizes and there are two or more values of the ratio ($D1/D2$), at least one value of the ratio ($D1/D2$) may be set so as to satisfy the above range.

[0105]

The distances $D1$ and $D2$ in the rotationally symmetric shape are appropriately set depending on the type of an object to be cleaned. If the object to be cleaned is a toilet bowl, the distance $D1$ is, for example, 1.0 to 3.2 cm, preferably 1.2 to 3.0 cm, more preferably 1.4 to 2.7 cm, and the distance $D2$ is, for example, 0.6 to 2.6 cm, preferably 0.7 to 1.4 cm, and more preferably 1.0 to 1.3 cm.

[0106]

In the rotationally symmetric shape, when there are two or more convex portions having different sizes and there are two or more values of the distances $D1$ and $D2$, at least one value of the distances $D1$ and $D2$ may be set so as to satisfy the above range.

[0107]

The number of convex portions per one rotationally symmetric shape may be 2 or more, and may be appropriately set depending on a pattern to be formed, and the number is, for example, 2 to 10 pieces, preferably 3 to 8 pieces, and more preferably 4 to 6 pieces.

[0108]

In the rotationally symmetric shape, the shape of the convex portion is not particularly limited, and examples thereof include a petal shape, an elliptical shape, a circular shape, a teardrop shape, and a needle shape. When the shape of the convex portion is a petal shape, an elliptical shape, a circular shape, a teardrop shape, or the like, a floral pattern can be formed in the rotationally symmetric shape. In the rotationally symmetric shape, the two or more convex portions may have the same size and shape, or may have different sizes or shapes.

[0109]

Another aspect of the shape having two or more convex portions is a nonrotational symmetric shape having two or more convex portions and a concave portion formed between the convex portions. In such a nonrotational symmetric shape, for example, a heart pattern or the like can be formed.

[0110]

As a preferable example of the nonrotational symmetric shape, a vertical distance D3 from a straight line L connecting vertices T of two adjacent convex portions to the concave portion B formed between the two convex portions is 1.2 cm or more. Fig. 2 schematically shows the distance D3 by giving an example of a nonrotationally symmetric shape having two convex portions and one concave portion formed between the convex portions. In the conventional gel detergent composition, even if the nonrotationally symmetric shape is designed so that the distance D3 increases, the shape cannot be maintained as designed, the distance D3 is reduced, and the shape of the convex portion tends to be difficult to be conspicuous. However, in the present invention, even if the nonrotationally symmetric shape is designed so that the distance D3 increases, the shape can be formed on the attached surface as designed, the distance

D3 is as large as the range described above, and the shape of the convex portion can be made conspicuous.

[0111]

The distance D3 is preferably about 1.4 to 2.0 cm and more preferably about 1.3 to 1.9 cm, from the viewpoint of providing an excellent appearance by making the shape of the convex portion conspicuous in the nonrotationally symmetric shape.

[0112]

In the nonrotationally symmetric shape, when there are three or more convex portions and there are two or more distances D3, at least one value of the distance D3 may be set so as to satisfy the above range.

[0113]

The number of convex portions per one nonrotationally symmetric shape may be 2 or more, and may be appropriately set depending on a pattern to be formed, and the number is, for example, 2 to 10 pieces, preferably 2 to 8 pieces, and more preferably 2 to 6 pieces.

[0114]

In the single nonrotationally symmetric shape, the shape of the convex portion is not particularly limited, and examples thereof include a petal shape, an elliptical shape, a circular shape, a teardrop shape, and a needle shape. In the nonrotationally symmetric shape, the two or more convex portions may have the same size and shape, or may have different sizes or shapes.

[0115]

In order to set the gel detergent composition of the present invention to form the shape on the attached surface after the gel detergent composition is discharged from the container, the shape of the discharge port of the container to be used and the amount

of the gel detergent composition discharged per one time may be appropriately set.

The shape of the discharge port of the container for forming the discharged gel detergent composition into a desired shape is known in Japanese Patent Laid-open Publication No. 2015-67321 and the like.

[0116]

In the gel detergent composition of the present invention, the amount of the gel detergent composition per one shape formed on the attached surface after discharge may be appropriately set depending on the type of the object to be cleaned, the number of the compositions attached onto the attached surface, etc., and the amount is, for example, about 2.4 to 4.0 g and is preferably about 3.0 to 3.5 g.

Examples

[0117]

Hereinafter, the present invention will be described with reference to examples, but the present invention is not limited to these examples.

[0118]

The structures, trade names, etc. of main components used in the following examples and comparative examples are as follows.

- Polyoxyalkylene block polymer: Structural formula: $\text{HO}-(\text{EO})_{j1}-(\text{BO})_{k1}-(\text{PO})_{l1}-(\text{BO})_{m1}-(\text{EO})_{n1}-\text{H}$ [$j1$ and $n1$ are approximately the same number, $k1$ and $m1$ are approximately the same number, EO addition mole number ($j1 + n1$) is about 330, BO addition mole number ($k1 + m1$) is about 20, PO addition mole number ($l1$) is about 20, molecular weight is about 16800, hydrophobic group part $((\text{BO})_{k1}-(\text{PO})_{l1}-(\text{BO})_{m1})$ has a molecular weight of about 2200]

- Polyoxyethylene alkyl ether: Mixture of polyoxyethylene (the number of added moles 50) cetyl ether and polyoxyethylene oleyl ether

- Amphoteric surfactant: Coconut oil fatty acid amide propyl dimethyl acetic acid

betaine, trade name “Amogen CB-H”, manufactured by DKS Co. Ltd.

- Tetraalkylammonium salt: Didecyldimethylammonium methosulfate, trade name

“DDAM (LIPOQUAD 210-80MSPG)”, manufactured by Lion Specialty Chemicals Co., Ltd.

- Hydrogen peroxide: Manufactured by Lion Specialty Chemicals Co., Ltd.

- Sodium chloride: Manufactured by Wako Pure Chemical Industries, Ltd.

- Ammonium chloride: Manufactured by Wako Pure Chemical Industries, Ltd.

- Glycerin oxide: Glycerol polyoxyethylene adduct in which three ethylene oxides in which the number of added moles is 20 are ester-bonded to glycerin, trade name “GE20”, manufactured by DKS Co. Ltd.

- Perfume: Mint-based perfume

[0119]

Test Example 1

A gel detergent composition was prepared by mixing a predetermined amount of each component shown in Table 1. The content shown in Table 1 indicates a substantial amount of each component excluding the solvent contained in the added additive (commodity). The obtained gel detergent composition was evaluated by the following method for its viscoelastic properties and its state after the composition is attached to the attached surface.

[0120]

<Viscoelastic properties>

Using a rheometer (“MCR302”, manufactured by Anton Paar GmbH), the loss modulus G'' and the storage modulus G' when the strain was 0.1% were measured under the following conditions, and the loss tangent $\tan \delta$ was calculated.

Measurement conditions: 25°C, parallel plate (25.5 mmφ), gap 0.5 mm

Measurement procedure: After standing still (shear velocity 0S^{-1} , time 300 seconds), a strain dispersion test (strain $\gamma = 0.01$ to 100%, frequency $f = 1\text{Hz}$) was performed.

[0121]

<State of gel detergent composition attached to attached surface>

Each gel detergent composition was contained in a pump-type container. The pump-type container is designed so that 3.5 g of the gel detergent composition is discharged by a single extrusion operation. The discharge port of the pump-type container is designed so that the gel detergent composition after discharge has a six-fold rotational symmetric shape (specifically, the shapes shown as Examples 1, 4 and 5 in Fig. 3) which has six circular convex portions and six concave portions and in which the distance D1 from the center to the vertex of the convex portion is 1.9 cm, the distance D2 from the center to the concave portion adjacent to the convex portion is 1.0 cm, and the ratio D1/D2 is 1.9.

[0122]

Each gel detergent composition was discharged from the pump-type container onto a hard surface made of acrylic, and the glossiness of the discharged gel detergent composition, a degree of stringiness of the gel detergent composition during discharge, and the shape of the discharged gel detergent composition were scored according to the following criteria. At the time of scoring, for example, in the case of an intermediate state between score 3 and score 4, the score was judged to be 3.5, and scoring was performed with the first decimal place. Each evaluation was scored for each item by four people, and the average score of each item was calculated.

[0123]

- Determination criteria of glossiness of gel detergent composition after discharge

5: The gel detergent composition after discharge has a sufficient glossiness.

4: The gel detergent composition after discharge has an almost sufficient glossiness.

3: The gel detergent composition after discharge has a slight glossiness.

2: The gel detergent composition after discharge has almost no glossiness.

1: The gel detergent composition after discharge has no glossiness.

[0124]

- Determination criteria of degree of stringiness of gel detergent composition during discharge

5: There is no stringing of the gel detergent composition from the discharge port of the container during discharge, and the shape of the discharged gel detergent composition is as designed.

4: There is almost no stringing of the gel detergent composition from the discharge port of the container during discharge, and the shape of the discharged gel detergent composition is as designed.

3: There is slight stringing of the gel detergent composition from the discharge port of the container during discharge, and the shape of the discharged gel detergent composition is slightly affected by the stringing, but is as designed as a whole.

2: There is stringing of the gel detergent composition from the discharge port of the container during discharge, and the shape of the discharged gel detergent composition changes from the designed shape due to the stringing.

1: The gel detergent composition significantly strings from the discharge port of the container during discharge, and the shape of the discharged gel detergent composition significantly changes from the designed shape due to the stringing.

[0125]

- Determination criteria of shape of gel detergent composition after discharge

5: The shape of the gel detergent composition after discharge has a ratio $D1/D2$ of about 1.8 to 2.0, and is as designed.

4: The shape of the gel detergent composition after discharge has a ratio $D1/D2$ of about 1.5 to 1.7, and is as substantially designed.

3: The shape of the gel detergent composition after discharge has a ratio $D1/D2$ of about 1.2 to 1.4, and is as almost designed.

2: The shape of the gel detergent composition after discharge has a ratio $D1/D2$ of about 1.1, and the shape of the convex portion does not appear as designed and changes from the designed shape.

1: The shape of the gel detergent composition after discharge has a ratio $D1/D2$ of about 1.0 or less, the shape of the convex portion does not appear at all as designed and significantly changes from the designed shape.

[0126]

An overall average score was calculated by adding the average score of each item and dividing by 3, and comprehensive evaluation was performed according to the following classification.

- Classification criteria for comprehensive evaluation

⊙: Overall average score is 4 or more

○: Overall average score is 3 or more and less than 4

△: Overall average score is 2 or more and less than 3

×: Overall average score is less than 2

[0127]

The results are shown in Table 1. As typical results, Fig. 3 shows the results

of observing the shapes of the discharged gel detergent compositions of Examples 1, 4 and 5 and Comparative Examples 1 and 3. As a result, when the gel detergent composition had a storage modulus (G') at 25°C of 10000 Pa or more, if the composition was discharged to the attached surface, good glossy appearance was provided, stringing could be suppressed, and a complicated shape could be formed as designed.

[0128]

[Table 1]

	Example							Comparative Example		
	1	2	3	4	5	6	7	1	2	3
Polyoxyalkylene block polymer	18.70	17.0	18.70	17.00	18.7	17.00	18.23	20.57	15.90	20.57
Polyoxyethylene alkyl ether	0.85	6.80	0.85	0.85	0.85	0.85	4.68	0.94	0.94	0.94
Amphoteric surfactant	12.75	12.75	17.00	12.75	12.75	17.00	9.35	4.68	14.03	14.03
Tetraalkylammonium salt	-	-	-	-	-	-	1.78	4.68	1.78	4.68
Hydrogen peroxide	2.70	2.70	2.70	2.70	2.70	2.70	-	-	-	-
Sodium chloride	-	-	-	-	-	-	0.94	-	0.94	0.94
Ammonium chloride	-	-	-	-	-	-	0.47	0.93	0.94	-
Glycerin oxide	2.55	6.80	2.55	2.55	6.80	6.80	6.08	9.35	9.35	0.94
Perfume	5.94	5.94	5.94	5.94	5.94	5.94	6.43	6.43	6.43	6.43
Ion-exchanged water	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder
Total (wt %)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Storage modulus G' (Pa)	31032	26316	24469	21956	21215	19388	17714	6989.9	5538.2	682.63
Loss modulus G'' (Pa)	261.51	241.85	143.18	170.78	172.99	130.9	174.77	368.84	501.61	5421.2
Loss tangent tanδ	0.008	0.009	0.006	0.008	0.008	0.007	0.01	0.053	0.091	0.126
Evaluation result of glossiness	4.8	4.9	4.8	4.6	4.8	4.9	4.2	1.2	2.1	1.2
Evaluation result of stringing state	4.1	3.3	3.1	4.2	3.4	2.8	4.9	1.4	1.3	1.4
Evaluation result of shape	4.2	4.9	3.9	4.6	4.0	3.6	4.8	1.6	2.0	1.4
Comprehensive evaluation	⊕	⊕	○	⊕	⊕	○	⊕	×	×	×

CLAIMS

1. A gel detergent composition comprising 10 to 50% by weight of a polyoxyalkylene block polymer, a polyoxyalkylene alkyl ether and 9 to 20% by weight of an amphoteric surfactant, and
the composition having a storage modulus (G') at 25°C of 16000 to 40000 Pa and a loss modulus (G'') at 25°C of 100 to 400 Pa.
2. The gel detergent composition according to claim 1, which is used as attached onto an attached surface to form a shape having two or more convex portions on the attached surface.
3. The gel detergent composition according to claim 2, wherein
the shape having two or more convex portions has a rotationally symmetric shape having two or more convex portions extending radially and a concave portion formed between the convex portions, and
a ratio ($D1/D2$) of a distance $D1$ from a center to a vertex of the convex portion and a distance $D2$ from the center to one of the concave portions adjacent to the convex portion is 1.2 or more.
4. The gel detergent composition according to claim 2, wherein
the shape having two or more convex portions has a nonrotationally symmetric shape having two or more convex portions and a concave portion formed between the convex portions, and
a vertical distance $D3$ from a straight line connecting vertices of two of the convex portions, which are adjacent to each other, to the concave portion formed between the two convex portions is 1.2 cm or more.
5. The gel detergent composition according to any one of claims 1 to 4, which is used as attached to a surface of a toilet bowl.