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- (71) **Applicant:** KIMBERLY-CLARK WORLDWIDE, INC.
[US/US]; 2300 Winchester Road, Neenah, Wisconsin
54956 (US).
- (72) **Inventors:** CHAUDHARY, Vinod; 2300 Winchester
Road, Neenah, Wisconsin 54956 (US). ENGELBRECHT,
Kathleen, Clare; 2300 Winchester Road, Neenah, Wis-
consin 54956 (US). VANDENHEUVEL, Amy, Lynn;
2300 Winchester Road, Neenah, Wisconsin 54956 (US).
KOENIG, David, William; 2300 Winchester Road, Nee-
nah, Wisconsin 54956 (US). BHATT, Divesh; 2300
Winchester Road, Neenah, Wisconsin 54956 (US). WEN-
ZEL, Scott, W.; 2300 Winchester Road, Neenah, Wiscon-
sin 54956 (US). ANUNSON, Paige, Nicole; 2300
Winchester Road, Neenah, Wisconsin 54956 (US).
MUNDSCHAU, Stacy, A.; 2300 Winchester Road, Nee-
nah, Wisconsin 54956 (US).
- (74) **Agents:** STOKER, Denise, L. et al.; Kimberly-Clark
Worldwide, Inc., 2300 Winchester Road, Neenah, Wiscon-
sin 54956 (US).
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(54) **Title:** ANTI-ADHERENT ALCOHOL-BASED COMPOSITION

(57) **Abstract:** The present disclosure is directed to alcohol-based anti-adherent compositions that do not adhere to or attract Gram-negative and Gram-positive bacteria once it is applied to a surface and dried. The composition may include as anti-adherent agents, hydrophilic film-formers such as cellulose, gums, acrylates, nonionic polymers, and anionic polymers. Examples of anti-adherent agents include Hydroxypropyl methylcellulose, Cellulose gum, Acacia Senegal Gum; Polyacrylate Crosspolymer-11, VP/Dimethyl-aminoethylmethacrylate/Polycarbamyl Polyglycol Ester; Acrylates/Vinyl Neodecanoate Crosspolymer, hydroxypropyl methylcellu-lose, Hydroxypropylcellulose, Methylcellulose, Propylene Glycol Alginate, Polyacrylate Crosspolymer-6, VP/Polycarbamyl Poly-glycol Ester, Acrylates/Steareth-20 Methacrylate Copolymer; Acrylates Copolymer, and any combination thereof. The anti-adherent may be applied to surfaces using a vehicle such as a wipe.



ANTI-ADHERENT ALCOHOL-BASED COMPOSITION

TECHNICAL FIELD

The present disclosure generally relates to anti-adherent, alcohol-based compositions which are effective in killing microbes on biotic and abiotic surfaces. Once the composition of the present disclosure is applied to a surface and dried, the remaining film does not attract or allow the attachment of microbes, thus minimizing the number of microbes on the surface and leaving the surface less apt to harbor microbes.

BACKGROUND OF THE DISCLOSURE

The notion of so called “germs” and germ transmission is well known by consumers. One of the best and easiest ways of preventing germ or disease transmission is by routinely washing surfaces that can carry microbes, such as the skin or hard surfaces. However, with the inconvenience or impracticality of washing under certain circumstances, such as traveling conditions or time constraints, manufacturers have introduced a plethora of antimicrobial compositions that can sanitize surfaces. For instance, there are many gel or spray hand sanitizing compositions on the market today, many of which are alcohol-based. These compositions are very effective at killing Gram-negative and Gram-positive bacteria (e.g. *Escherichia coli* and *Staphylococcus aureus*).

Although alcohol-based antimicrobial compositions are effective at the time of application, once the alcohol flashes off, some of the remaining ingredients left on the treated surface can attract and adhere to microbes. Depending on the circumstance, this can result in a seemingly “sanitized” surface which can eventually harbor more microbes than before the sanitization took place. Therefore, a person that sanitizes his or her hands with a gel antimicrobial composition could have more microbes adhere to their hands than a person that washed their hands with soap and water and completely dried them with a clean towel.

The present disclosure generally relates to alcohol-based compositions that are effective in killing Gram-positive and Gram-negative microorganisms (e.g. *E. coli* and *S. aureus*) without leaving a film behind that attracts or adheres to such microorganisms. Desirably, the antimicrobial composition is suitable for use on skin without causing undue dryness or irritation.

SUMMARY OF THE DISCLOSURE

In one aspect of the disclosure there is an anti-adherent composition for use on surfaces. The composition comprises 40% to 90% (by weight of composition) of a short-chain alcohol; and an anti-

adherent agent selected from the group consisting of Hydroxypropyl methylcellulose, Cellulose gum, Acacia Senegal Gum; Polyacrylate Crosspolymer-11; VP/Dimethylaminoethylmethacrylate/Polycarbamyl Polyglycol Ester; VP/Polycarbamyl Polyglycol Ester; Acrylates/Stearth-20 Methacrylate Copolymer a mixture of Acrylates Copolymer and VP/Polycarbamyl Polyglycol Ester, Acrylates/Vinyl Neodecanoate
5 Crosspolymer, hydroxypropyl cellulose, methylcellulose, Propylene Glycol Alginate, Polyacrylate Crosspolymer-6 and glycerin; and combinations thereof.

In another aspect of the disclosure there is an anti-adherent composition for use on surfaces. The composition comprises 40% to 90% (by weight of composition) of a short-chain alcohol; 0.01% to 20% (by weight of composition) of an anti-adherent agent; glycerin; and

10 a hydrophilic carrier. The composition reduces the adherence of *E. coli* and *S. aureus* on the surfaces by at least 0.5 LOG according to a High Throughput Anti-adherence Test or the Viable Count Anti-Adherence Test Method.

In yet another aspect of the disclosure there is a wipe made with a nonwoven substrate and an anti-adherent composition. The composition comprises 40% to 90% (by weight of composition) of a
15 short-chain alcohol; 0.01% to 20% (by weight of composition) of an anti-adherent agent; and a hydrophilic carrier; wherein the composition reduces the adherence of *E. coli* and *S. aureus* on the surfaces by at least 0.5 LOG according to the High Throughput Anti-adherence Test Method or the Viable Count Anti-Adherence Test Method.

DETAILED DESCRIPTION OF THE DISCLOSURE

20 The present disclosure is directed to an alcohol-based anti-adherent composition containing an anti-adherent and a short-chain alcohol. The composition is at least 40% alcohol by weight of the composition, and may be applied to a surface in the form of a liquid, gel, or foam. In addition, the composition may be applied to a surface using a vehicle such as a wipe.

The anti-adherent compositions may be used on biotic surfaces such as skin; or abiotic surfaces
25 such as food prep surfaces; hospital and clinic surfaces; household surfaces; automotive, train, ship and aircraft surfaces; and the like; as long as the surface is compatible with the ingredients of the composition.

According to the High Throughput Anti-adherence Test Method or the Viable Count Anti-Adherence Test Method, *infra*, the anti-adherent compositions reduce adherence to Gram-negative and Gram-positive bacteria by at least 0.5 LOG, or by at least 0.9 LOG, or by at least 1 LOG.

Anti-adherent Agents

The anti-adherent agents suitable for use in the compositions may include but not be limited to acrylates, acrylate derivatives, polysaccharides, urethanes, urethane derivatives, vinyl derivative, and silicone polyethers.

5 Suitable polysaccharides may include but not be limited to cellulosics and gums. Suitable nonionic cellulose ethers, for instance, may be produced in any manner known to those skilled in the art, such as by reacting alkali cellulose with ethylene oxide and/or propylene oxide, followed by reaction with methyl chloride, ethyl chloride and/or propyl chloride. Nonionic cellulosic ethers and methods for producing such ethers are described, for instance, in U.S. Patent Nos. 6,123,996 to Larsson, et al.; 6,248,880 to Karlson;
10 and 6,639,066 to Bostrom, et al., which are incorporated herein in their entirety by reference thereto for all purposes. Some suitable examples of nonionic cellulosic ethers include, but are not limited to, water-soluble alkyl cellulose ethers, such as methyl cellulose and ethyl cellulose; hydroxypropyl cellulose, hydroxyalkyl cellulose ethers, such as hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxypropyl hydroxybutyl cellulose, hydroxyethyl hydroxypropyl cellulose, hydroxyethyl hydroxybutyl cellulose, and
15 hydroxyethyl hydroxypropyl hydroxybutyl cellulose; alkyl hydroxyalkyl cellulose ethers, such as methyl hydroxyethyl cellulose, ethyl hydroxyethyl cellulose, ethyl hydroxypropyl cellulose, methyl ethyl hydroxyethyl cellulose, and methyl ethyl hydroxypropyl cellulose; and so forth . Particularly suitable nonionic cellulosic ethers for use in the present invention are hydroxypropyl methylcellulose, cellulose gum, and methylcellulose.

20 Specific examples of suitable nonionic cellulose ethers for use as the nonionic polymer of the present invention includes hydroxypropyl methylcellulose, hydroxypropyl cellulose, and methylcellulose.

A specific example of a suitable nonionic cellulose ether for use as the nonionic polymer of the present invention includes hydroxypropyl methylcellulose (BENECEL E-15 [average molecular weight 15,000 Daltons] available from Ashland, BENECEL K100LV [average molecular weight 26,000 Daltons],
25 HPMC [average molecular weight 86,000 Daltons] from Sigma Aldrich). The hydroxypropyl methylcellulose may have a molecular weight of about 1,000 Daltons to about 500,000 Daltons, or 10,000 Daltons to 100,000 Daltons, or about 10,000 Daltons to about 40,000 Daltons.

A specific example of a suitable nonionic cellulose ether for use as the nonionic polymer of the present invention includes hydroxyethylcellulose (NATROSOL 250LR [average molecular weight 90,000
30 Daltons] available from Ashland). The hydroxyethylcellulose may have a molecular weight of about

molecular weight of about 1,000 Daltons to about 500,000 Daltons, or about 10,000 Daltons to about 100,000 Daltons, or about 75,000 Daltons to about 350,000 Daltons.

A specific example of a suitable nonionic cellulose ether for use as the nonionic polymer of the present invention includes hydroxypropyl cellulose (KLUCEL ECS [average molecular weight 80,000 Daltons] from Ashland). The ydroxypropyl cellulose may have a molecular weight of about 1,000 Daltons to about 500,000 Daltons, or about 10,000 Daltons to about 100,000 Daltons, or about 60, 000 Daltons to about 100,000 Daltons..

A specific example of a suitable nonionic cellulose ether for use as the nonionic polymer of the present invention includes methylcellulose (BENECEL A4C [average molecular weight 41,000 Daltons] available from Ashland). The methylcellulose may have a molecular weight of about 1,000 Daltons to about 500,000 Daltons, or 10,000 Daltons to about 100,000 Daltons, or about 20,000 Daltons to about 50, 000 Daltons.

Gums are also suitable materials for use as the anti-adherent agent. The materials in this group are generally plant-derived materials which belong to the chemical class of carbohydrates. Although chemically diverse, the unique ability of gums to swell in the presence of water and to increase the viscosity of aqueous preparations accounts for this special class. The viscosity developed by hydrophilic colloids depends on their molecular weight and the presence of various cations which may neutralize some acid functions of these carbohydrate molecules or cause some cross linking. In cosmetics, gums and the like are used to impart viscosity to all types of products. They act as suspending or gelling agents and emulsion stabilizers. Some of these gums have unique textural qualities which make them useful in water-based lubricants. Suitable gums for use in the present invention may include but not be limited to Acacia Catechu Gum, Acacia Farnesiana Gum, Acacia Senegal Gum, Acacia Seyal Gum, Acacia Seyal Gum Octenylsuccinate, Agar, Algin, Alginic Acid, Ammonium Alginate, Amylopectin, Ascorbyl Methylsilanol Pectinate, Astragalus Gummifer Gum, Boswellia Serrata Gum, Caesalpinia Spinosa Gum, Calcium Alginate, Calcium Carboxymethyl Cellulose, Calcium Carrageenan, Carboxybutyl Chitosan, Carboxymethyl Cellulose Acetate Butyrate, Carboxymethyl Chitin, Carboxymethyl Dextran, Carboxymethyl Hydroxyethylcellulose, Carboxymethyl Hydroxypropyl Guar, Carrageenan, Cassia Gum, Cellulose Gum, Ceratonia Siliqua (Carob) Gum, Cyamopsis Tetragonoloba (Guar) Gum, Dehydroxanthan Gum, Dextran, Dextran Sulfate, Dextrin, Dextrin Behenate, Gelatin, Gelatin Crosspolymer, Gellan Gum, Ghatti Gum, Glycerol Alginate, Glycerol Starch, Guar Hydroxypropyltrimonium Chloride, Hydrolyzed Caesalpinia Spinosa Gum, Hydrolyzed Carrageenan, Hydrolyzed Cellulose Gum, Hydrolyzed Ceratonia Siliqua Gum Extract, Galactarabinan, Hydrolyzed Furcellaran, Hydrolyzed Gelatin, Hydrolyzed Guar, Hydrolyzed

Pectin, Hydrolyzed Rhizobian Gum, Hydrolyzed Sclerotium Gum, Hydroxybutyl Methylcellulose, Hydroxyethylcellulose, Hydroxyethyl Ethylcellulose, Hydroxypropylcellulose, Hydroxypropylcellulose, Hydroxypropyl Chitosan, Hydroxypropyl Methylcellulose, Hydroxypropyl Methylcellulose Acetate/Succinate, Hydroxypropyl Methylcellulose Stearoxy Ether, Hydroxypropyl Oxidized Starch,

5 Hydroxypropyl Starch, Hydroxypropyl Xanthan Gum, Locust Bean Hydroxypropyltrimonium Chloride, Magnesium Alginate, Maltodextrin, Methylamido Cellulose Gum, Methylcellulose, Methyl Hydroxyethylcellulose, Methylsilanol Carboxymethyl Theophylline Alginate, Natto Gum, Nonoxynyl Hydroxyethylcellulose, Olibanum, Pectin, Pistacia Lentiscus (Mastic) Gum, Potassium Alginate, Potassium Carrageenan, Potassium, Propylene Glycol Alginate, Prunus Persica (Peach) Gum, Rhizobian Gum,

10 Sclerotium Gum, Sodium Algin Sulfate, Sodium Carboxymethyl Chitin, Sodium Carboxymethyl Dextran, Sodium Carboxymethyl Beta-Glucan, Sodium Carboxymethyl Starch, Sodium Carrageenan, Sodium Cellulose Sulfate, Sodium Polyacrylate Starch, Sodium Stearoxy PG-Hydroxyethylcellulose Sulfonate, Sodium/TEA-Undecylenoyl Alginate, Sodium/TEA-Undecylenoyl Carrageenan, Sterculia Urens Gum, Styrax Benzoin Gum, Tamarindus Indica Seed Gum, TEA-Alginate, Undecylenoyl Xanthan Gum, Welan

15 Gum, Xanthan Gum. Specific examples of suitable gums for use in the present invention Xanthan gum (Ticaxan Xanthan Powder available from TIC), Acacia sennegal gum (Gum Arabic available from TIC), Cellulose Gum (Sigma-Aldrich) and propylene glycol alginate (available from FMC Biopolymer). Specific examples of suitable gums include but may not be limited to Cellulose gum, Acacia Senegal Gum, and Propylene Glycol Alginate.

20 Another suitable class of anti-adherent agents may include polystyrene sulfonates, commonly used within the cosmetic industry as film forming polymers, emulsion stabilizers and thickeners. The addition of sulfonic acid or a sulfonate function group substantially improves to water solubility of the polystyrene backbone, making it most versatile for personal care products. A particularly example is sodium polystyrene sulfonate, commercially available as Flexan II (AkzoNobel Global Personal Care).

25 Still another suitable example of anti-adherent agents may include acrylates and acrylate derivatives. Suitable examples include but not be limited to Polyacrylate Crosspolymer-11, VP/Dimethylaminoethylmethacrylate/Polycarbamyl Polyglycol Ester Acrylates/Steareth-20 Methacrylate Copolymer, Acrylates/Vinyl Neodecanoate Crosspolymer, and Polyacrylate Crosspolymer-6.

Another class of anti-adherent agents is polyesters, which are manufactured by polymerizing

30 organic acids and alcohols. Of particular interest are polyesters that are water soluble or dispersible.

Another class of anti-adherent agents is Polyimides. Polyimide-1 is a terpolymer that is made by reacting poly(isobutylene-alt-maleic anhydride) with dimethylaminopropylamine and methoxy-PEG/PPG-

31/9-2-propylamine in a mixture of ethanol and Water (q.v.). The resulting polymer contains both imide, ester, and acid functionality and is used in skin and hair care preparations as a film forming agent.

Another class of anti-adherent agents is Polyquaternium compounds. Polyquaterniums have been used in cosmetic industry for a long time and are known for their substantivity to hair and skin.

5 Another class of anti-adherent agents is copolymers of PEG, PPG or combination thereof. Specifically, Poloxamers are nonionic triblock copolymers composed of a central hydrophobic chain of polyoxypropylene (poly(propylene oxide)) flanked by two hydrophilic chains of polyoxyethylene (poly(ethylene oxide)) fall under this category. Because the lengths of the polymer blocks can be customized, many different poloxamers exist that have slightly different properties.

10 Another suitable anti-adherent agent may include a modified silicone having a polyether moiety. As used herein, the term "silicone" generally refers to a broad family of synthetic polymers that have a repeating silicon-oxygen backbone, including, but not limited to, polydimethylsiloxane and polysiloxanes having hydrogen-bonding functional groups selected from the group consisting of amino, carboxyl, hydroxyl, ether, polyether, aldehyde, ketone, amide, ester, and thiol groups.

15 Generally, any silicone may be used so long as it has a polyether moiety. Examples of polyoxyethylene derivatized dimethicones suitable for use in the compositions of the present disclosure include SILSOFT dimethicones, available from Momentive (Wilton, Conn.), such as SILSOFTSILSOFT 805 (INCI designation: PEG-8 dimethicone; molecular weight: about 10, 000); SILSOFT 810 (INCI designation: PEG-8 dimethicone; molecular weight: about 1, 700), SILSOFT 840 (INCI designation: PEG-8 dimethicone; molecular weight: about 4, 000), SILSOFT 870 (INCI designation: PEG-12 dimethicone; molecular weight: about 2, 100), SF1288 (INCI designation: PEG-12 dimethicone); SILSOFT 875 (INCI designation: PEG-12 dimethicone); SILSOFT 880 (INCI designation: PEG-12 dimethicone; molecular weight: about 5, 000); SILSOFT 895 (INCI designation: PEG-17 dimethicone; molecular weight: about 5, 000), SF1388 (INCI designation: bis- PEG-20 dimethicone). The SF1488, SILSOFT 810, SILSOFT 870, and SF1388 are linear polyoxyethylene derivatized dimethicones, while the SILSOFT 805, SILSOFT 840, SF1288, SILSOFT 875, SILSOFT 880, and SILSOFT 895 are pendant polyoxyethylene derivatized dimethicones.

The polyoxyethylene derivatized dimethicone may also include PEG derivatized dimethicones that have additional moieties added to the polymer, including bis-PEG-15 methyl ether dimethicone, dimethicone PEG-15 acetate, dimethicone PEG-8 benzoate, dimethicone PEG-7 lactate, dimethicone PEG-7 octyldodecyl citrate, dimethicone PEG-7 olivate, dimethicone PEG-8 olivate, dimethicone PEG-7

phosphate, dimethicone PEG-8 phosphate, dimethicone PEG-10 phosphate, dimethicone PEG-7 phthalate, dimethicone PEG-8 phthalate, dimethicone PEG-8 polyacrylate, dimethicone PEG-7 succinate, dimethicone PEG-8 succinate, dimethicone PEG-7 sulfate, dimethicone PEG-7 undecylenate, lauryl dimethicone PEG-10 phosphate, PEG-9 methyl ether dimethicone, PEG-10 methyl ether dimethicone, 5 PEG-11 methyl ether dimethicone, PEG-32 methyl ether dimethicone, PEG-12 methyl ether lauroxy PEG-5 amidopropyl dimethicone, and combinations thereof.

The dimethicone derivative may also be a polyoxyethylene/ polyoxypropylene derivatized dimethicone. As used herein, the term "polyoxyethylene/polyoxypropylene derivatized dimethicone" is meant to include dimethicone polymers comprising a substituted or unsubstituted polyoxyethylene/ 10 polyoxypropylene (PEG/PPG) functional group and methicone polymers comprising a substituted or unsubstituted PEG/PPG functional group. Like discussed above with regard to the polyoxyethylene derivatized dimethicones and the polyoxypropylene derivatized dimethicones, the polyoxyethylene/ polyoxypropylene derivatized dimethicone may be either pendant or linear. Pendant and linear polyoxyethylene/polyoxypropylene derivatized dimethicones have the same general structures as set forth 15 above for pendant and linear polyoxyethylene derivatized dimethicones, respectively, except R₁ is a substituted or unsubstituted polyethylene glycol/polypropylene glycol functional group.

Examples of polyoxyethylene/polyoxypropylene derivatized dimethicones suitable for use in the compositions of the present disclosure include SILSOFT dimethicones, available from Momentive (Wilton, Conn.), such as SILSOFT 430 (INCI designation: PEG-20/PPG-23 dimethicone; molecular weight: about 20, 000), SF1188A (INCI designation: PEG/PPG 20-15 dimethicone), SILSOFT 440 (INCI designation: 20 PEG-20/PPG-23 dimethicone; molecular weight: about 20, 000), and SILSOFT 475 (INCI designation: PEG-23/PPG-6 dimethicone; molecular weight: about 19, 000). SILSOFT 430, SF1188A, SILSOFT 440, and SILSOFT 475 are all pendant polyoxyethylene/polyoxypropylene derivatized dimethicones.

Other examples of suitable polyoxyethylene/polyoxypropylene derivatized dimethicones include 25 PEG-3/PPG- 10 dimethicone, PEG-4/PPG-12 dimethicone, PEG-6/PPG- 11 dimethicone, PEG-8/PPG-14 dimethicone, PEG-8/PPG-26 dimethicone, PEG-10/PPG-2 dimethicone, PEG-12/PPG- 16 dimethicone, PEG-12/PPG-18 dimethicone, PEG-14/ PPG-4 dimethicone, PEG-15/PPG-15 dimethicone, PEG-16/ PPG- 2 dimethicone, PEG-16/PPG-8 dimethicone, PEG-17/ PPG-18 dimethicone, PEG-18/PPG-6 dimethicone, PEG-18/ PPG-18 dimethicone, PEG-19/PPG-19 dimethicone, PEG- 20/PPG-6 dimethicone, PEG-20/PPG- 30 15 dimethicone, PEG-20/PPG-20 dimethicone, PEG-20/PPG-29 dimethicone, PEG-22/PPG-23 dimethicone, PEG-22/PPG-24 dimethicone, PEG-23/PPG-6 dimethicone, PEG-25/PPG-25 dimethicone,

PEG-27/PPG-27 dimethicone, PEG-30/PPG-10 dimethicone, and PPG-4-oleth-10 dimethicone (Le., PEG-10/PPG-4 dimethicone).

The polyoxyethylene/polyoxypropylene derivatized dimethicone may also include PEG/PPG derivatized dimethicones that have additional moieties added to the polymer, including Bis-PEG-16/PPG-16 PEG-16/PPG-16 dimethicone, dimethicone PEG-20/PPG-23 benzoate, dimethicone PEG-7/PPG-4 phosphate, dimethicone PEG-12/PPG-4 phosphate, PEG-28/PPG-21 acetate dimethicone, PEG/PPG-20/22 butyl ether dimethicone, PEG/PPG-22/22 butyl ether dimethicone, PEG/PPG-23/23 butyl ether dimethicone, PEG-24/PPG-18 butyl ether dimethicone PEG-27/PPG-9 butyl ether dimethicone PEG-24/PPG-24 methyl ether glycidoxo dimethicone, PEG-10/PPG-3 oleyl ether dimethicone, and the like.

Polyoxyethylene/polyoxypropylene derivatized dimethicones are selected from the group consisting of PEG-20/PPG-23 dimethicone, PEG/PPG 20-15 dimethicone, PEG-23/PPG-6 dimethicone, and combinations thereof.

Another suitable anti-adherent agent may include a urethane or urethane derivative. Polyurethane is a polymer composed of a chain of organic units joined by carbamate or urethane moieties.

Polyisocyanate is typically reacted with various polyols and other functional groups to create a broad range of physical characteristics and film forming properties. For this invention particularly useful commercially urethane polymers are rendered hydrophilic inclusion of polyethylene glycol or other highly hydrophilic moieties. Without being bound to any particular theory, the inclusion of hydrophilic moieties, particularly when added in a pendant fashion to the polymer, creates a sphere of hydration in which water molecules are tightly bound to the side chains of the polymer. Unable to remove the water, bacteria are unable to effectively bind to the surface. Also, it may be advantageous to include dimethicone, vinylpyrrolidone or acrylate based monomers within the polymer backbone itself to provide substantivity coating to the surface of interest. Particularly useful commercially available polyurethanes for the present invention include but are not limited to VP/Polycarbamyl Polyglycol Ester (Pecogel H-12).

Referring to Table 1, anti-adherent agents suitable for use in the present disclosure include hydrophilic film-formers such as cellulose, gums, acrylates, nonionic polymers, and anionic polymers. Specifically, these could include but not be limited to Hydroxypropyl Methylcellulose; Hydroxypropyl Cellulose; Cellulose Gum, or Acacia Senegal Gum; a crosspolymer of 2-Acrylamido-2-methylpropane sulfonic acid, N, N-Dimethylacrylamide and acrylic acid such as Polyacrylate Crosspolymer-11;; a synthetic polymer such as VP/Dimethylaminoethylmethacrylate/Polycarbamyl Polyglycol Ester, VP/Polycarbamyl Polyglycol Ester, or Acrylates/Steareth-20 Methacrylate Copolymer; and an anionic polymeric film former such as a mixture of Acrylates Copolymer and VP/Polycarbamyl Polyglycol Ester,, Acrylates/Vinyl

Neodecanoate Crosspolymer, Methylcellulose, Propylene Glycol Alginate, Polyacrylate Crosspolymer-6; and combinations thereof. These anti-adherent agents perform adequately and vary in anti-adherency to microbes as shown in Table 2, infra.

5 The anti-adherent agents can be formulated with one or more conventional and compatible carrier materials and can take multiple forms including, without limitation, aqueous solutions, gels, lotions, suspensions, sprays, foams, aerosols and the like. As the form can be water thin (i.e. spray) or take the form of a thickened solution (i.e. gel), multiple anti-adherent agents have been identified that can be used in these forms. . When formulated into a thickened carrier form, multiple anti-adherents can be used. It has been found, however that some of these thickeners may adversely affect the feel of these
10 compositions. As such, a combination of anti-adherents may be used to balance the anti-adherent activity and the feel of the composition, that is, not perceptively sticky or tacky.

One example of a thickened anti-adherent composition may include a blend of Polyacrylate Crosspolymer-11 and a modified cellulose. Examples of a modified cellulose include be Hydroxypropyl methylcellulose and Methylcellulose. The combination of the Polyacrylate Crosspolymer-11 and a
15 modified cellulose provide a consumer-acceptable skin feel when used with an alcoholic hand-sanitizing composition, and show a larger reduction in microbe adherence than the other agents listed in Table 1. In one embodiment, the weight/weight ("w/w") ratio of Polyacrylate Crosspolymer-11 and modified cellulose may be 10:1 to 1:10, respectively. In an alternative embodiment, the w/w ratio of ingredients range between about 7.5:1 to about 1:7.5; or between about 5:1 to about 1:5; or between about 3:1 to about 1:3.
20 In another embodiment, the weight/weight ("w/w") ratio of Polyacrylate Crosspolymer-11 and Hydroxypropyl methylcellulose or Methylcellulose may be 10:1 to 1:10, respectively. In an alternative embodiment, the w/w ratio of ingredients range between about 7.5:1 to about 1:7.5; or between about 5:1 to about 1:5; or between about 3:1 to about 1:3.

TABLE 1. Anti-Adherent Agents

Agent	INCI	Description	Manufacturer
ACULYN 22	Acrylates/Steareth-20 Methacrylate Copolymer	hydro-phobically modified acrylate	Dow Chemicals, Midland, MI
ARISTOFLEX VELVET	Polyacrylate Crosspolymer-11	polymeric sulfonic acid, neutralized	Clariant, Muttentz, Switzerland
CMC	Cellulose Gum	hydrophilic film former	Sigma Aldrich, St. Louis, MO
Gum Arabic	Acacia Senegal Gum	hydrophilic film former	Tic Gums, White March, MD
HPMC	Hydroxypropyl methylcellulose	hydrophobically modified cellulose	Sigma Aldrich, St. Louis, MO
PECOGEL GC-310	VP/Dimethylaminoethylmethacrylate/Polycarbamyl Polyglycol Ester	synthetic polymer	Phoenix Chemicals, Sommerville, NJ
PECOGEL H-12	VP/Polycarbamyl Polyglycol Ester	synthetic polymer	Phoenix Chemicals, Sommerville, NJ
SESAFLASH	Glycerin*, Acrylates Copolymer, VP/Polycarbamyl Polyglycol Ester, Hydrolyzed Sesame Protein PG-Propyl Methylsilanediol*	anionic polymeric emulsifier	Seppic, Paris, France
ACULYN 38	Acrylates/Vinyl Neodecanoate Crosspolymer	hydro-phobically modified acrylate	Dow Chemicals, Midland, MI
BENECEL A4C	Methylcellulose	modified cellulose	Ashland, Bridgewater, NJ
BENECEL E15	Hydroxypropyl Methylcellulose	modified cellulose	Ashland, Bridgewater, NJ
BENECEL K100LV	Hydroxypropyl Methylcellulose	modified cellulose	Ashland, Bridgewater, NJ
KLUCEL ECS	Hydroxypropyl Methylcellulose	modified cellulose	Ashland, Bridgewater, NJ
PROTANAL ESTER BV-3750	Propylene Glycol Alginate	polysaccharide	FMC Biopolymer, Philadelphia, PA
NATROSOL 250 LR	Hydroxypropylcellulose	modified cellulose	Ashland, Bridgewater, NJ
SEPIMAX ZEN	Polyacrylate Crosspolymer-6	synthetic polymer	Fairfield, New Jersey

*Carriers for the anti-adherent agents

The anti-adherent compositions of the present disclosure can suitably comprise anti-adherent agent(s) in an amount of from about 0.01% (by the total weight of the composition), to about 20% (by total weight of the composition), or from about 0.05% (by total weight of the composition) to about 15% (by total weight of the composition), or from about 0.1% (by total weight of the composition) to about 10% (by total weight of the composition).

Alcohol carriers

The presence of an alcohol carrier in the anti-adherent compositions provides the compositions with microbiocidal properties. More particularly, the alcohol is suitably capable of killing Gram-positive, Gram-negative bacteria, fungi, parasites, and a variety of viruses. The potent activity of the alcohol against a microorganism is due to its denaturation of proteins and enzymes and cellular dehydration.

Suitable alcohols for use within the anti-adherent composition can include any water-soluble alcohol known in the art. Specific examples of suitable alcohols include, for example, methyl alcohol, ethyl alcohol, iso-propyl alcohol, n-propyl alcohol, n-butyl alcohol, t-butyl alcohol, iso-butyl alcohol, and combinations thereof.

Typically, the more concentrated the alcohol-containing composition, the more potent the antimicrobial effect. However, with respect to skin, increasing the alcohol concentration may have the deleterious effect of causing irritation. Suitably, the present disclosure describes an anti-adherent composition with an alcohol concentration of at least 40% (by total weight of the composition). More suitably, the anti-adherent composition includes from about 50% (by total weight of the composition) to about 99.98% (by total weight of the composition) alcohol, or from about 60% (by total weight of the composition) to about 80% (by total weight of the composition) and, or 62% (by total weight of the composition) to 70% (by total weight of the composition) alcohol. The alcohol(s) may be mixed with hydrophilic or hydrophobic carriers.

Additional Carriers

Non-limiting examples of suitable carrier materials include water, emollients, humectants, polyols, surfactants, esters, silicones, clays, and other pharmaceutically acceptable carrier materials.

In one embodiment, the anti-adherent compositions of the disclosure can optionally include one or more emollients, which typically serves to soften, soothe, and otherwise lubricate and/or moisturize the skin. Suitable emollients that can be incorporated into the compositions include oils such as alkyl dimethicones, alkyl methicones, alkyl dimethicone copolyols, phenyl silicones, alkyl trimethylsilanes,

dimethicone, dimethicone crosspolymers, cyclomethicone, lanolin and its derivatives, fatty esters, glycerol esters and derivatives, propylene glycol esters and derivatives, alkoxyated carboxylic acids, alkoxyated alcohols, fatty alcohols, and combinations thereof.

5 The anti-adherent compositions may include one or more emollients in an amount of from about 0.01% (by total weight of the composition) to about 20% (by total weight of the composition), or from about 0.05% (by total weight of the composition) to about 10% (by total weight of the composition), or from about 0.10% (by total weight of the composition) to about 5% (by total weight of the composition).

10 In another embodiment, the anti-adherent compositions include one or more esters. The esters may be selected from cetyl palmitate, stearyl palmitate, cetyl stearate, isopropyl laurate, isopropyl myristate, isopropyl palmitate, and combinations thereof. The fatty alcohols include octyldodecanol, lauryl, myristyl, cetyl, stearyl, behenyl alcohol, and combinations thereof. Ethers such as eucalyptol, ceteraryl glucoside, dimethyl isosorbic polyglyceryl-3 cetyl ether, polyglyceryl-3 decyltetradecanol, propylene glycol myristyl ether, and combinations thereof can also suitably be used as emollients. Other suitable ester compounds for use in the hand sanitizing compositions or the present disclosure are listed in the
15 International Cosmetic Ingredient Dictionary and Handbook, 11th Edition, CTFA, (January, 2006) ISBN-10: 1882621360, ISBN-13: 978-1882621361, and in the 2007 Cosmetic Bench Reference, Allured Pub. Corporation (July 15, 2007) ISBN-10: 1932633278, ISBN-13: 978-1932633276, both of which are incorporated by reference herein to the extent they are consistent herewith.

20 Humectants that are suitable as carriers in the anti-adherent compositions of the present disclosure include, for example, glycerin, glycerin derivatives, hyaluronic acid, hyaluronic acid derivatives, betaine, betaine derivatives amino acids, amino acid derivatives, glycosaminoglycans, glycols, polyols, sugars, sugar alcohols, hydrogenated starch hydrolysates, hydroxy acids, hydroxy acid derivatives, salts of PCA, and the like, and combinations thereof. Specific examples of suitable humectants include honey, sorbitol, hyaluronic acid, sodium hyaluronate, betaine, lactic acid, citric acid, sodium citrate, glycolic acid,
25 sodium glycolate, sodium lactate, urea, propylene glycol, butylene glycol, pentylene glycol, ethoxydiglycol, methyl gluceth-10, methyl gluceth-20, polyethylene glycols (as listed in the International Cosmetic Ingredient Dictionary and Handbook such as PEG-2 through PEG 10), propanediol, xylitol, maltitol, or combinations thereof. Humectants are beneficial in that they prevent or reduce the chance that the anti-adherent film, formed after the anti-adherent agent is applied to a surface, will crack.

30 The anti-adherent compositions of the disclosure can desirably include one or more humectants in an amount of from about 0.01% (by total weight of the composition) to about 20% (by total weight of the composition), or from about 0.05% (by total weight of the composition) to about 10% by total weight of the

composition), or from about 0.1% (by total weight of the composition) to about 5.0% (by total weight of the composition).

5 The anti-adherent compositions may include water. For instance, where the anti-adherent composition is a wetting composition, such as described below for use with a wet wipe, the composition will typically include water. The compositions can suitably comprise water in an amount of from about 0.1% (by total weight of the composition) to about 40% (by total weight of the composition), or from about 0.5% (by total weight of the composition) to about 39% (by total weight of the composition), or from about 1.0% (by total weight of the composition) to about 38% (by total weight of the composition).

Rheology Modifier

10 Optionally, one or more rheology modifiers, such as thickeners, may be added to the anti-microbial composition. Suitable rheology modifiers are compatible with the anti-adherent agent. As used herein, "compatible" refers to a compound that, when mixed with the anti-adherent agent and alcohol, does not adversely affect the anti-adherent properties of same.

15 A thickening system is used in the anti-adherent compositions to adjust the viscosity and stability of the compositions. Specifically, thickening systems are desirable to prevent the composition from running off of the hands or body during dispensing and use of the composition. When the sanitizing composition is used with a wipe product, a thicker formulation is desired to prevent the composition from migrating from the wipe substrate. Furthermore, by increasing the viscosity of the composition, evaporation of the alcohol within the composition is slowed, allowing for more contact time between the alcohol and microorganisms.

20 Generally, due to the use of alcohol as a solvent, the typical thickening system includes one or more thickeners that remain soluble in alcohol concentrations up to at least 70%. Furthermore, as noted above, the thickening system should be compatible with the compounds used in the present disclosure; that is, the thickening system, when used in combination with the anti-adherent compounds, should not precipitate out, form a coacervate or prevent a user from perceiving the conditioning benefit (or other
25 desired benefit) to be gained from the composition. The thickening system may include a thickener, which can provide both the thickening effect desired from the thickening system and a conditioning effect to the user's skin.

Suitable thickeners include, cellulosics, gums, acrylates, starches, and various polymers. Examples could include but not be limited to hydroxethyl cellulose, potato starch, corn starch, xanthan
30 gum, and guar gum. In some embodiments, PEG-150 stearate, PEG-150 distearate, PEG-175

diisostearate, polyglyceryl-10 behenate/eicosadioate, disteareth-100 IPDI, polyacrylamidomethylpropane sulfonic acid, butylated PVP, and combinations thereof may be suitable.

While the viscosity of the compositions will typically depend on the thickener used and the other components of the compositions, the thickeners of the composition suitably provide for compositions having a viscosity in the range of greater than 10 cP to about 30,000 cP or more. In another embodiment, the thickeners provide compositions having a viscosity of from about 100 cP to about 20,000 cP. In yet another embodiment, the thickeners provide compositions having a viscosity of from about 200 cP to about 15,000 cP.

Typically, the anti-adherent compositions of the present disclosure include the thickening system in an amount of no more than about 20% (by total weight of the composition), and more suitably, from about 0.01% (by total weight of the composition) to about 20% (by total weight of the composition). In another aspect, the thickening system is present in the anti-adherent composition in an amount of from about 0.05% (by total weight of the composition) to about 15% (by total weight of the composition), or from about 0.075% (by total weight of the composition) to about 10% (by total weight of the composition), or from about 0.1% (by total weight of the composition) to about 7.5% (by total weight of the composition).

Foaming Agents

In one embodiment, the anti-adherent composition is delivered as a foam. In accordance with the present disclosure, in order to make the composition foamable, the alcohol is combined with a foaming agent such as at least one derivatized dimethicone.

The foaming agent is capable of causing the composition to foam when the composition is combined with air using, for instance, a manual pump dispenser. Although the sanitizing composition may be dispensed from an aerosol container, an aerosol is not needed in order to cause the composition to foam. Also of particular advantage, the sanitizing composition is foamable without having to include fluorinated surfactants.

Various different derivatized dimethicone foaming agents may be used in the composition of the present disclosure. The derivatized dimethicone, for instance, may comprise a dimethicone copolyol, such as an ethoxylated dimethicone. In one embodiment, the derivatized dimethicone is linear, although branched dimethicones may be used.

The amount of foaming agent present in the foaming compositions can depend upon various factors and the desired result. In general, the foaming agent can be present in an amount from about

0.01% to about 10% by weight, such as from about 0.1% to about 5% by weight, such as from about 0.1% to about 2% by weight.

When the sanitizing composition is made foamable, it may be contained in an aerosol container. In an aerosol container, the composition is maintained under pressure sufficient to cause foam formation when dispensed.

Adjunct Ingredients

The compositions of the present disclosure may additionally include adjunct ingredients conventionally found in pharmaceutical compositions in an established fashion and at established levels. For example, the compositions may comprise additional compatible pharmaceutically active and compatible materials for combination therapy, such as antioxidants, anti-parasitic agents, antipruritics, antifungals, antiseptic actives, biological actives, astringents, keratolytic actives, local anaesthetics, anti-stinging agents, anti-reddening agents, skin soothing agents, external analgesics, film formers, skin exfoliating agents, sunscreens, and combinations thereof.

Other suitable additives that may be included in the compositions of the present disclosure include compatible colorants, deodorants, emulsifiers, anti-foaming agents (when foam is not desired), lubricants, skin conditioning agents, skin protectants and skin benefit agents (e.g., aloe vera and tocopheryl acetate), solvents, solubilizing agents, suspending agents, wetting agents, pH adjusting ingredients (a suitable pH range of the compositions can be from about 3.5 to about 8), chelators, propellants, dyes and/or pigments, and combinations thereof.

Another component that may be suitable for addition to the anti-adherent compositions is a fragrance. Any compatible fragrance may be used. Typically, the fragrance is present in an amount from about 0% (by weight of the composition) to about 5% (by weight of the composition), and more typically from about 0.01% (by weight of the composition) to about 3% (by weight of the composition). In one desirable embodiment, the fragrance will have a clean, fresh and/or neutral scent to create an appealing delivery vehicle for the end consumer.

Organic sunscreens that may be present in the composition include ethylhexyl methoxycinnamate, avobenzene, octocrylene, benzophenone-4, phenylbenzimidazole sulfonic acid, homosalate, oxybenzone, benzophenone-3, ethylhexyl salicylate, and mixtures thereof.

Preservatives

The anti-microbial compositions may include various preservatives to increase shelf life. Some suitable preservatives that may be used in the present disclosure include, but are not limited to phenoxyethanol, capryl glycol, glyceryl caprylate, sorbic acid, gallic acid, KATHON CG.RTM., which is a mixture of methylchloroisothiazolinone and methylisothiazolinone, (available from Rohm & Haas Company, Philadelphia, PA); DMDM hydantoin (e.g., GLYDANT, available from Lonza, Inc., Fair Lawn, N.J.); EDTA and salts thereof; iodopropynyl butylcarbamate; benzoic esters (parabens), such as methylparaben, propylparaben, butylparaben, ethylparaben, isopropylparaben, isobutylparaben, benzylparaben, sodium methylparaben, and sodium propylparaben; 2-bromo-2-nitropropane-1,3-diol; benzoic acid;; and the like.

Other suitable preservatives include those sold by Sutton Labs, Inc., Chatham, NJ, such as "GERMALL 115" (imidazolidinyl urea), "GERMALL II" (diazolidinyl urea), and "GERMALL PLUS" (diazolidinyl urea and iodopropynyl butylcarbonate).

The amount of the preservative in the anti-adherent compositions is dependent on the relative amounts of other components present within the composition. For example, in some embodiments, the preservative is present in the compositions in an amount between about 0.001% to about 5% (by total weight of the composition), in some embodiments between about 0.01 to about 3% (by total weight of the composition), and in some embodiments, between about 0.05% to about 1.0% (by total weight of the composition).

Preparation of Anti-adherent Compositions

The anti-adherent composition of the present disclosure may be prepared by combining ingredients at room temperature and mixing.

In one embodiment, when the anti-adherent composition is to be applied to the skin of an individual, the composition includes the anti-adherent(s), alcohol(s), another hydrophilic carrier and a hydrophilic thickener. Suitable hydrophilic carriers can be, for example, water, glycerin, glycerin derivatives, glycols, water-soluble emollients, and combinations thereof. Suitable examples of alcohols include, but are not to be limited to, ethanol and isopropyl alcohol. Suitable examples of glycerin derivatives include, but are not to be limited to, PEG-7 glyceryl cocoate. Suitable glycols include, but are not to be limited to, propylene glycol, butylene glycol, pentylene glycol, ethoxydiglycol, dipropylene glycol, propanediol, and PEG-8. Suitable examples of water-soluble emollients could include, but are not to be limited to, PEG-6 Caprylic Capric Glycerides, Hydrolyzed Jojoba Esters, and PEG-10 Sunflower Glycerides.

Delivery Vehicles

The antimicrobial skin sanitizing compositions of the present disclosure may be used in combination with a product. For example, the compositions may be incorporated into or onto a substrate, such as a wipe substrate, an absorbent substrate, a fabric or cloth substrate, a tissue substrate, or the like.

5 In one embodiment, the anti-adherent compositions may be used in combination with a wipe substrate to form a wet wipe or may be a wetting composition for use in combination with a wipe which may be dispersible. In other embodiments, the anti-adherent compositions may be incorporated into wipes such as wet wipes, hand wipes, face wipes, cosmetic wipes, cloths and the like. In yet other embodiments, the anti-adherent compositions described herein can be used in combination with numerous personal care
10 products, such as absorbent articles or personal protective equipment. Absorbent articles of interest are diapers, training pants, adult incontinence products, feminine hygiene products, and the like; bath or facial tissue; and paper towels. Personal protective equipment articles of interest include but are not limited to masks, gowns, gloves, caps and the like.

In one embodiment, the wet wipe may comprise a nonwoven material that is wetted with an
15 aqueous solution termed the "wetting composition," which may include or be composed entirely of the antimicrobial skin sanitizing composition disclosed herein. As used herein, the nonwoven material comprises a fibrous material or substrate, where the fibrous material or substrate comprises a sheet that has a structure of individual fibers or filaments randomly arranged in a mat-like fashion. Nonwoven materials may be made from a variety of processes including, but not limited to, airlaid processes, wet-laid
20 processes such as with cellulosic-based tissues or towels, hydroentangling processes, staple fiber carding and bonding, melt blown, and solution spinning.

The fibers forming the fibrous material may be made from a variety of materials including natural fibers, synthetic fibers, and combinations thereof. The choice of fibers may depend upon, for example, the intended end use of the finished substrate and the fiber cost. For instance, suitable fibers may include, but
25 are not limited to, natural fibers such as cotton, linen, jute, hemp, wool, wood pulp, etc. Similarly, suitable fibers may also include: regenerated cellulosic fibers, such as viscose rayon and cuprammonium rayon; modified cellulosic fibers, such as cellulose acetate; or synthetic fibers, such as those derived from polypropylenes, polyethylenes, polyolefins, polyesters, polyamides, polyacrylics, etc. Regenerated cellulose fibers, as briefly discussed above, include rayon in all its varieties as well as other fibers derived
30 from viscose or chemically modified cellulose, including regenerated cellulose and solvent-spun cellulose, such as Lyocell. Among wood pulp fibers, any known papermaking fibers may be used, including softwood and hardwood fibers. Fibers, for example, may be chemically pulped or mechanically pulped, bleached or

unbleached, virgin or recycled, high yield or low yield, and the like. Chemically treated natural cellulosic fibers may be used, such as mercerized pulps, chemically stiffened or crosslinked fibers, or sulfonated fibers.

5 In addition, cellulose produced by microbes and other cellulosic derivatives may be used. As used herein, the term "cellulosic" is meant to include any material having cellulose as a major constituent, and, specifically, comprising at least 50 percent by weight cellulose or a cellulose derivative. Thus, the term includes cotton, typical wood pulps, non-woody cellulosic fibers, cellulose acetate, cellulose triacetate, rayon, thermomechanical wood pulp, chemical wood pulp, debonded chemical wood pulp, milkweed, or bacterial cellulose. Blends of one or more of any of the previously described fibers may also be used, if so
10 desired.

The fibrous material may be formed from a single layer or multiple layers. In the case of multiple layers, the layers are generally positioned in a juxtaposed or surface-to-surface relationship and all or a portion of the layers may be bound to adjacent layers. The fibrous material may also be formed from a plurality of separate fibrous materials wherein each of the separate fibrous materials may be formed from a
15 different type of fiber.

Airlaid nonwoven fabrics are particularly well suited for use as wet wipes. The basis weights for airlaid nonwoven fabrics may range from about 20 to about 200 Grams per square meter (gsm) with staple fibers having a denier of about 0.5 to about 10 and a length of about 6 to about 15 millimeters. Wet wipes may generally have a fiber density of about 0.025 g/cc to about 0.2 g/cc. Wet wipes may generally have a
20 basis weight of about 20 gsm to about 150 gsm. More desirably the basis weight may be from about 30 to about 90 gsm. Even more desirably the basis weight may be from about 50 gsm to about 75 gsm.

Processes for producing airlaid non-woven basesheets are described in, for example, published U.S. Pat. App. No. 2006/0008621, herein incorporated by reference to the extent it is consistent herewith.

The disclosure will be more fully understood upon consideration of the following non-limiting
25 Examples.

EXAMPLES

Example 1

The anti-adherent agents affect bacterial adherence to MBEC polystyrene pegs (see explanation below) in three different ways: 1) anti-adherent agents have a greater than or equal to 1 LOG reduction of
30 bacteria to the pegs, 2) neutral agents have between 0.9 LOG reduction of bacteria to the pegs and 0.9

LOG increase of bacteria on the pegs, 3) adherent agents have a greater than or equal to 1 LOG increase of bacteria on the pegs. No agents with anti-adherent activity were found to be antimicrobial (data not shown). In this example, anti-adherent compositions of the present disclosure were tested using the High Throughput Anti-adherence Test Method or the Viable Count Anti-Adherence Test Method, infra, against Gram-positive *S. aureus*, and Gram-negative *E. coli*. Eleven of the seventy-one agents tested were found to be anti-adherent against Gram-positive *S. aureus*, and Gram-negative *E. coli*. The anti-adherent agents are shown in Table 2 below.

The pH of the anti-adherent composition is between pH 3 to 10, or about pH 4 to about 8.

Example 2

Two separate anti-adherent hand sanitizer compositions were made with the following ingredients in accordance with the procedure shown below:

Table 2

Ingredients	Formulation A (%)	Formulation B (%)
Water	30	25
HPMC	3	3
Glycerin	5	10
EtOH	62	62

Procedure: Water and Ethanol (EtOH) were added to a mixing vessel and mixing was started. Glycerin and HPMC were slowly added to this mixture under continuous stirring using an overhead stirrer. The formulation was stirred for 15 minutes to ensure complete hydration of HPMC.

Anti-adherent sanitizer compositions of the present disclosure and three commercially-available hand sanitizers were tested to determine if they were adherent to Gram-positive and/or Gram-negative bacteria. Each composition was compared to a growth control. The growth control is the measure of bacteria that attach to an untreated MBEC peg as described in detail in the test methods below. Each composition was also compared to an anti-adherent control, a composition containing 92% water, 5% glycerin, and 3% Hydroxypropyl methylcellulose. The results of the comparison tests are shown in Figure 1, Table 3, and Table 4 below.

In general, the three commercially available alcoholic hand sanitizers show varying degrees of anti-adherency or adherency to bacteria. Brand A is minimally adherent to both *E. coli* and *S. aureus*.

Brand B is minimally adherent to *E. coli*, and minimally anti-adherent to *S. aureus*. Brand C is minimally anti-adherent to both *E. coli* and *S. aureus*. (The term “minimally adherent” is used because the effects are very small as compared to the anti-adherent control.) As can be seen, Brand B and Brand C do show some anti-adherence to *S. aureus*, and are either adherent or slightly anti-adherent to *E. coli*. In contrast,

5 the compositions of the present disclosure show a significant degree of anti-adherence to both Gram-negative and Gram-positive bacteria.

More specifically, Table 3 shows the change in the amount of bacteria compared to the growth control present after treatment with different alcohol hand sanitizer codes. Negative numbers indicate a decrease in the amount bacteria compared to the growth control (i.e. anti-adherent to bacteria). Positive

10 numbers indicate an increase in the amount of bacteria compared to the growth control (i.e. adherent to bacteria).

Table 3

Code Tested	Change compared to Growth Controls (LOG CFU/mL)	
	<i>E. coli</i> ATCC 11229	<i>S. aureus</i> ATCC 6538
HPMC (10% glycerin)+EtOH	-2.6	-3.9
HPMC (5% glycerin)+EtOH	-2.2	-3.5
Brand A	0.4	1.1
Brand B	1.0	-1.0
Brand C	-0.3	-1.2
Anti-adherent Control	-4.3	-4.3

Table 4 shows a comparison in the efficacy against Gram-negative and Gram-positive bacteria of the proposed invention formulations versus the commercial hand sanitizer samples (as shown in LOG difference). The results are as follows:

15

- HPMC with (10% glycerin)+EtOH is 3 LOG more anti-adherent than Brand A against *E. coli* and 5 LOG more anti-adherent against *S. aureus*
 - HPMC with (10% glycerin)+EtOH is 3.6 LOG more anti-adherent than Brand B against *E. coli* and 2.9 LOG more anti-adherent against *S. aureus*
 - HPMC with (10% glycerin)+EtOH is 2.3 LOG more anti-adherent than Brand C against *E. coli* and 2.7 LOG more anti-adherent against *S. aureus*
 - HPMC with (5% glycerin)+EtOH is 2.6 LOG more anti-adherent than Brand A against *E. coli* and 4.6 LOG more anti-adherent against *S. aureus*
- 20

- HPMC with (5% glycerin)+EtOH is 3.2 LOG more anti-adherent than Brand B against *E. coli* and 2.5 LOG more anti-adherent against *S. aureus*
- HPMC with (5% glycerin)+EtOH is 2.0 LOG more anti-adherent than Brand C against *E. coli* and 2.3 LOG more anti-adherent against *S. aureus*

5

Table 4

		Difference in attached bacteria when compared to commercial codes (LOG CFU/mL)	
		<i>E. coli</i> ATCC 11229	<i>S. aureus</i> ATCC 6538
HPMC (10% glycerin)+EtOH	Brand A	3.0	5.0
	Brand B	3.6	2.9
	Brand C	2.3	2.7
HPMC (5% glycerin)+EtOH	Brand A	2.6	4.6
	Brand B	3.2	2.5
	Brand C	2.0	2.3

Example 3**TABLE 5.** Anti-adherent agents in alcohol formulations using the Viable Count Anti-Adherence Test Method.

Agent 1	Con. Wt. %						Average LOG reduction	Average LOG reduction
		Agent 2	Con. Wt. %	Ethanol (w/w %)	Glycerin (%)	Water (%)	<i>E. coli</i> ATCC** 11229	<i>S. aureus</i> ATCC** 6538
ACULYN 22 pH 6.5	2			60	5	QS	1.7	1.3
ACULYN 22 pH 6.5	2	ARISTO-FLEX VELVET	0.4	60	5	QS	1.7	0.99
CMC pH 5	2			60	5	QS	1.91	1.31
Gum Arabic	4			60	5	QS	0.85	1.20
PECOGEL GC-310	5			60	5	QS	1.16	1.21
PECOGEL	5			60	5	QS	1.47	0.77

H-12								
SESAFLASH	5	ARISTO- FLEX VELVET	0.4	60	5	QS	1.20	0.54
ACULYN 38	1			60	5	QS	0.62	0.67
BENECEL A4C	1			60	5	QS	1.83	1.68
BENECEL A4C	1	ARISTO- FLEX VELVET	0.4	60	5	QS	2.01	2.59
BENECEL E15	0.5	ARISTO- FLEX VELVET	0.4	60	5	QS	1.40	1.52
BENECEL E15	0.5			60	5	QS	1.89	1.50
BENECEL K100LV	1	ARISTO- FLEX VELVET	0.4	60	5	QS	1.21	1.15
KLUCEL ECS	0.6			60	5	QS	0.66	1.08
PROTANAL ESTER BV- 3750	4			60	5	QS	0.99	0.65
NATROSOL 250 LR	1			60	5	QS	1.08	1.02
SEPIMAX ZEN	0.4			60	5	QS	0.51	0.70

Multiple compositions were prepared with varying combinations of anti-adherent agents, labeled Agent 1 and Agent 2, as displayed in Table 5. As can be seen in the table, Agent 1 materials were added and mixed into a constant quantity of Ethanol and Glycerin with the remaining balance of each composition consisting of water to a total of 100% w/w. Additionally, for some of the compositions, a second anti-adherent agent, Agent 2, was added to the compositions. For these compositions, Agent 1 and Agent 2 were mixed into a constant quantity of Ethanol and Glycerin with the remaining balance consisting of water to a total of 100% w/w. All of the compositions in Table 6 were then tested for anti-adherence against Gram – and Gram + microbes using the Viable Count Anti-Adherence Test Method. As can be seen in Table 5, all of the compositions containing Agent 1 or a combination of Agent 1 and Agent 2 reduced the adherence of microbes on the surface by at least 0.5 LOG according to the Viable Count Anti-Adherence Test Method.

TEST METHODS

HIGH THROUGHPUT ANTI-ADHERENCE TEST METHOD

This test method specifies the operational parameters required to grow and or prevent the formation of bacterial attachment using a high throughput screening assay. The assay device consists of a plastic lid with ninety-six (96) pegs and a corresponding receiver plate with ninety-six (96) individual wells that have a maximum 200 μ L working volume. Biofilm is established on the pegs under static batch conditions (i.e., no flow of nutrients into or out of an individual well).

1. Terminology

1.2 Definitions of Terms Specific to This Standard:

1.2.2 peg, n—biofilm sample surface (base: 5.0 mm, height: 13.1 mm).

1.2.3 peg lid, n—an 86 x 128 mm plastic surface consisting of ninety-six (96) identical pegs.

1.2.4 plate, n—an 86 x 128 mm standard plate consisting of ninety-six (96) identical wells.

1.2.5 well, n—small reservoir with a 50 to 200 μ L working volume capacity.

2. Acronyms

2.2 ATCC: American Type Culture Collection

2.3 CFU: colony forming unit

2.4 rpm: revolutions per minute

2.5 SC: sterility control

- 2.6 TSA: tryptic soy agar
- 2.7 TSB: tryptic soy broth
- 2.8 GC: growth control

5 3. Apparatus

- 3.2 Inoculating loop—nichrome wire or disposable plastic.
- 3.3 Petri dish—large labelled (100 x 150 x 15 mm, plastic, sterile) for plating.
- 3.4 Microcentrifuge tubes—sterile, any with a 1.5 mL volume capacity.
- 10 3.5 96-well microtiter plate—sterile, 86 x 128 mm standard plate consisting of ninety-six (96) identical flat bottom wells with a 200 μ L working volume.
- 3.6 Vortex—any vortex that will ensure proper agitation and mixing of microfuge tubes.
- 3.7 Pipette—continuously adjustable pipette with volume capability of 1 mL.
- 3.8 Micropipette—continuously adjustable pipette with working volume of 10 μ L – 200
15 μ L.
- 3.9 Sterile pipette tips—200 μ L and 1000 μ L volumes.
- 3.10 Sterile reagent reservoir—50 mL polystyrene.
- 3.11 Sterilizer—any steam sterilizer capable of producing the conditions of sterilization.
- 3.12 Colony counter—any one of several types may be used. A hand tally for the
20 recording of the bacterial count is recommended if manual counting is done.
- 3.13 Environmental incubator—capable of maintaining a temperature of $35 \pm 2^\circ\text{C}$ and relative humidity between 35 and 85%.
- 3.14 Reactor components—the MBEC Assay device, available from Innovotech, Edmonton,
AB, Canada.
- 25 3.15 Sterile conical tubes—50 mL, used to prepare initial inoculum.
- 3.16 Appropriate glassware—as required to make media and agar plates.
- 3.17 Erlenmeyer flask—used for growing broth inoculum.
- 3.18 Positive Displacement pipettes capable of pipetting 200 μ L.
- 3.19 Sterile pipette tips appropriate for Positive Displacement pipettes.

30 4. Reagents and Materials

- 4.2 Purity of water—all references to water as diluent or reagent shall mean distilled water or water of equal purity.
- 4.3 Culture media:

- 4.4 Bacterial growth broth—Tryptic soy broth (TSB) prepared according to manufacturer's directions.
- 4.5 Bacterial plating medium—Tryptic soy agar (TSA) prepared according to manufacturer's directions.
- 4.6 Phosphate Buffered Saline (PBS)—
- 4.7 Rinse Solution: Sterile PBS and TWEEN 80 (Sigma-Aldrich, St. Louis, MO) 1% w/v.

10 5. MICROORGANISMS:

5.1 *E. coli* ATCC 11229 and *S. aureus* ATCC 6538

6 TEST METHOD overview: The experimental process for the High-Throughput Anti-Adherence Test Method. This standard protocol may be broken into a series of small steps, each of which is detailed in the sections below.

15 6.1 Culture Preparation

6.1.1 *E. coli* ATCC 11229 and *S. aureus* ATCC 6538 are the organisms used in this test.

6.1.2 Using a cryogenic stock (at -70 °C), streak out a subculture of the above listed microorganisms on organism's specific agar (TSA).

20 6.1.3 Incubate at 35 ± 2 °C for the period of time of 22 ± 2 hours.

6.1.4 Aseptically remove isolated colony from streak plate and inoculate 20 mL of sterile TSB.

25 6.1.5 Incubate flask at 35 ± 2 °C and 175 ± 10 rpm for 16 to 18 hours (*E. coli* and *S. aureus*). Viable bacterial density should be 10^9 CFU/mL and should be checked by serial dilution and plating.

6.1.6 Pipette 10 mL from the incubation flask of *E. coli*, and *S. aureus* into a 50 mL conical tube and spin down at 5 minutes at 4,000 xg. Then remove supernatant and Resuspend in 10 mL sterile PBS. Approximate cell density should be 10^7 - 10^9

CFU/mL. Vortex the sample for approximately 30 seconds to achieve a homogeneous distribution of cells.

6.1.7 Perform 10-fold serial dilutions of the inoculum in triplicate.

6.1.8 Plate appropriate dilutions on appropriately labelled TSA plates. Incubate the plates at 35 ± 2 °C for 22 ± 2 hours depending on the isolates growth rate and enumerate.

6.2 Preparation of the Challenge plates:

6.2.1 Preparation of agents and coating agents onto MBEC plate lid

6.2.1.1.1 Using a positive displacement pipette aseptically add 200 µL of agents and control to be tested to a sterile 96-well microplate according to the plate layout of Table 6.

Table 6. Sample layout of 96-well MBEC plate.

		1	2	3	4	5	6	7	8	9	10	11	12
<i>E. coli</i>	A	AAC		T1	T2	T3	T4	T5	T6	T7	T8	NT-GC	T1-SC
<i>E. coli</i>	B	AAC		T1	T2	T3	T4	T5	T6	T7	T8	NT-GC	T2-SC
<i>E. coli</i>	C	AAC		T1	T2	T3	T4	T5	T6	T7	T8	NT-GC	T3-SC
<i>E. coli</i>	D	AAC		T1	T2	T3	T4	T5	T6	T7	T8	NT-GC	T4-SC
<i>S. aureus</i>	E	AAC		T1	T2	T3	T4	T5	T6	T7	T8	NT-GC	T5-SC
<i>S. aureus</i>	F	AAC		T1	T2	T3	T4	T5	T6	T7	T8	NT-GC	T6-SC
<i>S. aureus</i>	G	AAC		T1	T2	T3	T4	T5	T6	T7	T8	NT-GC	T7-SC
<i>S. aureus</i>	H	AAC		T1	T2	T3	T4	T5	T6	T7	T8	NT-GC	T8-SC

AAC = Anti-Adherent Control

NT-GC = No Treatment Growth Control

SC = Sterility Control

T1 – T8 = Test Codes

6.2.1.1.2 Add 200 µL of each code to the appropriate well for sterility controls.

6.2.1.1.3 Place the MBEC plate lid, peg side down into the 96-well microplate containing the test compound solutions.

6.2.1.1.4 Allow the plate to sit at room temperature (25 ± 3 °C) for 2 hours.

6.2.1.1.5 Remove the MBEC plate lid and allow the lid to dry at room temperature (25 ± 3 °C) overnight in a laminar flow hood.

7.1 Bacterial Adherence Challenge:

7.1.1 Add 100 μ L of diluted bacteria to the appropriate wells in a sterile 96-well microplate as indicated in the plate layout in Table 6.

7.1.2 Add 200 μ L of sterile PBS to the sterility controls.

7.1.3 The MBEC containing dried agents is then inserted into the bacterial inoculated 96 well flat bottom microplate from section 9.3.1

7.1.4 Incubate stationary at room temperature (25 ± 3 °C) for 15 minutes.

7.1.5 Remove the MBEC lid and place into a 96-well microplate containing 200 μ L PBS + 1% w/v TWEEN 80. Incubate stationary at room temperature (25 ± 3 °C) for 15 seconds.

7.1.6 Repeat step 7.1.5 for two additional washes for a total of 3 washes.

7.2 Method to Determine Number of Attached Bacteria

7.2.1 Transfer the washed MBEC plate lid to a 96-well plate containing 200 μ L ALAMARBLUE reagent (prepared according to manufacturer's directions, Life Technologies, Carlsbad, CA) in each well to be tested.

7.2.2 The final plate is transferred to a SPECTRAMAX GEMINI EM microplate reader (Molecular Devices, Inc. Sunnyvale, CA USA) for a 20 hour kinetic, bottom read with an excitation of 560 nm and emission of 590 nm. The rate of fluorescence development (relative fluorescence units (RFU)/minute) is determined for each well.

7.2.3 Data was analyzed using a standard curve (described below) for each organism to determine the numbers of bacteria attached to the pegs (LOG CFU/mL) present in each sample. Number of attached bacteria was quantified by incubating with an ALAMARBLUE reagent and measuring fluorescence development over time.

7.2.4 From these data, the LOG CFU/mL reduction of each time point relative to the growth control is calculated to determine the activity of each code.

7.3 Method for Generating a Standard Curve with bacteria in an ALAMARBLUE Solution:

- 5 7.3.1 Standard curves were constructed for each organism to define the rate of fluorescence development as a function of bacterial concentration, as determined via viable plate counts. This standard curve provided the ability to relate rate of fluorescence development (RFU/minute) to the LOG CFU/mL number of bacteria present in a given sample
- 7.3.2 Day 1:
- 7.3.2.1 Aseptically remove loopful of bacteria strain to be tested from freezer stock and place in 20 mL of TSB media in a culture flask.
- 7.3.2.2 Incubate with shaking (200 rpm) for 22 ± 2 hours at 37 ± 2 °C.
- 10 7.3.3 Day 2:
- 7.3.3.1 Aseptically transfer 100 µL of the 22 ± 2 hours freezer stock cultures into 20 mL of TSB media in a culture flask.
- 7.3.3.2 Incubate cultures on a gyratory shaker (200 rpm) for 22 ± 2 hours at 37 ± 2 °C.
- 15 7.3.3.3 Perform a streak for isolation from the culture flask on TSA. Incubate plate for 22 ± 2 hours at 37 ± 2 °C.
- 7.3.4 Day 3:
- 7.3.4.1 Prepare an ALAMARBLUE solution according to the manufacturer's directions.
- 7.3.4.2 Remove culture flask from shaking incubator after 22 ± 2 hours. Pipette 1 mL of bacteria into a 1.7 mL microcentrifuge tube.
- 20 7.3.4.3 Centrifuge the bacteria at 4000xg.
- 7.3.4.4 Resuspend bacterial cells in sterile PBS. Perform a total of two washes.
- 7.3.4.5 Perform 1:10 serial dilutions with washed bacterial culture in 0.9 mL dilution blanks of sterile PBS (100 µL culture into 900 µL of sterile PBS).
- 7.3.4.6 Plate appropriate dilutions of prepared bacteria.
- 25 7.3.4.7 Add 270 µL of ALAMARBLUE solution to wells A-D: columns 1-7 of a 96-well plate.
- 7.3.4.8 Add 30 µL of bacterial dilution the wells of a 96-well plate (n=4 per dilution).
- 7.3.4.9 Add 30 µL of sterile PBS to wells A-D, column 8 for a background control.
- 30 7.3.4.10 Place plate in a bottom reading spectrophotometer that measures fluorescence. Set temp to 37 °C. Perform assay at 37 °C, read every 20 minutes for 24 hours at 560 excite and 590 emit.

7.3.4.11 Enumerate the dilutions.

7.3.4.12 Calculate the mean rate of fluorescence development.

7.3.4.13 Plot the mean rate of fluorescence development as a function of the mean CFU/mL of the dilutions.

5 VIABLE COUNT ANTI-ADHERENCE TEST METHOD

This test method specifies the operational parameters required to grow and or prevent the formation of bacterial attachment using viable counts. The assay device consists of a plastic lid with ninety-six (96) pegs and a corresponding receiver plate with ninety-six (96) individual wells that have a maximum 200 μ L working volume. Biofilm is established on the pegs under static batch conditions (i.e., no
10 flow of nutrients into or out of an individual well).

This test method is identical to the High Throughput Anti-Adherence Test Method except that Section 7.1 through 7.3.4.13 is replaced with the following:

A. Bacterial Adherence Challenge:

15 A.1 Add 100 μ L of diluted bacteria to the appropriate wells in a sterile 96-well microplate as indicated in the plate layout in Table 4.

A.2 Add 200 μ L of sterile PBS to the sterility controls.

A.3 The MBEC containing dried agents is then inserted into the bacterial inoculated 96 well flat bottom microplate from section 9.3.1

B. Recovery:

20 B.1 After the 15 minute contact time, transfer the MBEC™ lid to the rinse plate where each well contains 200 μ L for 15 seconds of saline and 1% Tween 80 to wash of any loosely attached planktonic cells. Repeat this for 3 separate wash plates.

B.2 *S. aureus* Recovery:

25 B.2.1 Break the corresponding pegs from the MBECTM lid using a sterile pliers and transfer them into 50 mL conical tubes containing 10 mL PBS.

B.2.2 Vortex the conical tubes for 10 seconds

B.2.3 Transfer the conical tubes to the sonicator and sonicate on high. Sonicate for 1 minute on. Then allow the tubes to rest for 1 minute. Repeat the sonication step for

a total of 5 minutes of sonication to dislodge surviving attached bacteria. The conical tubes were placed in the sonicator water bath using a float.

B.2.4 Vortex the conical tubes again for 10 seconds.

B.3 *E. coli* Recovery:

B.3.1 Transfer the MBEC™ lid to a plate containing 200 µL PBS.

B.3.2 Transfer the plate to the sonicator and sonicate on high for 10 minutes to dislodge surviving attached bacteria. The plates are placed in a dry stainless steel insert tray which sits in the water of the sonicator. The vibrations created in the water by the sonicator transfer through the insert tray to actively sonicate the contents of the 96 well recovery plate(s).

C. LOG₁₀ Reduction:

C.1 Following sonication, place 100 µL from each well of the MBEC™ plate, into the first 12 empty wells of the first row of a 96 well-micro titer plate. Place 180 µL of sterile 0.9% saline in the remaining rows.

C.2 Prepare a serial dilution (10^0 - 10^{-7}) by moving 20 µL down each of the 8 rows.

C.3 Remove 10 µL from each well and spot plate on a prepared TSA plates.

C.4 Plates are incubated at $37 \pm 1^\circ\text{C}$ and counted after approximately 24 h hours of incubation.

C.5 Data will be evaluated as Log₁₀ CFU/peg.

C.6 Cell Enumeration:

C.7 Count the appropriate number of colonies according to the plating method used.

C.8 Calculate the arithmetic mean of the colonies counted on the plates.

C.8.1 The log density for one peg is calculated as follows:

$$\text{Log}_{10} (\text{CFU/peg}) = \text{Log}_{10} [(X/B) (D)] \text{ where:}$$

X = mean CFU; B = volume plated (0.02 mL); and D = dilution.

C.9 Calculate the overall attached bacteria accumulation by calculating the mean of the log densities calculated.

C.10 Calculate the Log₁₀ reduction for each dilution as follows: LOG₁₀ Reduction = Mean LOG₁₀ Growth Control – Mean Log₁₀ Test.

EXPLANATION OF LOG DECREASE

The compositions of the present disclosure exhibit a decrease of bacteria on surfaces. Log decrease, for example, may be determined from the decrease of bacteria adhered to a surface according to the following correlations:

5	Fold Decrease of Bacteria	LOG Decrease
	1	0.5
	10	1
	100	2
	1000	3

10 In other words, surface exhibiting a decrease of bacteria of 1 Log means the number of bacteria on the fibrous substrate has decreased 10-fold, a decrease of 2 Log means the number of bacteria has decreased 100-fold, a decrease of 3 Log means the number of bacteria has decreased 1000-fold, etc., as compared to the number of bacteria present on a surface that is not treated with the disclosed composition. A larger Log decrease thus corresponds with a composition that is able to more effectively repel Gram
 15 negative and Gram positive bacteria.

When introducing elements of the present disclosure, the articles “a”, “an”, “the” and “said” are intended to mean that there are one or more of the elements. The terms “comprising”, “including” and “having” are intended to be inclusive and mean that there may be additional elements other than the listed elements. Many modifications and variations of the present disclosure can be made without departing
 20 from the spirit and scope thereof. Therefore, the exemplary embodiments described above should not be used to limit the scope of the invention.

WHAT IS CLAIMED IS:

1. A anti-adherent composition for use on surfaces, the composition comprising:
40% to 90% (by weight of composition) of a short-chain alcohol; and
an anti-adherent agent selected from the group consisting of Hydroxypropyl methylcellulose,
5 Cellulose gum, Acacia Senegal Gum; Polyacrylate Crosspolymer-11;
VP/Dimethylaminoethylmethacrylate/Polycarbamyl Polyglycol Ester; Acrylates/Vinyl Neodecanoate
Crosspolymer; hydroxypropyl methylcellulose; Hydroxypropylcellulose; Methylcellulose; Propylene
Glycol Alginate; Polyacrylate Crosspolymer-6; VP/Polycarbamyl Polyglycol Ester;
Acrylates/Steareth-20 Methacrylate Copolymer; Acrylates Copolymer; and combinations thereof.
- 10 2. The composition of claim 1 wherein the anti-adherent agent is Hydroxypropyl methylcellulose
(HPMC), Methylcellulose; Polyacrylate Crosspolymer-11, or a combination thereof.
3. The composition of claim 1 wherein the anti-adherent agent is a combination of Hydroxypropyl
methylcellulose (HPMC) and Polyacrylate Crosspolymer-11, and wherein the weight/weight ratio of
HPMC to Polyacrylate Crosspolymer-11 ranges from 10:1 to 1:10, respectively.
- 15 4. The composition as in any one of the preceding claims wherein the short-chain alcohol is present
in the amount of 62% to 72% by weight of the composition.
5. The composition as in any one of the preceding claims wherein the anti-adherent agent is present
in the amount of 0.01% to 20% by weight of the composition.
6. The composition as in any one of the preceding claims wherein composition reduces the
20 adherence of microbes on the surface by at least 0.5 LOG according to the High Throughput Anti-
adherence Test Method or the Viable Count Anti-Adherence Test Method.
7. The composition as in any one of the preceding claims wherein composition reduces the
adherence of microbes on the surface by at least 1 LOG according to the High Throughput Anti-
adherence Test Method or the Viable Count Anti-Adherence Test Method.
- 25 8. The composition as in any one of the preceding claims further comprising a hydrophilic carrier.
9. A anti-adherent composition for use on surfaces, the composition comprising:
40% to 90% (by total weight of composition) of a short-chain alcohol;
0.01% to 20% (by total weight of composition) of an anti-adherent agent; and
water;
- 30 wherein the composition reduces the adherence of *E. coli* and *S. aureus* on the surfaces by at
least 0.5 LOG according to the High Throughput Anti-adherence Test Method or the Viable Count
Anti-Adherence Test Method.

10. The composition of claim 9 further comprising a humectant selected from the group consisting of glycerin, glycerin derivatives, hyaluronic acid derivatives, betaine derivatives amino acids, amino acid derivatives, glycosaminoglycans, glycols, polyols, sugars, sugar alcohols, hydrogenated starch hydrolysates, hydroxy acids, hydroxy acid derivatives, salts of PCA, and combinations thereof.
11. The composition of claim 9 further comprising a humectant selected from the group consisting of honey, sorbitol, hyaluronic acid, sodium hyaluronate, betaine, lactic acid, citric acid, sodium citrate, glycolic acid, sodium glycolate, sodium lactate, urea, propylene glycol, butylene glycol, pentylene glycol, ethoxydiglycol, methyl gluceth-10, methyl gluceth-20, PEG-2, PEG-3, PEG-4, PEG-5, PEG-6, PEG-7, PEG-8, PEG-9, PEG 10, Propanediol, xylitol, maltitol, and a combination thereof.
12. The composition of claims 9 or 10 or 11 wherein the composition reduces the adherence of *E. coli* and *S. aureus* on the surfaces by at least 1 LOG according to the High Throughput Anti-adherence Test Method or the Viable Count Anti-Adherence Test Method.
13. The composition of claims 9 or 10 or 11 further comprising a foaming agent.
14. A wipe comprising:
a nonwoven substrate; and
an anti-adherent composition comprising 40% to 90% (by total weight of composition) of a short-chain alcohol; 0.01% to 20% (by total weight of composition) of an anti-adherent agent; and a hydrophilic carrier; wherein the composition reduces the adherence of *E. coli* and *S. aureus* on the surfaces by at least 0.5 LOG according to the High Throughput Anti-adherence Test Method.
15. The wipe of claim 14 wherein the anti-adherent composition further comprises a humectant.
16. The wipe of claims 14 or 15 wherein the anti-adherent agent is selected from the group of Hydroxypropyl methylcellulose, Cellulose gum, Acacia Senegal Gum; Polyacrylate Crosspolymer-11; VP/Dimethylaminoethylmethacrylate/Polycarbamyl Polyglycol Ester; Acrylates/Vinyl Neodecanoate Crosspolymer; hydroxypropyl methylcellulose; Hydroxypropylcellulose; Methylcellulose; Propylene Glycol Alginate; Polyacrylate Crosspolymer-6; VP/Polycarbamyl Polyglycol Ester; Acrylates/Steareth-20 Methacrylate Copolymer; Acrylates Copolymer; and combinations thereof.
17. The wipe of claims 14 or 15 wherein the anti-adherent agent is Methylcellulose, Hydroxypropyl methylcellulose (HPMC), Polyacrylate Crosspolymer-11, or a combination thereof.
18. The wipe of claims 14 or 15 wherein the anti-adherent agent is present in the amount of 0.1% to 10% (by total weight of the composition).

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/023852**A. CLASSIFICATION OF SUBJECT MATTER****C08L 29/02(2006.01)i, C08L 1/02(2006.01)i, C08J 3/02(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C08L 29/02; A61K 8/02; A01N 59/16; A61K 9/00; A61K 8/73; A01P 1/00; A61J 3/00; C08L 1/02; C08J 3/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: anti-adherent agent, liquid carrier, humectants, emulsion, wipe, microbe**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7993675 B2 (OLIVER, D. A. et al.) 09 August 2011	1,2,4,9-18
A	See abstract; column 5, lines 25-61 and column 10, line 1-column 13, lines 22.	3
Y	US 2014-0205546 A1 (ANNUARY HEALTHCARE, INC.) 24 July 2014	1,2,4,9-18
A	See abstract; paragraphs [0013], [0118]-[0125], [0135]-[0136], [0146]-[0150] and [0158].	3
A	US 2012-0294911 A1 (REDMOND, M. J. et al.) 22 November 2012	1-4,9-18
A	See abstract; paragraphs [0031]-[0040].	
A	US 2007-0237800 A1 (LAHANN, J.) 11 October 2007	1-4,9-18
A	See abstract; paragraphs [0033]-[0035], [0039], [0045] and [0085]-[0086].	
A	US 2006-0193789 A1 (TAMARKIN, D. et al.) 31 August 2006	1-4,9-18
A	See abstract; paragraphs [0026]-[0027] and [0110].	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

13 July 2015 (13.07.2015)

Date of mailing of the international search report

14 July 2015 (14.07.2015)

Name and mailing address of the ISA/KR

International Application Division
Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan City, 302-701,
Republic of Korea

Facsimile No. +82-42-472-7140

Authorized officer

KIM, Dong Seok

Telephone No. +82-42-481-5405



INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US2015/023852**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 5-8
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/023852

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7993675 B2	09/08/2011	AU 2007-249413 A1	22/11/2007
		AU 2007-346705 A1	14/08/2008
		CA 2651646 A1	22/11/2007
		CA 2651646 C	27/01/2015
		CA 2676081 A1	14/08/2008
		CA 2860295 A1	14/08/2008
		CN 101443079 A	27/05/2009
		CN 101626762 A	13/01/2010
		CN 101626762 B	27/02/2013
		EP 2029232 A1	04/03/2009
		EP 2120908 A1	25/11/2009
		EP 2712614 A2	02/04/2014
		EP 2712614 A3	27/08/2014
		JP 2009-536666 A	15/10/2009
		JP 2014-240419 A	25/12/2014
		KR 10-1421765 B1	22/07/2014
		KR 10-1453011 B1	21/10/2014
		KR 10-1461842 B1	13/11/2014
		KR 10-2009-0005162 A	12/01/2009
		KR 10-2009-0122438 A	30/11/2009
		KR 10-2013-0141724 A	26/12/2013
		US 2007-0264296 A1	15/11/2007
		US 2007-0264310 A1	15/11/2007
		US 2007-0264342 A1	15/11/2007
		US 2007-0264353 A1	15/11/2007
		US 2008-0195037 A1	14/08/2008
		US 2009-0258086 A1	15/10/2009
		US 2011-300235 A1	08/12/2011
		US 7959943 B2	14/06/2011
		US 7976873 B2	12/07/2011
		US 7976875 B2	12/07/2011
		US 8088095 B2	03/01/2012
		US 8691288 B2	08/04/2014
		WO 2007-134055 A1	22/11/2007
		WO 2008-097317 A1	14/08/2008
US 2014-0205546 A1	24/07/2014	US 2013-177504 A1	11/07/2013
		WO 2012-174466 A2	20/12/2012
		WO 2012-174466 A3	02/05/2013
US 2012-0294911 A1	22/11/2012	US 2013-224273 A1	29/08/2013
		US 2013-230610 A1	05/09/2013
		US 8431142 B2	30/04/2013
		US 8871233 B2	28/10/2014
US 2007-0237800 A1	11/10/2007	EP 1809719 A2	25/07/2007
		EP 1809719 B1	16/01/2013
		EP 2285889 A1	23/02/2011
		JP 2008-520407 A	19/06/2008

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/023852

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-0193789 A1	31/08/2006	JP 4690418 B2	01/06/2011
		US 2006-0201390 A1	14/09/2006
		US 2008-0242774 A1	02/10/2008
		US 2010-0015447 A1	21/01/2010
		US 2010-0038830 A1	18/02/2010
		US 2011-0062608 A1	17/03/2011
		US 7767017 B2	03/08/2010
		US 7947772 B2	24/05/2011
		US 8043480 B2	25/10/2011
		US 8052849 B2	08/11/2011
		US 8187708 B2	29/05/2012
		US 8241651 B2	14/08/2012
		WO 2006-137936 A2	28/12/2006
		WO 2006-137936 A3	21/06/2007
		WO 2007-149310 A2	27/12/2007
		WO 2007-149310 A3	25/09/2008
		WO 2009-055693 A2	30/04/2009
		WO 2009-055693 A3	17/09/2009
		WO 2009-151421 A1	17/12/2009
		WO 2010-011641 A2	28/01/2010
		WO 2010-011641 A3	22/04/2010
		AU 2003-279493 A1	13/05/2004
		AU 2003-279493 B2	20/08/2009
		AU 2004-261063 A1	10/02/2005
		AU 2004-266502 A1	03/03/2005
		AU 2004-266502 B2	23/09/2010
		AU 2004-313285 A1	29/09/2005
		AU 2004-321183 A1	12/01/2006
		AU 2004-321183 B2	03/06/2010
		AU 2005-204341 A1	17/11/2005
		AU 2005-204347 A1	10/08/2006
		AU 2006-201878 A1	27/09/2007
		AU 2006-273697 A1	01/02/2007
		AU 2006-283225 A1	01/03/2007
		AU 2006-298442 A1	12/04/2007
		AU 2006-313443 A1	18/05/2007
		AU 2007-355106 A1	18/12/2008
		AU 2007-356328 A1	15/01/2009
		AU 2009-211147 A1	13/08/2009
		CA 2502986 A1	06/05/2004
		CA 2502986 C	23/08/2011
		CA 2534372 A1	10/02/2005
		CA 2534372 C	24/01/2012
		CA 2536482 A1	03/03/2005
		CA 2536482 C	24/07/2012
		CA 2549505 A1	12/01/2006
		CA 2549505 C	27/01/2015
		CA 2565754 A1	28/10/2005
		CA 2602042 A1	28/06/2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/023852

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		CA 2606933 A1	01/02/2007
		CA 2606933 C	29/07/2014
		CA 2609948 A1	01/03/2007
		CA 2609953 A1	12/04/2007
		CA 2610662 A1	18/05/2007
		CA 2711703 A1	16/07/2009
		CA 2714015 A1	13/08/2009
		CA 2776692 A1	03/03/2005
		CA 2776692 C	30/12/2014
		CA 2857889 A1	12/01/2006
		CN 101267804 A	17/09/2008
		CN 1713891 A	28/12/2005
		CN 1713891 C	28/12/2005
		CN 1856294 A	01/11/2006
		CN 1856294 C	01/11/2006
		EP 1556009 A2	27/07/2005
		EP 1556009 B1	24/12/2014
		EP 1663148 A2	07/06/2006
		EP 1670435 A2	21/06/2006
		EP 1699433 A2	13/09/2006
		EP 1768648 A1	04/04/2007
		EP 1863447 A2	12/12/2007
		EP 1865923 A2	19/12/2007
		EP 1888032 A2	20/02/2008
		EP 1890679 A2	27/02/2008
		EP 1893396 A2	05/03/2008
		EP 1919448 A2	14/05/2008
		EP 1942870 A2	16/07/2008
		EP 2029106 A2	04/03/2009
		EP 2051697 A2	29/04/2009
		EP 2073794 A2	01/07/2009
		EP 2097065 A2	09/09/2009
		EP 2257276 A2	08/12/2010
		EP 2422768 A2	29/02/2012
		EP 2422768 A3	09/05/2012
		EP 2422768 B1	15/04/2015
		EP 2494959 A1	05/09/2012
		EP 2494959 B1	19/11/2014
		IL 152486 A	29/05/2003
		JP 2006-505583 A	16/02/2006
		JP 2007-503428 A	22/02/2007
		JP 2007-508243 A	05/04/2007
		JP 2007-516265 A	21/06/2007
		JP 2008-539222 A	13/11/2008
		JP 2008-540508 A	20/11/2008
		JP 2008-540509 A	20/11/2008
		JP 2008-540511 A	20/11/2008
		KR 10-1108439 B1	31/01/2012
		KR 10-2005-0083826 A	26/08/2005
		KR 10-2006-0113657 A	02/11/2006

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/023852

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		KR 10-2007-0032272 A	21/03/2007
		US 2005-0031547 A1	10/02/2005
		US 2005-0069566 A1	31/03/2005
		US 2005-0074414 A1	07/04/2005
		US 2005-0186142 A1	25/08/2005
		US 2005-0205086 A1	22/09/2005
		US 2005-0232869 A1	20/10/2005
		US 2005-0244342 A1	03/11/2005
		US 2005-0271596 A1	08/12/2005
		US 2005-0271598 A1	08/12/2005
		US 2006-0018937 A1	26/01/2006
		US 2006-0140984 A1	29/06/2006
		US 2006-0233721 A1	19/10/2006
		US 2006-0269485 A1	30/11/2006
		US 2006-0275218 A1	07/12/2006
		US 2006-0275221 A1	07/12/2006
		US 2007-0020213 A1	25/01/2007
		US 2007-0020304 A1	25/01/2007
		US 2007-0253911 A1	01/11/2007
		US 2007-0280891 A1	06/12/2007
		US 2007-0292355 A1	20/12/2007
		US 2007-0292359 A1	20/12/2007
		US 2007-0292461 A1	20/12/2007
		US 2008-0031907 A1	07/02/2008
		US 2008-0044444 A1	21/02/2008
		US 2008-0050317 A1	28/02/2008
		US 2008-0063607 A1	13/03/2008
		US 2008-0069779 A1	20/03/2008
		US 2008-0138293 A1	12/06/2008
		US 2008-0138296 A1	12/06/2008
		US 2008-0152596 A1	26/06/2008
		US 2008-0206155 A1	28/08/2008
		US 2008-0206159 A1	28/08/2008
		US 2008-0206161 A1	28/08/2008
		US 2008-0253973 A1	16/10/2008
		US 2008-0260655 A1	23/10/2008
		US 2008-0317679 A1	25/12/2008
		US 2009-0180970 A1	16/07/2009
		US 2010-0040561 A9	18/02/2010
		US 2010-0111879 A1	06/05/2010
		US 2010-0221195 A1	02/09/2010
		US 2010-0266510 A1	21/10/2010
		US 2010-0284938 A1	11/11/2010
		US 2011-0002857 A1	06/01/2011
		US 2011-0097279 A1	28/04/2011
		US 2012-0148503 A1	14/06/2012
		US 2012-0156144 A1	21/06/2012
		US 2013-0183250 A1	18/07/2013
		US 2013-0183251 A1	18/07/2013
		US 2013-0189195 A1	25/07/2013

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/023852

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2013-0189196 A1	25/07/2013
		US 2013-0295022 A1	07/11/2013
		US 2014-0086848 A1	27/03/2014
		US 2014-0182585 A1	03/07/2014
		US 2014-0193502 A1	10/07/2014
		US 2014-0227199 A1	14/08/2014
		US 2014-0241998 A1	28/08/2014
		US 2015-0025060 A1	22/01/2015
		US 2015-0098907 A1	09/04/2015
		US 2015-0157586 A1	11/06/2015
		US 7645803 B2	12/01/2010
		US 7700076 B2	20/04/2010
		US 7704518 B2	27/04/2010
		US 7820145 B2	26/10/2010
		US 8114385 B2	14/02/2012
		US 8119109 B2	21/02/2012
		US 8119150 B2	21/02/2012
		US 8362091 B2	29/01/2013
		US 8435498 B2	07/05/2013
		US 8486376 B2	16/07/2013
		US 8518378 B2	27/08/2013
		US 8722021 B2	13/05/2014
		US 8741265 B2	03/06/2014
		US 8795635 B2	05/08/2014
		US 8795693 B2	05/08/2014
		US 8840869 B2	23/09/2014
		US 8900554 B2	02/12/2014
		WO 2004-037225 A2	06/05/2004
		WO 2004-037225 A3	29/12/2004
		WO 2005-011567 A2	10/02/2005
		WO 2005-011567 A3	27/10/2005
		WO 2005-018530 A2	03/03/2005
		WO 2005-018530 A3	20/10/2005
		WO 2006-003481 A2	12/01/2006
		WO 2006-003481 A3	17/01/2008
		WO 2006-131784 A1	14/12/2006
		WO 2007-007198 A2	18/01/2007
		WO 2007-007198 A3	03/05/2007
		WO 2007-007208 A2	18/01/2007
		WO 2007-007208 A3	30/08/2007
		WO 2007-012977 A2	01/02/2007
		WO 2007-012977 A3	12/07/2007
		WO 2007-023396 A2	01/03/2007
		WO 2007-023396 A3	20/03/2008
		WO 2007-039825 A2	12/04/2007
		WO 2007-039825 A3	06/03/2008
		WO 2007-054818 A2	18/05/2007
		WO 2007-054818 A3	23/10/2008
		WO 2007-072216 A2	28/06/2007
		WO 2007-072216 A3	08/05/2008

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/023852Patent document
cited in search reportPublication
datePatent family
member(s)Publication
date

WO 2007-085899 A2	02/08/2007
WO 2007-085899 A3	10/07/2008
WO 2007-085902 A2	02/08/2007
WO 2007-085902 A3	29/11/2007
WO 2007-102052 A2	13/09/2007
WO 2007-102052 A3	03/01/2008
WO 2008-038140 A2	03/04/2008
WO 2008-038140 A3	04/09/2008
WO 2008-038147 A2	03/04/2008
WO 2008-038147 A3	16/10/2008
WO 2008-075207 A2	26/06/2008
WO 2008-075207 A3	29/01/2009
WO 2008-110872 A2	18/09/2008
WO 2008-110872 A3	25/06/2009
WO 2008-152444 A2	18/12/2008
WO 2008-152444 A3	18/06/2009
WO 2009-007785 A2	15/01/2009
WO 2009-007785 A3	04/06/2009
WO 2009-087578 A2	16/07/2009
WO 2009-087578 A3	10/06/2010
WO 2009-098595 A2	13/08/2009