

DESCRIPTION

Title of the Invention: WIPING SHEET

Technical Field

[0001]

5 The present invention relates to a wet wiping sheet.

Background Art

[0002]

10 What is called a wet sheet (cleaning sheet) in the form in which an aqueous solution containing a sanitizer and the like is infiltrated into a nonwoven fabric is convenient, easy to use, and disposable, and thus clean wet sheets are always available. The sheets are therefore used not only at home but also in food factories, kitchens, and medical facilities for environmental improvement.

[0003]

15 The aqueous cleaning liquid included in a wet sheet often contains an antimicrobial agent or a bactericidal agent to improve the hygiene of an object to be wiped. For example, Patent Literature 1 discloses a bacteria removing sheet in which a base sheet is impregnated with an aqueous sanitizer. The aqueous sanitizer included in the bacteria removing sheet contains a quaternary ammonium salt surfactant, an inorganic electrolyte and/or a citrate, an alkaline agent, and water.

20 Patent Literature 2 discloses a bacteria removing sheet including an aqueous sanitizer that contains a quaternary ammonium salt surfactant, potassium hydroxide, an aminocarboxylic acid chelating agent, and water.

Citation List

Patent Literatures

25 [0004]

Patent Literature 1: JP 2018-027916 A

Patent Literature 2: JP 2019-112342 A

Summary of Invention

[0005]

The present invention relates to a wiping sheet including a nonwoven fabric and an aqueous cleaning liquid infiltrated into the nonwoven fabric.

5 In an embodiment, the aqueous cleaning liquid preferably contains an aromatic antimicrobial agent and a nonionic surfactant.

Description of Embodiments

[0006]

10 When a wet sheet is used to cleanse a large area of a surface to be wiped, a sufficient amount of an aqueous cleaning liquid is supplied in the early stages of wiping, and thus a sufficient hygienic effect can be provided onto the wiped surface. As the wiped area increases, however, the hygienic effect provided onto the wiped surface is likely to gradually decrease. The tendency also applies to the techniques disclosed in Patent Literatures 1 and 2.

15 [0007]

The present invention therefore relates to a wiping sheet capable of maintaining the hygiene performance on a wiped surface almost equal to that in the early stages of wiping even after the discharge amount of a cleaning liquid decreases as the wiped area increases.

20 [0008]

The present invention will now be described on the basis of preferred embodiments.

25 In the present invention, “wiping” includes both meanings of cleaning and cleansing and, for example, includes building cleaning such as floor, wall, ceiling, and pillar cleaning, cleaning of fittings and fixtures, wiping of articles, and cleansing of human bodies and apparatuses for human bodies.

In the following description, an aqueous cleaning liquid may also be called simply a “cleaning liquid”.

[0009]

The present invention relates to a wiping sheet including a nonwoven fabric and an aqueous cleaning liquid infiltrated into the nonwoven fabric. The inventors of the present invention have intensively studied the formulation of the aqueous cleaning liquid capable of maintaining the hygiene performance after a large area is wiped and have found
5 that an aqueous cleaning liquid containing an aromatic antimicrobial agent and a nonionic surfactant can surprisingly improve the virus removal effect of a wiping sheet with excellent efficiency after a large area is wiped.

[0010]

The aromatic antimicrobial agent includes both an alcohol antimicrobial agent
10 having an aromatic ring and an antimicrobial agent in which at least one hydrogen atom on an aromatic hydrocarbon nucleus is substituted by a hydroxy group.

[0011]

Typical examples of the alcohol antimicrobial agent having an aromatic ring preferably include a compound in which one hydrogen atom on a benzene ring is
15 substituted by an alkyl group having a hydroxy group and having 1 to 3 carbon atoms and a compound in which the hydrogen atom on a phenolic hydroxy group of a phenol is substituted by an alkyl group having a hydroxy group and having 1 to 8 carbon atoms. Of these compounds, specifically, a compound in which a hydrogen atom on a benzene ring or the hydrogen atom on a phenolic hydroxy group of a phenol is substituted by an alkyl group
20 having a hydroxy group in such a way that the carbon atom farthest from the hydroxy group of the alkyl group is bonded to a carbon atom constituting the benzene ring or to the oxygen atom of the phenolic hydroxy group is preferably included. Examples of the alcohol antimicrobial agent having an aromatic ring include benzyl alcohol, phenoxyethanol, phenethyl alcohol, and 3-phenylpropanol.

25 [0012]

Examples of the antimicrobial agent in which at least one hydrogen atom on an aromatic hydrocarbon nucleus is substituted by a hydroxy group include parabens (also called "p-hydroxybenzoate esters"), hinokitiol, 5-chloro-2-(2,4-dichlorophenoxy)phenol (common name: triclosan), 4,4'-dichloro-2-hydroxydiphenyl ether (common name:
30 diclosan), o-benzyl-p-chlorophenol (chlorophen), isopropylmethylphenol (3-methyl-4-

isopropylphenol, IPMP), parachlorometaxylenol (4-chloro-3,5-dimethylphenol, PCMX), thymol, and cresol. Examples of the paraben include p-hydroxybenzoate esters and sodium salts thereof, such as methylparaben, ethylparaben, propylparaben, isopropylparaben, butylparaben, isobutylparaben, benzylparaben, and sodium methylparaben.

[0013]

In the present invention, an alcohol antimicrobial agent having an aromatic ring or a paraben is preferably used as the aromatic antimicrobial agent from the viewpoint of especially easily improving the virus removal effect by the wiping sheet after a large area is wiped. Specifically, phenoxyethanol or a paraben is more preferably used, and phenoxyethanol or methylparaben is even more preferably used.

[0014]

In the aqueous cleaning liquid, the amount of the aromatic antimicrobial agent is preferably 0.01% by mass or more from the viewpoint of easily allowing the aromatic antimicrobial agent to provide the effect of suppressing a reduction in the hygiene performance when a large area is wiped, more preferably 0.05% by mass or more, and even more preferably 0.1% by mass or more. In the aqueous cleaning liquid, the amount of the aromatic antimicrobial agent is preferably 1.0% by mass or less from the viewpoint of safety and of suppressing base material damages, more preferably 0.5% by mass or less, and even more preferably 0.3% by mass or less.

In terms of the range, the amount of the aromatic antimicrobial agent is preferably 0.01% by mass or more and 1.0% by mass or less, more preferably 0.05% by mass or more and 0.5% by mass or less, and even more preferably 0.1% by mass or more and 0.3% by mass or less.

[0015]

The nonionic surfactant contained in the aqueous cleaning liquid is preferably an alkylene oxide adduct nonionic surfactant such as an ethylene oxide adduct nonionic surfactant from the viewpoint of allowing combination use with an aromatic antimicrobial agent to especially efficiently suppress a reduction in the hygiene performance after a large area is wiped and is more preferably a polyoxyethylene alkyl ether.

[0016]

The polyoxyethylene alkyl ether is also called an “alcohol ethoxylate” and is, for example, a nonionic surfactant produced by ethoxylation of an alcohol with ethylene oxide. The inventors of the present invention have found that when an aqueous cleaning liquid containing a polyoxyethylene alkyl ether and an aromatic antimicrobial agent is infiltrated into a nonwoven fabric, a reduction in the hygiene performance such as virus removal performance can be efficiently suppressed even after a large area is wiped.

[0017]

The polyoxyethylene alkyl ether is represented by General Formula (1). In General Formula (1), “ $H_{2m+1}C_m$ ” is the hydrophobic group, and “ $O(CH_2-CH_2-O)_n$ ” is the ethylene oxide repeating moiety as the hydrophilic group.

[0018]



In the formula, m is an integer of 1 or more, and n is an integer of 2 or more.

[0019]

The cleaning liquid infiltrated into the wiping sheet is preferably aqueous from the viewpoint of safety, finishing properties, or feeling of use. From this viewpoint, the nonionic surfactant is preferably highly water-soluble. From this viewpoint, as the nonionic surfactant, the polyoxyethylene alkyl ether preferably has an ethylene oxide number of 4 or more, more preferably 8 or more, and even more preferably 20 or more.

The polyoxyethylene alkyl ether preferably has an ethylene oxide number of 50 or less from the viewpoint of hygiene performance or cleanability and more preferably 47 or less.

In terms of the range, the polyoxyethylene alkyl ether preferably has an ethylene oxide number of 4 or more and 50 or less, more preferably 8 or more and 47 or less, and even more preferably 20 or more and 47 or less.

The ethylene oxide number is indicated by “n” in General Formula (1).

[0020]

The nonionic surfactant preferably includes two or more polyoxyethylene alkyl

ethers having different ethylene oxide numbers. Specifically, the nonionic surfactant more preferably includes a polyoxyethylene alkyl ether having an ethylene oxide number of 20 or more and a polyoxyethylene alkyl ether having an ethylene oxide number of less than 12 and even more preferably includes a polyoxyethylene alkyl ether having an ethylene oxide number of 21 or more and a polyoxyethylene alkyl ether having an ethylene oxide number of less than 12. This is because such a composition as above markedly achieves the effect of suppressing a reduction in the hygiene performance after a large area is wiped. In addition, various components contained in the cleaning liquid are prevented from adsorbing to sheet fibers, and the cleaning liquid can be efficiently discharged to an intended surface.

[0021]

From the viewpoint of markedly achieving the effect, the polyoxyethylene alkyl ether having an ethylene oxide number of less than 12 more preferably has an ethylene oxide number of not less than 4 and less than 12 and even more preferably 8 or more and 10 or less.

[0022]

As for the length of the alkyl chain as the hydrophobic group in the polyoxyethylene alkyl ether, the carbon number m in Formula (1) is preferably 6 or more and 24 or less and more preferably 8 or more and 18 or less from the viewpoint of excellent balance with the ethylene oxide number and of accordingly more easily achieving an excellent effect of suppressing a reduction in the hygiene performance. When the aqueous cleaning liquid contains two or more polyoxyethylene alkyl ethers having different ethylene oxide numbers, the ethers may have the same carbon number m or different carbon numbers but preferably have the same carbon number from the viewpoint of further easily achieving an excellent effect of suppressing a reduction in the hygiene performance.

[0023]

The content of the nonionic surfactant in the aqueous cleaning liquid is preferably 0.01% by mass or more, more preferably 0.02% by mass or more, and even more preferably 0.05% by mass or more from the viewpoint of easily suppressing a reduction in the hygiene performance of the wiping sheet after a large area is wiped. The content of the nonionic

surfactant in the aqueous cleaning liquid is preferably 5.0% by mass or less, more preferably 4.0% by mass or less, even more preferably 3.0% by mass or less, and further preferably 2.0% by mass or less from the viewpoint of finishing properties after wiping or of suppressing base material damages.

5 In terms of the range, the content of the nonionic surfactant in the aqueous cleaning liquid is preferably 0.01% by mass or more and 5.0% by mass or less, more preferably 0.02% by mass or more and 4.0% by mass or less, even more preferably 0.05% by mass or more and 3.0% by mass or less, and further preferably 0.05% by mass or more and 2.0% by mass or less.

10 [0024]

From the viewpoint of more easily suppressing a reduction in the hygiene performance of the wiping sheet after a large area is wiped, the content of the nonionic surfactant in the aqueous cleaning liquid is preferably 1 part by mass or more and 1 000 parts by mass or less and more preferably 50 parts by mass or more and 800 parts by mass or less relative to 100 parts by mass of the aromatic antimicrobial agent.

[0025]

From the viewpoint of more easily suppressing a reduction in the hygiene performance of the wiping sheet after a large area is wiped, the amount of the nonionic surfactant, specifically, the amount of the polyoxyethylene alkyl ether is preferably 1 part by mass or more and more preferably 10 parts by mass or more relative to 100 parts by mass of the surfactants contained in the aqueous cleaning liquid.

[0026]

When the nonionic surfactant includes a polyoxyethylene alkyl ether having an ethylene oxide number of 12 or more and a polyoxyethylene alkyl ether having an ethylene oxide number of less than 12, the mass ratio of the amount C1 of the polyoxyethylene alkyl ether having a polyethylene oxide number of 12 or more to the amount C2 of the polyoxyethylene alkyl ether having an ethylene oxide number of less than 12, C1:C2, is preferably 100:0 to 10 000, more preferably 100:0 to 1 000, and even more preferably 100:10 to 1 000 from the viewpoint of more easily achieving the above marked effect by the two or more polyoxyethylene alkyl ethers. Similarly, the mass ratio of the amount C1'

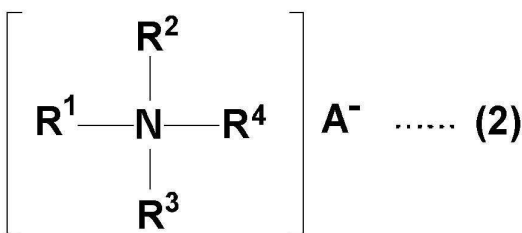
of the polyoxyethylene alkyl ether having a polyethylene oxide number of 20 or more to the amount C2 of the polyoxyethylene alkyl ether having an ethylene oxide number of less than 12, C1':C2, is preferably 100:0 to 10 000, more preferably 100:0 to 1 000, and even more preferably 100:10 to 1 000.

5 [0027]

The aqueous cleaning liquid preferably further contains a bactericidal agent from the viewpoint of further improving the hygiene performance of the wiping sheet. Preferred examples of the bactericidal agent include a quaternary ammonium salt. Examples of the quaternary ammonium salt include alkyltrimethylammonium salts, polyoxyethylenealkylmethylammonium salts, alkylbenzyltrimethylammonium salts such as benzalkonium chloride, quaternary ammonium salts having a group in which an arylalkyl group is divided by an ether group, a benzyl group, and two methyl groups, and alkylpyridinium salts such as alkyl cetylpyridinium chloride. Examples of the quaternary ammonium salt having a group in which an arylalkyl group is divided by an ether group, a benzyl group, and two methyl groups include benzethonium chloride. Examples of the group in which an arylalkyl group is divided by an ether group include a group in which the alkyl chain of an arylalkyl group is interrupted by an oxygen atom. For example, a typical quaternary ammonium salt is represented by Formula (2).

20 [0028]

[Chemical Formula 1]



[0029]

In the formula, R¹ is a linear or branched alkyl group having 6 or more and 28 or less carbon atoms, a linear or branched alkenyl group having 6 or more and 28 or less carbon atoms, an arylalkyl group having 7 or more and 28 or less carbon atoms, or a group in which the alkyl group, the alkenyl group, or the arylalkyl group is divided by an amido group, an ester group, or an ether group. R² is a linear or branched alkyl group having 1

or more and 28 or less carbon atoms, a linear or branched alkenyl group having 1 or more and 28 or less carbon atoms, an arylalkyl group having 7 or more and 28 or less carbon atoms, a group in which the alkyl group, the alkenyl group, or the arylalkyl group is divided by an amido group, an ester group, or an ether group, or an arylalkyl group having 7 or more and 28 or less carbon atoms. R^3 and R^4 are the same or different from each other and are a linear or branched alkyl group having 1 or more and 3 or less carbon atoms. R^2 , R^3 , and R^4 may together form a pyridine ring. A^- is an anion as the counter ion of the ammonium ion.

A^- is, for example, a carboxylate ion, a sulfonate ion, or a halogen ion. Of them, a halogen ion is preferred, a chloride ion or a bromide ion is more preferred, and a chloride ion is even more preferred.

[0030]

The quaternary ammonium salt is preferably an alkylbenzyltrimethylammonium salt from the viewpoint of excellent hygiene performance and is more preferably benzalkonium chloride.

[0031]

The content of the quaternary ammonium salt in the aqueous cleaning liquid is preferably 0.01% by mass or more, more preferably 0.02% by mass or more, and even more preferably 0.03% by mass or more from the viewpoint of improving the hygiene performance of the aqueous cleaning liquid. The content of the quaternary ammonium salt in the aqueous cleaning liquid is preferably 5.0% by mass or less, more preferably 3.0% by mass or less, and even more preferably 1.0% by mass or less from the viewpoint of safety.

In terms of the range, the content of the quaternary ammonium salt in the aqueous cleaning liquid is preferably 0.01% by mass or more and 5.0% by mass or less, more preferably 0.02% by mass or more and 3.0% by mass or less, and even more preferably 0.03% by mass or more and 1.0% by mass or less.

[0032]

In the present invention, the aqueous cleaning liquid preferably further contains an additional antimicrobial agent other than the aromatic antimicrobial agent from the

viewpoint of further improving the hygiene performance of the wiping sheet.

Examples of the additional antimicrobial agent other than the aromatic antimicrobial agent include glycol compounds. The glycol compound is a compound having no aromatic ring but having two hydroxy groups, and propylene glycol, dipropylene glycol, isoprene glycol, ethylene glycol, butylene glycol, pentylene glycol, 1,2-hexanediol, 1,2-octanediol, and the like are known. Specifically, dipropylene glycol is preferably used from the viewpoint of further improving the hygiene performance.

[0033]

When the aqueous cleaning liquid contains a glycol compound used as the antimicrobial agent, the amount of the glycol compound in the aqueous cleaning liquid is preferably 0.01% by mass or more and 1.0% by mass or less, more preferably 0.02% by mass or more and 0.5% by mass or less, and even more preferably 0.05% by mass or more and 0.3% by mass or less from the viewpoint of improving the antimicrobial performance or of safety.

[0034]

As long as the effect of the present invention is achieved, the aqueous cleaning liquid may contain, in addition to the nonionic surfactant, a cationic surfactant, an anionic surfactant, and/or an amphoteric surfactant as the surfactant. From the viewpoint of cleanability, the aqueous cleaning liquid preferably contains only the nonionic surfactant or preferably contains the nonionic surfactant as well as an amphoteric surfactant as the surfactant. Examples of the amphoteric surfactant used in the present invention include at least one selected from lauryldimethylamine oxide, alkyl betaines, and 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine. When the amphoteric surfactant is contained, the amount of the amphoteric surfactant is preferably 0.01% by mass or more and 0.1% by mass or less in the aqueous cleaning liquid.

[0035]

As long as the effect of the present invention is achieved, the aqueous cleaning liquid may further contain an additive in addition to the above components. Examples of the additive include surfactants other than the above-described nonionic surfactants and amphoteric surfactants, bactericidal agents other than the alcohols and quaternary

ammonium salts, preservatives, air fresheners, fragrances, deodorants, pH adjusters, sequestering agents, viscosity modifiers, and solvents. These additives may be used singly or in combination. These additives may be used as needed for properties required for the wiping sheet, and when additives are used, each amount may be preferably 0.001%
5 by mass or more and 20% by mass or less in the aqueous cleaning liquid.

[0036]

From the viewpoint of hygiene performance or of safety, the aqueous cleaning liquid in the wiping sheet at 25°C preferably has a pH of 3.0 or more and more preferably 4.0 or more and preferably has a pH of 11.0 or less and more preferably 10.0 or less. To
10 make the cleaning liquid have a pH within the above range, for example, a pH adjuster may be added for the adjustment in such an amount that the effect of the invention is achieved.

[0037]

The aqueous cleaning liquid included in the wiping sheet of the present invention preferably mainly contains water. The content of the water contained in the aqueous
15 cleaning liquid is preferably 80.0% by mass or more and more preferably 90.0% by mass or more and is preferably 99.8% by mass or less and more preferably 99.0% by mass or less relative to the total mass of the cleaning liquid.

[0038]

Next, the nonwoven fabric included in the wiping sheet will be described.

20 [0039]

The proportion of the aqueous cleaning liquid infiltrated into the nonwoven fabric is preferably 100% by mass or more and more preferably 200% by mass or more relative to the mass of the nonwoven fabric from the viewpoint of the liquid moving amount to a cleansing surface. From the viewpoint of the liquid moving amount to a cleansing
25 surface, the proportion is preferably 600% by mass or less and more preferably 500% by mass or less.

[0040]

Examples of the fibers included in the nonwoven fabric include regenerated fibers,

natural fibers, and synthetic fibers. From the viewpoint of safety or of easy infiltration or retaining properties of the aqueous cleaning liquid, regenerated fibers are preferably included. Examples of the regenerated fibers include rayon fibers and acetate fibers, and from the viewpoint of safety or of versatility, rayon fibers are preferably used. Examples
 5 of the natural fibers include cotton, hemp, and collagen fibers. The synthetic fibers are preferably formed from a fiber-forming resin as the material from the viewpoint of production efficiency. Examples of such a resin include various thermoplastic resins. Examples of the thermoplastic resin include polyolefin resins such as polyethylene (PE) and polypropylene (PP); polyester resins such as polyethylene terephthalate (PET);
 10 polyamide resins; vinyl resins such as polyvinyl chloride and polystyrene; acrylic resins such as polyacrylic acid and polymethyl methacrylate; and fluorine resins such as polyperfluoroethylene. These resins may be used singly or in combination of two or more of them.

[0041]

15 The proportion of the regenerated fibers in the nonwoven fabric is preferably 1% by mass or more from the viewpoint of easy infiltration or retaining properties of the aqueous cleaning liquid. From this viewpoint, the proportion of the regenerated fibers in the nonwoven fabric is more preferably 5% by mass or more and even more preferably 10% by mass or more. The proportion of the regenerated fibers in the nonwoven fabric is
 20 preferably 99% by mass or less from the viewpoint of the operability during wiping and is more preferably 90% by mass or less.

[0042]

From the viewpoint of the infiltrating performance of the aqueous cleaning liquid, the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 5
 25 g/m² or more and more preferably 10 g/m² or more in the dry state of the nonwoven fabric. From the viewpoint of capable of continuously discharging an appropriate amount of the aqueous cleaning liquid during cleansing, the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 60 g/m² or less, more preferably 50 g/m² or less, and even more preferably 40 g/m² or less.

30 [0043]

From the viewpoint of hygiene performance, the rate of the mass of the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 0.05 or more, more preferably 0.075 or more, and even more preferably 0.01 or more. From the viewpoint of the liquid moving amount to a cleansing surface and of hygiene performance, the rate of the mass of the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 1.0 or less, more preferably 0.6 or less, and even more preferably 0.4 or less.

[0044]

From the viewpoint of hygiene performance, the rate of the mass of the aromatic antimicrobial agent in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 0.000 2 or more, more preferably 0.000 3 or more, and even more preferably 0.000 5 or more. From the viewpoint of hygiene performance, the rate of the mass of the aromatic antimicrobial agent in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 0.005 or less, more preferably 0.003 or less, and even more preferably 0.001 or less.

[0045]

From the viewpoint of hygiene performance, the rate of the mass of the nonionic surfactant in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 0.000 1 or more, more preferably 0.000 5 or more, and even more preferably 0.000 8 or more. From the viewpoint of hygiene performance, the rate of the mass of the nonionic surfactant in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 0.02 or less, more preferably 0.01 or less, and even more preferably 0.007 or less.

[0046]

The regenerated fibers preferably have a fineness of 0.5 dtex or more, more preferably 0.75 dtex or more, and even more preferably 1.0 dtex or more from the viewpoint of the operability during wiping. The upper limit is preferably 3.0 dtex or less, more

preferably 2.5 dtex or less, and even more preferably 2.0 dtex or less.

[0047]

When the nonwoven fabric contains synthetic fibers, the amount of the synthetic fibers in the nonwoven fabric is preferably 99% by mass or less, more preferably 90% by mass or less, and even more preferably 80% by mass or less from the viewpoint of easy infiltration or retaining properties of the aqueous cleaning liquid. The proportion of the synthetic fibers in the nonwoven fabric is preferably 5% by mass or more and more preferably 10% by mass or more from the viewpoint of the operability during wiping or of the dirt removal.

10 [0048]

The synthetic fibers preferably have a fineness of 0.5 dtex or more, more preferably 1 dtex or more, and even more preferably 1.2 dtex or more from the viewpoint of the operability during wiping and of the dirt removal efficiency. The upper limit is preferably 4 dtex or less, more preferably 3.5 dtex or less, and even more preferably 3 dtex or less.

[0049]

In the nonwoven fabric, fibers including the regenerated fibers, the synthetic fibers, and the natural fibers are accumulated, entangled, or conjugated to each other to form fiber aggregates. The fibers constituting the nonwoven fabric may be fused to each other or may not be fused. The wiping sheet may include only the nonwoven fabric or may include, in addition to the nonwoven fabric, an additional sheet material or an additional member.

[0050]

The nonwoven fabric constituting the wiping sheet preferably has a basis weight of 30 g/m² or more, more preferably 35 g/m² or more, and even more preferably 40 g/m² or more in the dry state of the nonwoven fabric. The upper limit is preferably 100 g/m² or less, more preferably 90 g/m² or less, and even more preferably 80 g/m² or less. The dry state means that a nonwoven fabric contains water at a content of 3% by mass or less. When the nonwoven fabric in the dry state has such a basis weight, the wiping sheet can be

impregnated with a sufficient amount of the aqueous cleaning liquid, accordingly achieves an excellent hygiene performance, can capture much of the dirt removed, and has an excellent strength during wiping.

[0051]

5 As the nonwoven fabric, a spunlace nonwoven fabric, a meltblown nonwoven fabric, a spunbond nonwoven fabric, an air-through nonwoven fabric, a resin bonded nonwoven fabric, a needle punching nonwoven fabric, or the like may be used. A composite of these nonwoven fabrics may also be used. Of them, a spunlace nonwoven fabric is preferably used from the viewpoint of easy entanglement with fibrous dirt such as
10 hair or cotton dust.

[0052]

 The nonwoven fabric and the wiping sheet of the present invention including the nonwoven fabric may be, for example, an approximately rectangular sheet having a longitudinal direction and a width direction orthogonal to the longitudinal direction. The
15 wiping sheet may have or may not have projecting-and-depressed portions in a macroscopic pattern having curved lines on at least one face.

[0053]

 From the viewpoint of providing a sufficient strength during use of the wiping sheet, the wiping sheet of the present invention may further include a scrim net for
20 supporting the nonwoven fabric. The scrim net is also preferably provided in the center region in the thickness direction of the nonwoven fabric. The scrim net can be integrally tangled with the synthetic fibers constituting the nonwoven fabric and may be in the form of net, lattice, strand, or the like.

[0054]

25 As the material of the scrim net, a resin may be used. As the resin, for example, a polyolefin resin such as polyethylene and polypropylene; a polyester resin such as polyethylene terephthalate; a polyamide resin such as nylon 6 and nylon 66; an acrylonitrile resin such as polyacrylonitrile; a vinyl resin such as polyvinyl chloride and polystyrene; or a vinylidene resin such as polyvinylidene chloride may be used.

[0055]

From the viewpoint of achieving both the tangling properties between the constituent fibers and the scrim net and the strength of the wiping sheet, the wire diameter (the diameter on a cross section) of the scrim net may be appropriately set depending on the tangling degree of fibers but is preferably 10 μm or more and more preferably 100 μm or more and is preferably 2 000 μm or less and more preferably 1 000 μm or less. The wire diameter of the scrim net may partially vary or may be uniform. When the wire diameter partially varies, the wire diameter of the scrim is the average of varying diameters. The scrim net preferably has a basis weight of 1 g/m^2 or more and more preferably 3 g/m^2 or more and preferably 20 g/m^2 or less and more preferably 10 g/m^2 or less.

[0056]

The wiping sheet may be used as the simple wiping sheet or may be attached to a cleaning tool such as a wiper, for building such as floors and walls, fittings such as closets, windowpanes, mirrors, doors, and doorknobs, furniture such as rugs, carpets, and dining tables, a kitchen, a toilet, cleansing of human bodies, sanitary goods, packages, and the like.

[0057]

In particular, in the wiping sheet of the present invention, a nonwoven fabric is impregnated with a cleaning liquid containing an aromatic antimicrobial agent and a nonionic surfactant, and thus a reduction in the hygiene performance such as virus removal performance is efficiently suppressed even after a large area is wiped. Accordingly, the wiping sheet of the present invention has excellent hygiene performance and can provide the effects of saving the cleaning cost by reducing the number of used sheets and of improving the cleanliness by cleaning.

[0058]

The present invention has been described on the basis of preferred embodiments thereof, but the present invention is not limited to the above embodiments.

In consideration of the above embodiments, the present invention will further disclose the following wiping sheets.

<1>

A wiping sheet comprising:

a nonwoven fabric; and
an aqueous cleaning liquid infiltrated into the nonwoven fabric, wherein
the aqueous cleaning liquid contains an aromatic antimicrobial agent and a
nonionic surfactant.

5 <2>

The wiping sheet as set forth in clause <1>, in which the content of the nonionic
surfactant in the aqueous cleaning liquid is preferably 0.01% by mass or more, more
preferably 0.02% by mass or more, and even more preferably 0.05% by mass or more and
is preferably 5.0% by mass or less, more preferably 4.0% by mass or less, even more
10 preferably 3.0% by mass or less, and further preferably 2.0% by mass or less.

<3>

The wiping sheet as set forth in clause <1> or <2>, in which the nonionic
surfactant is a polyoxyethylene alkyl ether.

[0059]

15 <4>

The wiping sheet as set forth in clause <3>, in which the polyoxyethylene alkyl
ether has an ethylene oxide number of 20 or more.

<5>

The wiping sheet as set forth in clause <3> or <4>, in which the polyoxyethylene
20 alkyl ether having an ethylene oxide number of 20 or more and the polyoxyethylene alkyl
ether having an ethylene oxide number of less than 12 are contained.

<6>

The wiping sheet as set forth in any one of clauses <1> to <3>, in which in the
aqueous cleaning liquid, the amount of the aromatic antimicrobial agent is preferably
25 0.01% by mass or more, more preferably 0.05% by mass or more, and more preferably
0.1% by mass or more and is preferably 1.0% by mass or less, more preferably 0.5% by
mass or less, and even more preferably 0.3% by mass or less.

[0060]

<7>

30 The wiping sheet as set forth in any one of clauses <1> to <6>, in which the
aromatic antimicrobial agent is phenoxyethanol or methylparaben.

<8>

The wiping sheet as set forth in any one of clauses <1> to <7>, in which a quaternary ammonium salt is further contained.

<9>

5 The wiping sheet as set forth in clause <8>, in which the quaternary ammonium salt is benzalkonium chloride.

<10>

The wiping sheet as set forth in any one of clauses <1> to <9>, in which a glycol compound is further contained.

<11>

10 The wiping sheet as set forth in clause <10>, in which in the aqueous cleaning liquid, the amount of the glycol compound is preferably 0.01% by mass or more and 1.0% by mass or less, more preferably 0.02% by mass or more and 0.5% by mass or less, and even more preferably 0.05% by mass or more and 0.3% by mass or less.

<12>

15 The wiping sheet as set forth in clause <10> or <11>, in which the glycol compound is dipropylene glycol.

<13>

The wiping sheet as set forth in any one of clauses <1> to <12>, in which the nonwoven fabric contains regenerated fibers.

20 [0061]

<14>

The wiping sheet as set forth in clause <13>, in which the regenerated fibers are rayon fibers.

<15>

25 The wiping sheet as set forth in any one of clauses <1> to <14>, in which the proportion of the regenerated fibers in the nonwoven fabric is preferably 1% by mass or more, more preferably 5% by mass or more, and even more preferably 10% by mass or more, and the proportion of the regenerated fibers in the nonwoven fabric is preferably 99% by mass or less and more preferably 90% by mass or less.

30 <16>

The wiping sheet as set forth in any one of clauses <1> to <15>, in which the nonwoven fabric preferably has a basis weight of 30 g/m² or more, more preferably 35 g/m² or more, and even more preferably 40 g/m² or more, and the nonwoven fabric preferably

has a basis weight of 100 g/m² or less, more preferably 90 g/m² or less, and even more preferably 80 g/m² or less.

[0062]

<17>

5 The wiping sheet as set forth in any one of clauses <1> to <16>, in which the mass of the regenerated fibers in 1 m² of the nonwoven fabric is preferably 5 g/m² or more and more preferably 10 g/m² or more, and the mass of the regenerated fibers in 1 m² of the nonwoven fabric is preferably 60 g/m² or less, more preferably 50 g/m² or less, and even more preferably 40 g/m² or less.

10 <18>

 The wiping sheet as set forth in any one of clauses <1> to <17>, in which the proportion of the aqueous cleaning liquid infiltrated into the nonwoven fabric is preferably 100% by mass or more and more preferably 200% by mass or more relative to the mass of the nonwoven fabric, and the proportion of the aqueous cleaning liquid infiltrated into the
15 nonwoven fabric is preferably 600% by mass or less and more preferably 500% by mass or less.

<19>

 The wiping sheet as set forth in any one of clauses <1> to <18>, in which the rate of the mass of the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the
20 regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 0.05 or more, more preferably 0.075 or more, and even more preferably 0.01 or more, and the rate of the mass of the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is preferably 1.0 or less, more preferably 0.6 or less, and even more preferably 0.4 or less.

25 [0063]

<20>

 The wiping sheet as set forth in any one of clauses <1> to <19>, in which the rate of the mass of the aromatic antimicrobial agent in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²)
30 is preferably 0.000 2 or more, more preferably 0.000 3 or more, and even more preferably 0.000 5 or more, and the rate of the mass of the aromatic antimicrobial agent in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m²

of the nonwoven fabric (g/m^2) is preferably 0.005 or less, more preferably 0.003 or less, and even more preferably 0.001 or less.

<21>

The wiping sheet as set forth in any one of clauses <1> to <20>, in which the rate
 5 of the mass of the nonionic surfactant in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m^2 of the nonwoven fabric (g/m^2) is preferably 0.000 1 or more, more preferably 0.000 5 or more, and even more preferably 0.000 8 or more, and the rate of the mass of the nonionic surfactant in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m^2 of the
 10 nonwoven fabric (g/m^2) is preferably 0.02 or less, more preferably 0.01 or less, and even more preferably 0.007 or less.

Examples

[0064]

The present invention will next be described in further detail with reference to
 15 examples. However, the scope of the invention is not limited to the examples. Unless otherwise specified, “%” means “% by mass”.

[0065]

[Examples 1 to 10 and Comparative Examples 1 to 5]

As the nonwoven fabric containing cellulose fibers, a nonwoven fabric that had
 20 been prepared by water-jet entangling fibers containing synthetic fibers and cellulose fibers and had a scrim net (made from polypropylene, a wire diameter of about 100 μm , a basis weight of 5 g/m^2) in the center region in the thickness direction was used. The nonwoven fabric contained PET fibers (a fineness of 1.7 dtex), acrylic fibers (a fineness of 1.0 dtex), and rayon fibers (a fineness of 1.7 dtex) at a mass ratio of 70:15:15 as the fiber formulation,
 25 had a basis weight of 70 g/m^2 in the dry state, and had dimensions of 285 mm $\times$ 205 mm.

The nonwoven fabric was impregnated with an aqueous cleaning liquid in an amount of 350% by mass relative to the mass of the nonwoven fabric to give an intended wet wiping sheet.

[0066]

30 The aqueous cleaning liquid was an aqueous solution containing 0.05% of an

amphoteric surfactant (lauryldimethylamine oxide), 2% of alcohol, 1% of a solvent (methyl propylene glycol), 0.01% of a preservative (1,2-benzisothiazolin-3-one), 0.01% of a sequestering agent, and components shown in Table 1 each in an amount shown in Table 1. A pH adjuster was further added such that the liquid had a pH of 9.0. Before infiltration, the pH of the cleaning liquid at 25°C was adjusted by using a pH meter (pH meter F22 manufactured by HORIBA). The cleaning liquid contained water at a content of 90.0% by mass or more. The amount of each component in Table 1 is not the amount of a preparation but is the amount of an active component contained in the preparation.

[0067]

10 [Virus removal activity value]

Each wet wiping sheet in Examples and Comparative Examples was used under a load of 0.64 kN/m² to continuously wipe a 20-tatami mat size (corresponding to 32.4 m²) of a wood floor (Combit New Advance 101, manufactured by WOOD ONE) as a surface to be wiped at a wiping speed of 1 m/s. The wood floor before wiping had a constant cleanliness by cleaning with a 70% aqueous ethanol solution and by swabbing with Kimtowel (registered trademark). Each wiping sheet in Examples and Comparative Examples after wiping was evaluated in accordance with “Microbial removal performance test of wet wipers” as specified by Japan Clean Paper and Cotton Industry Association.

As the virus species, the influenza A virus was selected. The number of viruses was adjusted at 1.1×10^9 /mL. On a stainless-steel plate, 0.01 mL of a virus-containing liquid was inoculated and was spread with a cell spreader in a 15 mm × 90 mm region. The plate was swabbed with each wiping sheet in Examples and Comparative Examples after the wiping. As the swabbing operation, the wiping sheet under a load of 0.78 kN/m² was moved back and forth on the plate five times at intervals of about 2 seconds. After the completion of swabbing operation, the stainless-steel plate was allowed to stand for 5 minutes in an environment at 25°C, and then the swabbed portion was swabbed with a swab that was moved back and forth ten times. The swab had been impregnated with 1.5 mL of a SCDLP liquid culture medium. Next, stirring was performed with a vortex mixer, and a virus suspension was prepared. The above operation was performed without the swabbing operation using a wiping sheet, and the resulting virus suspension was used as the blank sample.

An EMEM was used to prepare a 10-fold dilution series of the virus suspension, and the viral infectivity in 0.1 mL of the virus suspension was determined by plaque assay.

Accordingly, the viral infectivity (PFU/stainless-steel plate) was calculated.

A similar operation was performed with a control sheet, and the average of common logarithms of the determined viral infectivities (PFU/stainless-steel plate) was calculated. As the control sheet, a sheet in which, in place of the cleaning liquid, a physiological saline in which a 0.05% polysorbate 80 was dissolved was infiltrated into Kanakin No. 3 (285 mm × 205 mm) as specified in JIS L0803, Standard adjacent fabrics for staining of color fastness test, at 150% was used. The Kanakin No. 3 had been washed and sterilized by the method as specified by the test method.

The virus removal activity value was calculated in accordance with the following calculation formula. The results are shown in Table 1.

$$\text{Virus removal activity value} = X' - Y'$$

X': The average of the common logarithm values of viral infectivities (PFU/stainless-steel plate) as the three test results with a control sheet.

Y': The average of the common logarithm values of viral infectivities (PFU/stainless-steel plate) as the three test results with a wiping sheet to be tested.

The virus removal performance was scored on the basis of a magnitude of the virus removal activity value calculated in accordance with the above calculation formula, according to the following criteria.

S: > 4.0

A: 3.5 to 4.0

B: 2.5 to 3.4

C: 2.0 to 2.4

D: 0 to 1.9

[0068]

[Table 1]

			Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Ex. 6	Ex. 7	Ex. 8	Ex. 9	Ex. 10	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3	Comp. Ex. 4	Comp. Ex. 5
Cleaning liquid component (% by mass)	Nonionic surfactant A * ¹		0	0.5	1.0	1.5	0	0.5	1.0	1.5	0.0	1.0	0	0	0	0	0
	Nonionic surfactant B * ²		0.25	0.5	1.0	1.5	0.25	0.5	1.0	1.5	1.0	0.0	0	0	0	0	0
	Quaternary ammonium salt * ³		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.1
	Dipropylene glycol		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0.1	0.1	0.1
	Phenoxyethanol		0.3	0.3	0.3	0.3	0	0	0	0.3	0.3	0.3	0	0	0	0	0.3
	Methylparaben		0	0	0	0	0.3	0.3	0.3	0	0	0	0	0	0	0.3	0.3
	Nonionic surfactant A + nonionic surfactant B		0.25	1	2	3	0.25	1	2	3	1	1	0	0	0	0	0
Evaluation	Virus removal activity value	Influenza A virus	A	S	S	A	A	S	S	A	A	A	D	C	C	B	B

*1: EMULGEN 123P (manufactured by Kao Corporation, a polyoxyethylene alkyl ether, n = 23, m = 12)

*2: EMULGEN 109P (manufactured by Kao Corporation, a polyoxyethylene alkyl ether, n = 9, m = 12)

*3: SANISOL B-50 (manufactured by Kao Corporation, an alkyl benzyl dimethyl ammonium chlorides)

[0069]

The results shown in Table 1 reveal that using an aqueous cleaning liquid containing both a nonionic surfactant and an aromatic antimicrobial agent extremely improves the virus removal activity value of the wiping sheet after a 20-tatami mat size of a floor is wiped. This indicates that in the wiping sheet of the present invention, a reduction in the hygiene performance on a wiped surface from the early stages of wiping is efficiently suppressed even after the discharge amount of a cleaning liquid decreases as the wiped area increases.

Industrial Applicability

10 [0070]

According to the present invention, a reduction in the hygiene performance on a wiped surface from the early stages of wiping is efficiently suppressed even after the discharge amount of a cleaning liquid decreases as the wiped area increases.

CLAIMS

1. A wiping sheet comprising:
 - a nonwoven fabric; and
 - an aqueous cleaning liquid infiltrated into the nonwoven fabric, wherein
 - 5 the aqueous cleaning liquid contains an aromatic antimicrobial agent, a nonionic surfactant and a quaternary ammonium salt,
 - the nonionic surfactant contains a polyoxyethylene alkyl ether,
 - the polyoxyethylene alkyl ether comprises a polyoxyethylene alkyl ether having an ethylene oxide number of 20 or more and a polyoxyethylene alkyl ether having an
 - 10 ethylene oxide number of 8 or more and less than 12, and
 - the aromatic antimicrobial agent comprises phenoxyethanol and/or methylparaben.
2. The wiping sheet according to claim 1, being used for cleaning a floor.
3. The wiping sheet according to claim 1 or 2, wherein a content of the nonionic
- 15 surfactant in the aqueous cleaning liquid is 0.01% by mass or more and 5.0% by mass or less.
4. The wiping sheet according to any one of claims 1 to 3, wherein an amount of the aromatic antimicrobial agent in the aqueous cleaning liquid is 0.01% by mass or more and 1.0% by mass or less.
- 20 5. The wiping sheet according to any one of claims 1 to 4, wherein the quaternary ammonium salt comprises one or two of more selected from the group consisting of:
 - an alkyltrimethylammonium salt;
 - a polyoxyethylenealkylmethylammonium salt;
 - an alkylbenzyltrimethylammonium salt;
 - 25 a quaternary ammonium salt having
 - a group in which an arylalkyl group is divided by an ether group,
 - a benzyl group, and
 - two methyl groups.; and

an alkylpyridinium salt.

6. The wiping sheet according to any one of claims 1 to 5, wherein the quaternary ammonium salt comprises an alkylbenzyltrimethylammonium salt.
7. The wiping sheet according to any one of claims 1 to 6, wherein the quaternary ammonium salt comprises benzalkonium chloride.
8. The wiping sheet according to any one of claims 1 to 7, wherein a content of the quaternary ammonium salt in the aqueous cleaning liquid is 0.01% by mass or more and 5.0% by mass or less.
9. The wiping sheet according to any one of claims 1 to 8, wherein the aqueous cleaning liquid contains a glycol compound.
10. The wiping sheet according to claim 9, wherein the glycol compound comprises at least one or two or more selected from the group consisting of propylene glycol, dipropylene glycol, isoprene glycol, ethylene glycol, butylene glycol, pentyleneglycol, 1,2-hexanediol and 1,2-octanediol.
11. The wiping sheet according to claim 9 or 10, wherein the glycol compound comprises dipropylene glycol.
12. The wiping sheet according to any one of claims 1 to 11, wherein a mass of regenerated fibers in 1 m² of the nonwoven fabric is 5 g/m² or more and 60 g/m² or less.
13. The wiping sheet according to any one of claims 1 to 12, wherein a proportion of the aqueous cleaning liquid infiltrated into the nonwoven fabric is 100% by mass or more and 600% by mass or less relative to a mass of the nonwoven fabric.
14. The wiping sheet according to any one of claims 1 to 13, wherein a rate of a mass of the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated

fibers in 1 m² of the nonwoven fabric (g/m²) is 0.05 or more and 1.0 or less.

15. The wiping sheet according to any one of claims 1 to 14, wherein a rate of a mass of the aromatic antimicrobial agent in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is 0.000 2 or more and 0.005 or less.

16. The wiping sheet according to any one of claims 1 to 15, wherein a rate of a mass of the nonionic surfactant in the aqueous cleaning liquid in 1 g of the nonwoven fabric to the mass of the regenerated fibers in 1 m² of the nonwoven fabric (g/m²) is 0.000 1 or more and 0.02 or less.

- 10 17. The wiping sheet according to any one of claims 1 to 16, wherein a proportion of the regenerated fibers in the nonwoven fabric is 10% by mass or more and 90% by mass or less.

- 15 18. The wiping sheet according to any one of claims 1 to 17, wherein an amount of the synthetic fibers in the nonwoven fabric is 10% by mass or more and 90% by mass or less.

19. The wiping sheet according to any one of claims 1 to 18, wherein the wiping sheet has a basis weight of 30 g/m² or more and 100 g/m² or less in a dry state of the nonwoven fabric.

- 20 20. The wiping sheet according to any one of claims 1 to 19, wherein a content of the water contained in the aqueous cleaning liquid is 80.0% by mass or more relative to the total mass of the aqueous cleaning liquid.