

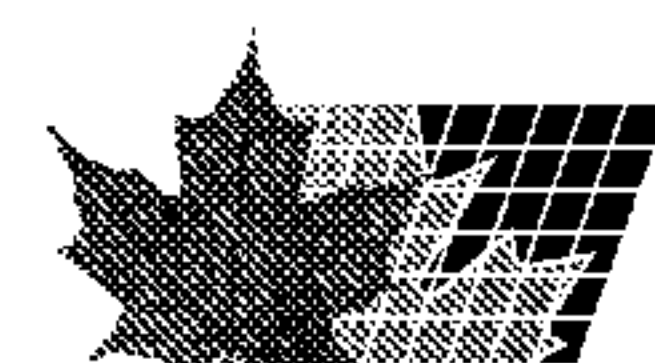


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(54) Titre : INHIBITION DES EXOPROTEINES AU MOYEN D'ISOPRENOIDES
(54) Title: INHIBITION OF EXOPROTEINS USING ISOPRENOIDS

(57) **Abrégé/Abstract:**

Absorbent articles, such as catamenial tampons, are disclosed. The absorbent articles include an effective amount of an isoprenoid inhibitory compound to substantially inhibit the production of exotoxins by Gram positive bacteria. The isoprenoid inhibitory compounds of the present invention include terpenes and terpenoids which substantially reduce the production of exotoxins by Gram positive bacteria.



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(54) Title: INHIBITION OF EXOPROTEINS USING ISOPRENOIDS

(57) Abstract: Absorbent articles, such as catamenial tampons, are disclosed. The absorbent articles include an effective amount of an isoprenoid inhibitory compound to substantially inhibit the production of exotoxins by Gram positive bacteria. The isoprenoid inhibitory compounds of the present invention include terpenes and terpenoids which substantially reduce the production of exotoxins by Gram positive bacteria.



WO 03/028777 A1

INHIBITION OF EXOPROTEINS USING ISOPRENOIDS

BACKGROUND OF THE INVENTION

5 The present invention relates to the inhibition of exoprotein production in association with an absorbent article such as a catamenial tampon. More particularly, the present invention relates to the incorporation of certain isoprenoid compounds into absorbent articles and non-absorbent articles and the effects of these compounds on Gram positive bacteria.

10 Disposable absorbent devices, such as catamenial tampons, for the absorption of human exudates are widely used. These disposable devices typically have a compressed mass of absorbent formed into the desired shape, which is typically dictated by the intended consumer use. In the area of a menstrual tampon, the device is intended to be inserted in a body cavity for absorption of the body fluids generally
15 discharged during a woman's menstrual period.

 There exists in the female body a complex process which maintains the vagina and physiologically related areas in a healthy state. In a female between the age of menarche and menopause, the normal vagina provides an ecosystem for a variety of microorganisms. Bacteria are the predominant type of microorganism present in the
20 vagina; most women harbor about 10^9 bacteria per gram of vaginal fluid. The bacterial flora of the vagina is comprised of both aerobic and anaerobic bacteria. The more commonly isolated bacteria are *Lactobacillus* species, *Corynebacteria*, *Gardnerella vaginalis*, *Staphylococcus* species, *Peptococcus* species, aerobic and anaerobic *Streptococcus* species, and *Bacteroides* species. Other microorganisms
25 that have been isolated from the vagina on occasion include yeast (*Candida albicans*), protozoa (*Trichomonas vaginalis*), mycoplasma (*Mycoplasma hominis*), chlamydia (*Chlamydia trachomatis*), and viruses (*Herpes simplex*). These latter organisms are generally associated with vaginitis or venereal disease, although they may be present in low numbers without causing symptoms.

30 Physiological, social, and idiosyncratic factors effect the quantity and species of bacteria present in the vagina. Physiological factors include age, day of the menstrual cycle, and pregnancy. For example, vaginal flora present in the vagina throughout the

menstrual cycle can include lactobacilli, corynebacterium, ureaplasma, and mycoplasma. Social and idiosyncratic factors include method of birth control, sexual practices, systemic disease (e.g., diabetes), and medications.

5 Bacterial proteins and metabolic products produced in the vagina can effect other microorganisms and the human host. For example, the vagina between menstrual periods is mildly acidic having a pH ranging from about 3.8 to about 4.5. This pH range is generally considered the most favorable condition for the maintenance of normal flora. At that pH, the vagina normally harbors the numerous species of microorganisms in a balanced ecology, playing a beneficial role in providing
10 protection and resistance to infection and makes the vagina inhospitable to some species of bacteria such as *Staphylococcus aureus* (*S. aureus*). The low pH is a consequence of the growth of lactobacilli and their production of acidic products. Microorganisms in the vagina can also produce antimicrobial compounds such as hydrogen peroxide and bactericides directed at other bacterial species. One example
15 is the lactocins, bacteriocin-like products of lactobacilli directed against other species of lactobacilli.

Some microbial products produced in the vagina may negatively affect the human host. For example, *S. aureus* can produce and excrete into its environment a variety of exoproteins including enterotoxins, Toxic Shock Syndrome Toxin-1 (TSST-
20 1), and enzymes such as proteases and lipase. When absorbed into the bloodstream of the host, TSST-1 may produce Toxic Shock Syndrome (TSS) in non-immune humans.

S. aureus is found in the vagina of approximately 16% of healthy women of menstrual age. Approximately 25% of the *S. aureus* isolated from the vagina are
25 found to produce TSST-1. TSST-1 and some of the staphylococcal enterotoxins have been identified as causing TSS in humans.

Symptoms of Toxic Shock Syndrome generally include fever, diarrhea, vomiting and a rash followed by a rapid drop in blood pressure. Multiple organ failure occurs in approximately 6% of those who contract the disease. *S. aureus* does not
30 initiate Toxic Shock Syndrome as a result of the invasion of the microorganism into the vaginal cavity. Instead as *S. aureus* grows and multiplies, it can produce TSST-1.

Only after entering the bloodstream does TSST-1 toxin act systemically and produce the symptoms attributed to Toxic Shock Syndrome.

Menstrual fluid has a pH of about 7.3. During menses, the pH of the vagina moves toward neutral and can become slightly alkaline. This change permits
5 microorganisms whose growth is inhibited by an acidic environment the opportunity to proliferate. For example, *S. aureus* is more frequently isolated from vaginal swabs during menstruation than from swabs collected between menstrual periods.

When *S. aureus* is present in an area of the human body that harbors a normal microbial population such as the vagina, it may be difficult to eradicate the *S. aureus*
10 bacterium without harming members of the normal microbial flora required for a healthy vagina. Typically, antibiotics that kill *S. aureus* are not an option for use in catamenial products because of their effect on the normal vaginal microbial flora and their propensity to stimulate toxin production if all of the *S. aureus* are not killed. An alternative to eradication is technology designed to prevent or substantially reduce the
15 bacterium's ability to produce toxins.

There have been numerous attempts to reduce or eliminate pathogenic microorganisms and menstrually occurring Toxic Shock Syndrome by incorporating into a tampon pledget one or more biostatic, biocidal, and/or detoxifying compounds. For example, L-ascorbic acid has been applied to a menstrual tampon to detoxify toxin
20 found in the vagina. Others have incorporated monoesters and diesters of polyhydric aliphatic alcohols, such as glycerol monolaurate, as biocidal compounds (see, e.g., U.S. Patent No. 5,679,369). Still others have introduced other non-ionic surfactants, such as alkyl ethers, alkyl amines, and alkyl amides as detoxifying compounds (see, e.g., U.S. Patent Nos. 5,685,872, 5,618,554, and 5,612,045).

25 Despite the aforementioned art, there continues to be a need for compounds and methods that will effectively inhibit the production of exoproteins, such as TSST-1, from Gram positive bacteria, maintain activity even in the presence of the enzymes lipase and esterase which can have adverse effects on potency and which may also be present in the vagina. Further, it is desirable that the detoxifying compounds useful
30 in the inhibition of the production of exoproteins be substantially non-harmful to the natural flora found in the vaginal area. It is also desirable that the inhibitory

compounds be coated or otherwise introduced onto absorbent articles or non-absorbent substrates prior to use.

SUMMARY OF THE INVENTION

5 The present invention is based on the discovery that when one or more isoprenoid compounds, such as a terpene compound or terpenoid compound, are incorporated onto a non-absorbent substrate or into an absorbent article, such as a catamenial tampon, the production of exoprotein in Gram positive bacterium is substantially inhibited.

10 The present invention relates to non-absorbent substrates or articles for use in inhibiting the production of exoproteins from Gram-positive bacteria. The substrates are particularly useful for inhibiting the production of TSST-1 from *S. aureus* bacteria in the vaginal area. Examples of suitable non-absorbent substrates which may have the isoprenoid compounds of the present invention incorporated thereon include non-
15 absorbent incontinence devices, barrier birth control devices, douches, contraceptive sponges, and tampon applicators. One specific example of a non-absorbent incontinence device is a female barrier incontinence device, such as an incontinence pledget formed from a resilient material like rubber. Another suitable non-absorbent substrate is the applicator used with a tampon. For example, the tampon applicator
20 may have the isoprenoid compound coated on an outer surface, such that when the applicator is used to introduce a tampon into a women's vagina the isoprenoid compound (typically in the form of a cream, wax, gel or other suitable form) is transferred from the applicator onto the wall of the vagina.

 It is a general object of the present invention to provide a non-absorbent article
25 which inhibits the production of exoprotein from Gram positive bacterium. A more specific object of the present invention is to provide a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, tampon applicator, or a douche incorporating one or more isoprenoid compounds which act to substantially inhibit the production of TSST-1, alpha hemolysin and Enterotoxin B by *S. aureus*.

30 Another object of the present invention is to provide a non-absorbent substrate incorporating one or more isoprenoid compounds in combination with one or more other inhibitory ingredients such as, but not limited to, for example, laureth-4, PPG-5

lauryl ether, 1-0-dodecyl-rac-glycerol, disodium laureth sulfosuccinate, glycerol monolaurate, alkylpolyglycosides, polyethylene oxide (2) sorbital ether or myreth-3-myristate which in combination act to substantially inhibit the production of TSST-1, alpha hemolysis, and Enterotoxin B by *S. aureus*.

5 A further object of the present invention is to provide a non-absorbent substrate that has incorporated therewith one or more compounds that will inhibit the production of exoproteins from Gram positive bacterium without significantly imbalancing the natural flora present in the vaginal tract.

It is also a general object of the present invention to provide an absorbent
10 article which inhibits the production of exoprotein from Gram positive bacterium. A more specific object of the present invention is to provide a catamenial tampon incorporating one or more isoprenoid compounds which act to substantially inhibit the production of TSST-1 and Enterotoxin B by *S. aureus*.

Another object of the present invention is to provide a catamenial tampon
15 incorporating one or more isoprenoid compounds in combination with one or more other inhibitory ingredients such as, but not limited to, for example, laureth-4, PPG-5 lauryl ether, 1-0-dodecyl-rac-glycerol, disodium laureth sulfosuccinate, glycerol monolaurate, alkylpolyglycosides, polyethylene oxide (2) sorbital ether or myreth-3-myristate which in combination act to substantially inhibit the production of TSST-1,
20 alpha hemolysin, and Enterotoxin B by *S. aureus*.

A further object of the present invention is to provide a catamenial tampon that has incorporated therewith one or more isoprenoid compounds that will inhibit the production of exoproteins from Gram positive bacterium without significantly imbalancing the natural flora present in the vaginal tract.

25 It is another general object of the present invention to provide a composition for use in inhibiting the production of exoproteins from Gram positive bacteria. The compositions of the present invention are particularly useful for inhibiting the production of TSST-1, Enterotoxin B and alpha hemolysin from *S. aureus* bacteria. The compositions, which comprise one or more isoprenoid compounds as described
30 herein and a pharmaceutically acceptable carrier, can be prepared and applied to a substrate or product in a variety of suitable forms, including without limitation, aqueous solutions, lotions, balms, gels, salves, ointments, boluses, suppositories, and the like.

In one embodiment, the active isoprenoid compound of the composition can be formulated into a variety of vaginal cleaning formulations, such as those employed in current commercial douche formulations, or in higher viscosity douches.

Another object of the present invention is to provide methods for using the isoprenoid containing compositions of the present invention. The methods as described herein comprise exposing Gram positive bacteria to an effective amount of an isoprenoid containing composition such that the Gram positive bacteria is substantially inhibited from producing exoproteins.

Other objects and advantages of the present invention, and modifications thereof, will become apparent to persons skilled in the art without departure from the inventive concepts defined in the claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the present invention, it has been discovered that isoprenoid compounds as described herein can be used in combination with a non-absorbent substrate or with an absorbent article, such as a catamenial tampon, to substantially inhibit the production of exoproteins, such as TSST-1, from Gram positive bacteria without substantially imbalancing the natural flora present in the vaginal tract. It has also been discovered that the isoprenoid compounds can also be used in combination with other surface-active agents such as, for example, compounds with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol, polyalkoxylated sulfate salt, or polyalkoxylated sulfosuccinic salt, to substantially inhibit the production of exoproteins such as TSST-1 from Gram positive bacteria without substantially imbalancing the natural flora present in the vaginal tract.

This invention will be partly described herein in detail in connection with a catamenial tampon, but will be understood by persons skilled in the art to be applicable to other disposable absorbent articles such as sanitary napkins, panty liners, adult incontinence garments, diapers, medical bandages and tampons such as those intended for medical, dental, surgical, and/or nasal use wherein the inhibition of exoproteins from Gram positive bacteria would be beneficial. As used herein, the phrase "absorbent article" generally refers to devices which absorb and contain body

fluids, and more specifically, refers to devices which are placed against or near the skin to absorb and contain the various fluids discharged from the body. The term "disposable" is used herein to describe absorbent articles that are not intended to be laundered or otherwise restored or reused as an absorbent article after a single use.

- 5 Examples of such disposable absorbent articles include, but are not limited to, health care related products including bandages and tampons such as those intended for medical, dental, surgical and/or nasal use; personal care absorbent products such as feminine hygiene products (e.g., sanitary napkins, panty liners, and catamenial tampons), diapers, training pants, incontinent products and the like, wherein the
10 inhibition of the production of exoproteins from Gram positive bacteria would be beneficial.

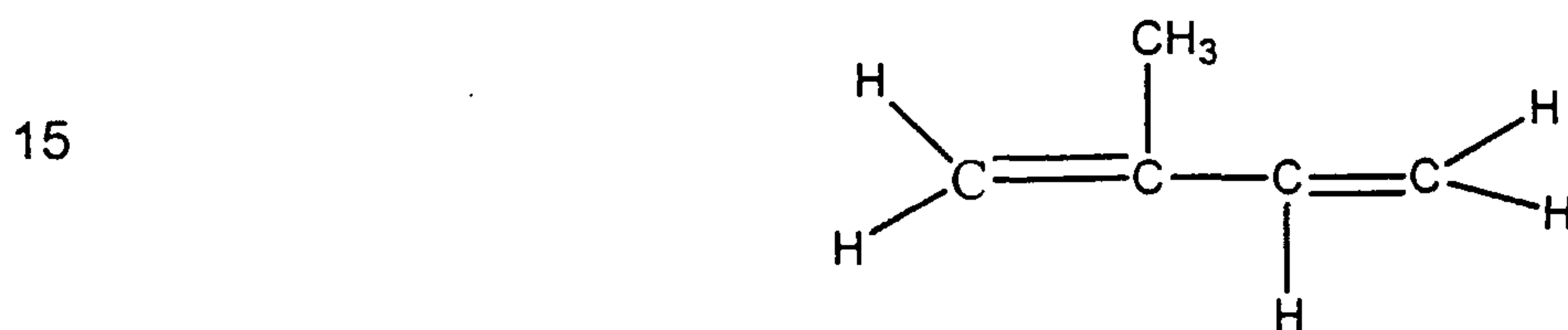
This invention will also be described herein in detail in connection with various non-absorbent substrates or products such as non-absorbent incontinence devices, barrier birth control devices, contraceptive sponges, tampon applicators, and douches,
15 but will be understood by persons skilled in the art to be applicable to other non-absorbent articles, devices and/or products as well wherein the inhibition of exoproteins from Gram positive bacteria would be beneficial. As used herein, the phrase "non-absorbent article" generally refers to substrates or devices which include an outer layer formed from a substantially hydrophobic material which repels fluids
20 such as urine, menses, blood products and the like. Suitable materials for construction of the non-absorbent articles of the present invention include, for example, rubber, plastic, and cardboard.

Catamenial tampons suitable for use with the present invention are typically made of absorbent fibers, including natural and synthetic fibers, compressed into a
25 unitary body of a size which may easily be inserted into the vaginal cavity. Suitable fibers include, for example, cellulosic fibers such as cotton and rayon. Fibers may be 100% cotton, 100% rayon, a blend of cotton and rayon, or other materials known to be suitable for tampon use.

Catamenial tampons are typically made in an elongated cylindrical form in
30 order that they may have a sufficiently large body of material to provide the required absorbing capacity, but may be made in a variety of shapes. The tampon may or may not be compressed, although compressed types are now generally preferred. The

tampon may be made of various fiber blends including both absorbent and nonabsorbent fibers, which may or may not have a suitable cover or wrapper. Suitable methods and materials for the production of tampons are well known to those skilled in the art.

- 5 It has been discovered that certain isoprenoid compounds can substantially inhibit the production of exoprotein by Gram positive bacterium and, specifically, the production of TSST-1, alpha hemolysin, and Enterotoxin B from *S. aureus* bacterium. As used herein, the term "isoprenoid compound" means a hydrocarbon containing compound structurally based on multiple isoprene units which may or may not be substituted and may or may not contain hetero atoms and functional groups such as
- 10 carbonyls, ketones, aldehydes, and alcohols. Isoprene, also commonly referred to as 2-methyl-1,3-butadiene, has the following chemical structure:



- Desirably, the isoprenoid compounds used in the accordance with the present invention are terpenes. As used herein, "terpene compound" refers to compounds which are based on isoprene, but which may contain heteroatoms such as oxygen and/or alcohols, aldehydes, ketones and/or carbonyls.
- 20

- Various types and kinds of terpenes are useful in accordance with the present invention. Suitable terpenes include hemiterpenes (terpenes containing 5 carbon atoms), monoterpenes (terpenes containing 10 carbon atoms), sesquiterpenes (terpenes containing 15 carbon atoms), diterpenes (terpenes containing 20 carbon atoms), triterpenes (terpenes containing 30 carbon atoms), tetraterpenes (terpenes containing 40 carbon atoms), as well as polyterpenes and mixtures and combinations thereof. Terpenoids, oxygenated derivatives of terpenes which may or may not
- 25
- 30 contain hydroxyl and/or carbonyl groups, are also useful in the present invention and can be used in combination with the terpenes described above.

The terpenes, terpenoids and derivatives described herein and useful in the present invention, may be cyclic or acyclic, and may be saturated or unsaturated. Examples of monoterpenes useful in the present invention include, for example, α -pinen, β -pinen, campher, geraniol, borneol, nerol, thujone, citral a, limonen, cineole, 5 terpeneol, terpinene, terpin (cis and trans), α -myrcene, β -myrcene, dipentene, linalool, 2-methyl-6-methylene-1,7-octadiene, and menthol. Examples of sesquiterpenes useful in the present invention include, for example, humulene, ionone, nerolidol and farnesol. An example of a suitable diterpene is phytol. A suitable triterpene for use in the present invention is squalen. Suitable tetraterpenes for use in the present 10 invention include α -carotene, β -carotene, γ carotene, δ -carotene, lutein, and violaxanthin.

Preferred isoprenoid compounds of the present invention include terpeneol, β -ionone, terpin (cis and trans), linalool, geraniol, and menthol, and mixtures and combinations thereof.

15 In accordance with the present invention, the absorbent article or non-absorbent substrate or article including the isoprenoid compound contains an effective amount of the inhibiting isoprenoid compound to substantially inhibit the formation of TSST-1 when the absorbent article or non-absorbent substrate is exposed to *S. aureus* bacteria. Several methods are known in the art for testing the effectiveness of 20 potential inhibitory agents on the inhibition of the production of TSST-1 by *S. aureus*. One such preferred method is set forth in Example 1 shown below. When tested in accordance with the testing methodology set forth herein, preferably, the inhibiting isoprenoid compounds reduce the formation of TSST-1 when the absorbent article or non-absorbent substrate is exposed to *S. aureus* by at least about 40%, more 25 preferably by at least about 50%, still more preferably by at least about 60%, still more preferably by at least about 70%, still more preferably by at least about 80%, still more preferably by at least about 90%, and still more preferably by at least about 95%.

Effective amounts of isoprenoid compound that significantly reduce the production of TSST-1 have been found to be at least about 0.1 micromoles of the 30 isoprenoid compound per gram of the absorbent product or non-absorbent substrate. Preferably, the isoprenoid compound ranges from about 0.5 micromoles per gram of absorbent or non-absorbent substrate to about 100 micromoles per gram of absorbent

or non-absorbent substrate and more preferably from about 1 micromole per gram of absorbent or non-absorbent substrate to about 50 micromoles per gram of absorbent or non-absorbent substrate. Although "isoprenoid compound" is used in the singular, one skilled in the art would understand that it includes the plural, and that various
5 isoprenoid compounds within the scope of this invention may be used in combination.

The isoprenoid compounds of the present invention can be prepared and applied in any suitable form, but are preferably prepared in forms including, without limitation, aqueous solutions, lotions, balms, gels, salves, ointments, boluses, liposomes, suppositories, and the like. One skilled in the art would recognize that
10 other forms may perform equally well.

The isoprenoid compounds may be applied to the absorbent article or non-absorbent substrate using conventional methods for applying an inhibitory agent to the desired absorbent article or non-absorbent substrate. For example, unitary tampons without separate wrappers or various non-absorbent substrates may be dipped
15 directly into a liquid bath having the inhibitory compound and then can be air dried, if necessary, to remove any volatile solvents. For compressed tampons, impregnating any of its elements is best done before compressing. The isoprenoid compounds when incorporated on and/or into the tampon materials may be fugitive, loosely adhered, bound, or any combination thereof. As used herein, the term "fugitive"
20 means that the composition is capable of migrating through the tampon materials. Alternatively, the absorbent or non-absorbent articles can be sprayed or otherwise coated with the inhibitory isoprenoid compounds.

It is not necessary to impregnate the entire absorbent body of the tampon with the inhibitory isoprenoid compound. Optimum results both economically and
25 functionally can be obtained by concentrating the material on or near the outer surface where it may be most effective during use.

In another embodiment, an isoprenoid-containing composition may be applied directly onto an individual layer of material before it is incorporated into an article to be manufactured, such as an absorbent product. For example, an aqueous solution
30 containing the isoprenoid compound can be sponged or blotted or otherwise applied onto the surface of a porous cover sheet or absorbent layer designed to be incorporated into an absorbent product. This can be done either during the production

of the individual layer or during a fabrication process which incorporates the layer into the article being manufactured. Nonwoven webs coated with the isoprenoid-containing compositions of the present invention can be prepared by conventional processes. For example, the isoprenoid composition can be applied to one or both
5 sides of a traveling web. It will be appreciated by those skilled in the art that the application can be carried out as an inline treatment or as a separate, offline step.

The substantially inhibitory isoprenoid compounds may additionally employ one or more conventional pharmaceutically-acceptable and compatible carrier materials useful for the desired application. The carrier can be capable of co-dissolving or
10 suspending the materials used in the absorbent article or on the non-absorbent substrate. Carrier materials suitable for use in the instant invention include those well-known for use in the cosmetic and medical arts as a basis for ointments, lotions, creams, salves, aerosols, suppositories, gels, and the like. For example, the isoprenoid compound can be formulated into a variety of formulations such as those
15 employed in current commercial douche formulations, or in higher viscosity douches.

Where the isoprenoid compound is formulated as a composition which includes a pharmaceutically acceptable carrier, the composition typically contains at least about 0.01 % (weight/volume) and desirably at least about 0.04% (weight/volume) isoprenoid compound (based on the total volume of the composition). Typically, the
20 composition will contain no more than about 0.3%(weight/volume) of isoprenoid compound. Particularly suitable formulations for use in vaginal cleansing applications can contain at least about 0.25 millimoles/liter, and desirably no more than about 10 millimoles/liter. Desirably, vaginal cleansing formulations contain from about 0.5 millimoles/liter to about 8 millimoles/liter of isoprenoid compound or from about 1
25 millimoles/liter to about 5 millimoles/liter of isoprenoid compound. One skilled in the art will recognize that the concentration will vary within this range depending on the compound selected and the other components of the formulation.

The isoprenoid compositions of the present invention may contain other additives as appropriate for a desired result so long as the additives do not have a
30 substantially antagonistic effect on the activity of the isoprenoid compounds. Examples of such additives include conventional surfactants such as ethoxylated

hydrocarbons or surfactants, or co-wetting aids such as low molecular weight alcohols.

The isoprenoid compounds of the present invention may additionally employ adjunct components conventionally found in pharmaceutical compositions in their art-established fashion and at their art-established levels. For example, the compositions
5 may contain additional compatible pharmaceutically active materials for combination therapy, such as supplementary antimicrobial, antioxidants, anti-parasitic agents, antipruritics, astringents, local anaesthetics, or anti-inflammatory agents.

In another embodiment of the present invention, the inhibitory isoprenoid
10 compounds described above can be used in combination with one or more surface active agents to reduce the production of TSST-1 without significantly eliminating the beneficial bacterial flora. The surface active agents can include, for example, compounds with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol, polyalkoxylated sulfate salt, or polyalkoxylated
15 sulfosuccinic salt.

In one embodiment, the inhibitory isoprenoid compounds described herein can be used in combination with ether compounds having the general formula:



20 wherein R¹⁰ is a straight or branched alkyl or alkenyl group having a chain of from about 8 to about 18 carbon atoms and R¹¹ is selected from an alcohol, a polyalkoxylated sulfate salt or a polyalkoxylated sulfosuccinate salt.

The alkyl, or the R¹⁰ moiety of the ether compounds useful for use in combination with the inhibitory aromatic compounds described herein, can be
25 obtained from saturated and unsaturated fatty acid compounds. Suitable compounds include, C₈-C₁₈ fatty acids, and preferably, fatty acids include, without limitation, caprylic, capric, lauric, myristic, palmitic and stearic acid whose carbon chain lengths are 8, 10, 12, 14, 16, and 18, respectively. Highly preferred materials include capric, lauric, and myristic acids.

30 Preferred unsaturated fatty acids are those having one or two cis-type double bonds and mixtures of these materials. Suitable materials include myristoleic, palmitoleic, linolenic and mixtures thereof.

Desirably, the R¹¹ moiety is an aliphatic alcohol which can be ethoxylated or propoxylated for use in the ether compositions in combination with the inhibitory aromatic compounds described herein. Suitable aliphatic alcohols include glycerol, sucrose, glucose, sorbitol and sorbitan. Preferred ethoxylated and propoxylated
5 alcohols include glycols such as ethylene glycol, propylene glycol, polyethylene glycol and polypropylene glycol.

The aliphatic alcohols can be ethoxylated or propoxylated by conventional ethoxylating or propoxylating compounds and techniques. The compounds are preferably selected from the group consisting of ethylene oxide, propylene oxide, and
10 mixtures thereof, and similar ringed compounds which provide a material which is effective.

The R¹¹ moiety can further include polyalkoxylated sulfate and polyalkoxylated sulfosuccinate salts. The salts can have one or more cations. Preferably, the cations are sodium, potassium or both.

15 Preferred ether compounds for use in combination with the inhibitory isoprenoid compounds described herein include laureth-3, laureth-4, laureth-5, PPG-5 lauryl ether, 1-O-dodecyl-rac-glycerol, sodium laureth sulfate, potassium laureth sulfate, disodium laureth (3) sulfosuccinate, dipotassium laureth (3) sulfosuccinate, and polyethylene oxide (2) sorbitol ether.

20 In accordance with the present invention, the absorbent article or non-absorbent substrate contains an effective amount of the combination of the inhibitory isoprenoid and ether compounds. The amount of ether compound included in the absorbent article or non-absorbent substrate is at least about 0.0001 millimoles of ether compound per gram of absorbent article or non-absorbent substrate, and
25 preferably at least about 0.005 millimoles of ether compound per gram of absorbent article or non-absorbent substrate. In a preferred embodiment, the absorbent article or non-absorbent substrate contains from about 0.005 millimoles of ether compound per gram of absorbent article or non-absorbent substrate to about 2 millimoles of ether compound per gram of absorbent article or non-absorbent substrate.

30 The absorbent articles of the present invention containing a combination of two active ingredients can be a variety of absorbent articles including, for example, catamenial tampons, sanitary napkins, panty liners, incontinent undergarments,

diapers, wound dressings, dental tampons, medical tampons, surgical tampons, nasal tampons and the like.

The non-absorbent articles of the present invention containing a combination of two active ingredients can be a variety of non-absorbent articles including, for
5 example, incontinence devices, barrier birth control devices, contraceptive sponges, douches, tampon applicators, and the like.

The absorbent articles or non-absorbent substrates of the present invention containing a first inhibitory isoprenoid compound and a second inhibitory ether compound contain a sufficient amount of both inhibitory compounds to substantially
10 inhibit the formation of TSST-1 when the absorbent article or non-absorbent substrate is exposed to *S. aureus* bacteria. Preferably, the combination of inhibitory compounds reduces the formation of TSST-1 when the absorbent article or non-absorbent substrate is exposed to *S. aureus* by at least about 40%, more preferably at least about 50%, still more preferably at least about 60%, still more preferably by at least
15 about 70%, still more preferably by at least about 80%, still more preferably by at least about 90%, and still more preferably by at least about 95%.

The absorbent articles or non-absorbent substrates of the present invention containing the combination of isoprenoid inhibitory compounds and ether inhibitory compounds may additionally employ adjunct components conventionally found in
20 pharmaceutical compositions in their art-established fashion and at their art-established levels. For example, the compositions may contain additional compatible pharmaceutically active materials for combination therapy, such as supplementary antimicrobial, antioxidants, anti-parasitic agents, antipruritics, astringents, local anaesthetics, or anti-inflammatory agents.

25 Typically, the absorbent article or non-absorbent substrate will contain a molar ratio of inhibitory isoprenoid compound to ether compound of from about 1:0.1 to about 1:20.

In another embodiment, the inhibitory isoprenoid compounds described herein can be used in combination with an alkyl polyglycoside compound. Suitable alkyl
30 polyglycosides for use in combination with the inhibitory isoprenoid compounds include alkyl polyglycosides having the general formula:



wherein Z is a saccharide residue having 5 or 6 carbon atoms, n is a whole number
5 from 1 to 6, and R¹⁴ is a linear or branched alkyl group having from about 8 to about
18 carbon atoms. Commercially available examples of suitable alkyl polyglycosides
having differing carbon chain lengths include Glucopon 220, 225, 425, 600, and 625,
all available from Henkel Corporation (Ambler, Pennsylvania). These products are all
10 mixtures of alkyl mono- and oligoglucopyranosides with differing alkyl group chain
lengths based on fatty alcohols derived from coconut and/or palm kernel oil.
Glucopon 220, 225, and 425 are examples of particularly suitable alkyl polyglycosides
for use in combination with the inhibitory aromatic compounds of the present
invention. Another example of a suitable commercially available alkyl polyglycoside is
15 TL 2141, a Glucopon 220 analog available from ICI Surfactants (Wilmington,
Delaware).

It should be understood that as referred to herein, an alkylpolyglycoside may
consist of a single type of alkyl polyglycoside molecule or, as is typically the case, may
include a mixture of different alkyl polyglycoside molecules. The different alkyl
polyglycoside molecules may be isomeric and/or may be alkyl polyglycoside
20 molecules with differing alkyl group and/or saccharide portions. By use of the term
alkyl polyglycoside isomers reference is made to alkyl polyglycosides which, although
including the same alkyl ether residues, may vary with respect to the location of the
alkyl ether residue in the alkyl polyglycoside as well as isomers which differ with
respect to the orientation of the functional groups about one or more chiral centers in
25 the molecules. For example, an alkyl polyglycoside can include a mixture of molecules
with saccharide portions which are mono, di-, or oligosaccharides derived from more
than one 6 carbon saccharide residue and where the mono-, di- or oligosaccharide
has been etherified by reaction with a mixture of fatty alcohols of varying carbon chain
length. The present alkyl polyglycosides desirably include alkyl groups where the
30 average number of carbon atoms in the alkyl chain is about 8 to about 12. One
example of a suitable alkyl polyglycoside is a mixture of alkyl polyglycoside molecules
with alkyl chains having from about 8 to about 10 carbon atoms.

The alkyl polyglycosides employed in the absorbent articles in combination with the inhibiting isoprenoid compounds can be characterized in terms of their hydrophilic lipophilic balance (HLB). This can be calculated based on their chemical structure using techniques well known to those skilled in the art. The HLB of the alkyl polyglycosides used in the present invention typically falls within the range of about 10 to about 15. Desirably, the present alkyl polyglycosides have an HLB of at least about 12 and, more desirably, about 12 to about 14.

In accordance with the present invention, the absorbent article or non-absorbent substrate contains an effective amount of the combination of the inhibitory isoprenoid and alkyl polyglycoside compounds. The amount of alkyl polyglycoside compound included in the absorbent article or non-absorbent substrate is at least about 0.0001 millimoles of alkyl polyglycoside per gram of absorbent article or non-absorbent substrate, and preferably at least about 0.005 millimoles of alkyl polyglycoside per gram of absorbent article or non-absorbent substrate. In a preferred embodiment, the absorbent article or non-absorbent substrate contains from about 0.005 millimoles per gram of absorbent article to about 2 millimoles per gram of absorbent article or non-absorbent substrate.

The absorbent articles of the present invention containing a combination of inhibitory or active ingredients such as isoprenoid inhibitory compounds and alkyl polyglycoside inhibitory compounds can be a variety of absorbent articles including, for example, catamenial tampons, sanitary napkins, panty liners, incontinent undergarments, diapers, wound dressings, dental tampons, medical tampons, surgical tampons, nasal tampons and the like.

The non-absorbent articles of the present invention containing a combination of inhibitory or active ingredients such as isoprenoid inhibitory compounds and alkyl polyglycoside inhibitory compounds can be a variety of non-absorbent articles including, for example, incontinence devices, barrier birth control devices, contraceptive sponges, douches, tampon applicators, and the like.

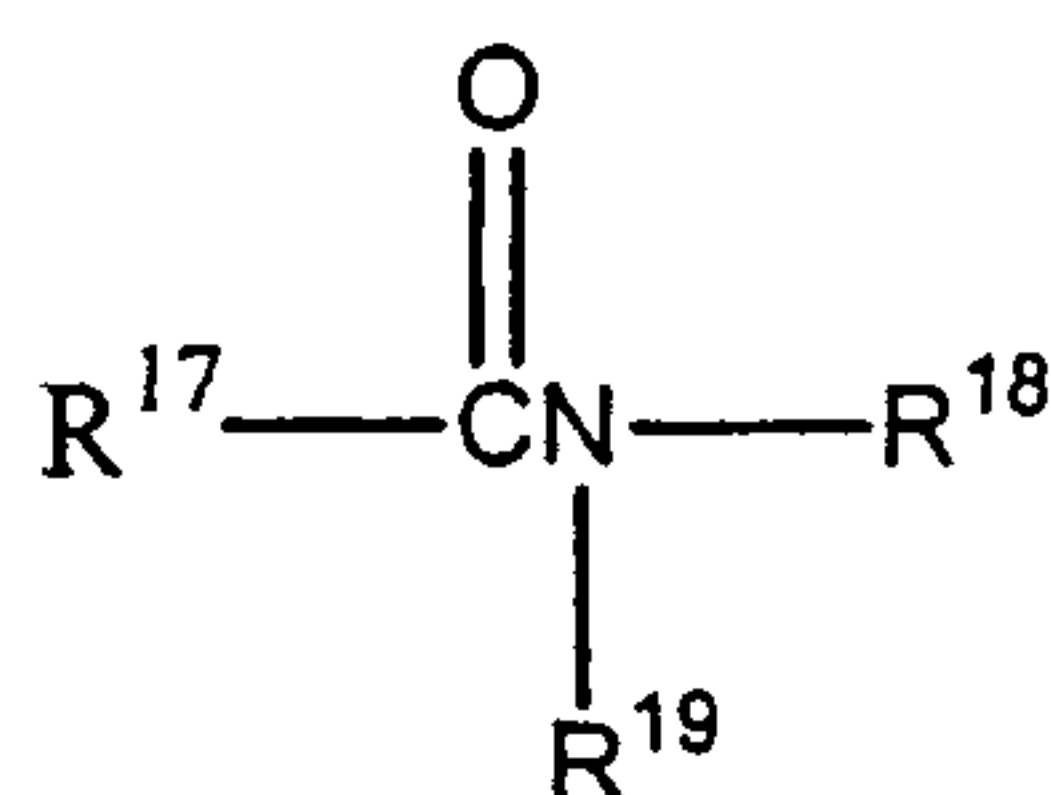
The absorbent articles or non-absorbent substrates of the present invention containing a first inhibitory isoprenoid compound and a second inhibitory alkyl polyglycoside compound contain a sufficient amount of both inhibitory compounds to substantially inhibit the formation of TSST-1 when the absorbent article or non-

absorbent substrate is exposed to *S. aureus* bacteria. Preferably, the combination of inhibitory compounds reduces the formation of TSST-1 when the absorbent article or non-absorbent substrate is exposed to *S. aureus* by at least about 40%, more preferably at least about 50%, still more preferably at least about 60%, still more preferably by at least about 70%, still more preferably by at least about 80%, still more preferably by at least about 90%, and still more preferably by at least about 95%.

The absorbent articles or non-absorbent substrates of the present invention containing the combination of isoprenoid inhibitory compounds and alkyl polyglycoside inhibitory compounds may additionally employ adjunct components conventionally found in pharmaceutical compositions in their art-established fashion and at their art-established levels. For example, the compositions may contain additional compatible pharmaceutically active materials for combination therapy, such as supplementary antimicrobial, antioxidants, anti-parasitic agents, antipruritics, astringents, local anaesthetics, or anti-inflammatory agents.

Typically, the absorbent article or non-absorbent substrates will contain a molar ratio of inhibitory isoprenoid compound to alkyl glycoside compound of from about 1:1 to about 1:0.05.

In another embodiment, the inhibitory isoprenoid compounds described herein can be used in combination with an amide containing compound having the general formula:



wherein R^{17} , inclusive of the carbonyl carbon, is an alkyl group having 8 to 18 carbon atoms, and R^{18} and R^{19} are independently selected from hydrogen or an alkyl group having from 1 to about 12 carbon atoms which may or may not be substituted with groups selected from ester groups, ether groups, amine groups, hydroxyl groups, carboxyl groups, carboxyl salts, sulfonate groups, sulfonate salts, and mixtures thereof.

R^{17} can be derived from saturated and unsaturated fatty acid compounds. Suitable compounds include, C_8 - C_{18} fatty acids, and preferably, the fatty acids include, without limitation, caprylic, capric, lauric, myristic, palmitic and stearic acid whose carbon chain lengths are 8, 10, 12, 14, 16, and 18, respectively. Highly preferred materials include capric, lauric, and myristic.

Preferred unsaturated fatty acids are those having one or two cis-type double bonds and mixtures of these materials. Suitable materials include myristoleic, palmitoleic, linolenic and mixtures thereof.

The R^{18} and R^{19} moieties can be the same or different and each being selected from hydrogen and an alkyl group having a carbon chain having from 1 to about 12 carbon atoms. The R^{18} and R^{19} alkyl groups can be straight or branched and can be saturated or unsaturated. When R^{18} and/or R^{19} are an alkyl moiety having a carbon chain of at least 2 carbons, the alkyl group can include one or more substituent groups selected from ester, ether, amine, hydroxyl, carboxyl, carboxyl salts, sulfonate and sulfonate salts. The salts can have one or more cations selected from sodium, potassium or both.

Preferred amide compounds for use in combination with the inhibitory isoprenoid compounds described herein include sodium lauryl sarcosinate, lauramide monoethanolamide, lauramide diethanolamide, lauramidopropyl dimethylamine, disodium lauramido monoethanolamide sulfosuccinate and disodium lauroamphodiacetate.

In accordance with the present invention, the absorbent article or non-absorbent substrate contains an effective amount of the combination of the inhibitory isoprenoid and amide-containing compounds. The amount of amide-containing compound included in the absorbent article or non-absorbent substrate is at least about 0.0001 millimoles of nitrogen containing compound per gram of absorbent article or non-absorbent substrate, and preferably at least about 0.005 millimoles of nitrogen containing compound per gram of absorbent article or non-absorbent substrate. In a preferred embodiment, the absorbent article or non-absorbent substrate contains from about 0.005 millimoles per gram of absorbent article or non-absorbent substrate to about 2 millimoles per gram of absorbent article or non-absorbent substrate.

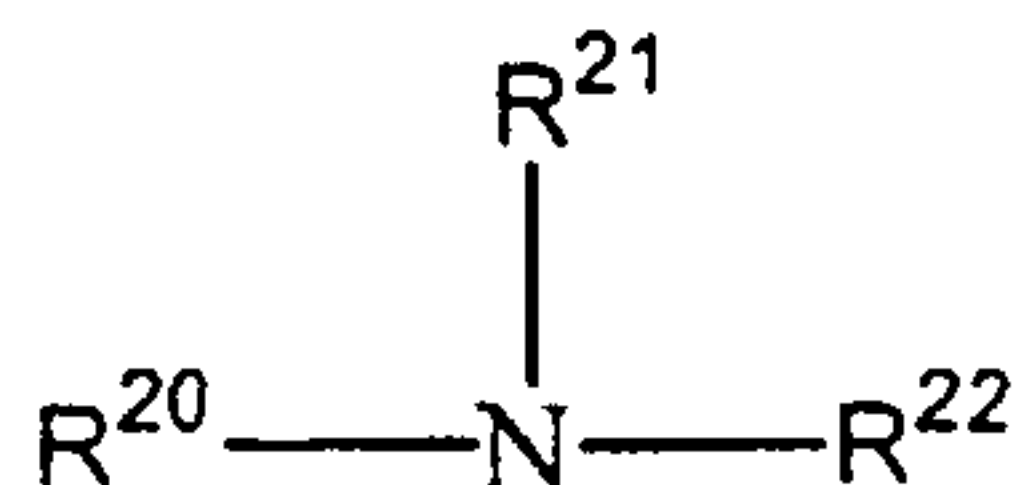
The absorbent articles or non-absorbent substrates of the present invention containing a combination of inhibitory or active ingredients such as isoprenoid inhibitory compounds and amide-containing inhibitory compounds can be a variety of absorbent articles including, for example, catamenial tampons, sanitary napkins, panty
5 liners, incontinent undergarments, diapers, wound dressings, dental tampons, medical tampons, surgical tampons, nasal tampons and the like.

The absorbent articles of the present invention containing a first inhibitory isoprenoid compound and a second inhibitory amide-containing compound contain a sufficient amount of both inhibitory compounds to substantially inhibit the formation of
10 TSST-1 when the absorbent article is exposed to *S. aureus* bacteria. Preferably, the combination of inhibitory compounds reduces the formation of TSST-1 when the absorbent article is exposed to *S. aureus* by at least about 40%, more preferably at least about 50%, still more preferably at least about 60%, still more preferably by at least about 70%, still more preferably by at least about 80%, still more preferably by at
15 least about 90%, and still more preferably by at least about 95%.

The absorbent articles of the present invention containing the combination of isoprenoid inhibitory compounds and amide-containing inhibitory compounds may additionally employ adjunct components conventionally found in pharmaceutical compositions in their art-established fashion and at their art-established levels. For
20 example, the compositions may contain additional compatible pharmaceutically active materials for combination therapy, such as supplementary antimicrobial, antioxidants, anti-parasitic agents, antipruritics, astringents, local anaesthetics, or anti-inflammatory agents.

Typically, the absorbent article will contain a molar ratio of inhibitory isoprenoid
25 compound to amide-containing compound of from about 1:2 to about 1:0.01.

In another embodiment, the inhibitory compounds described herein can be used in combination with amine compounds having the general formula:



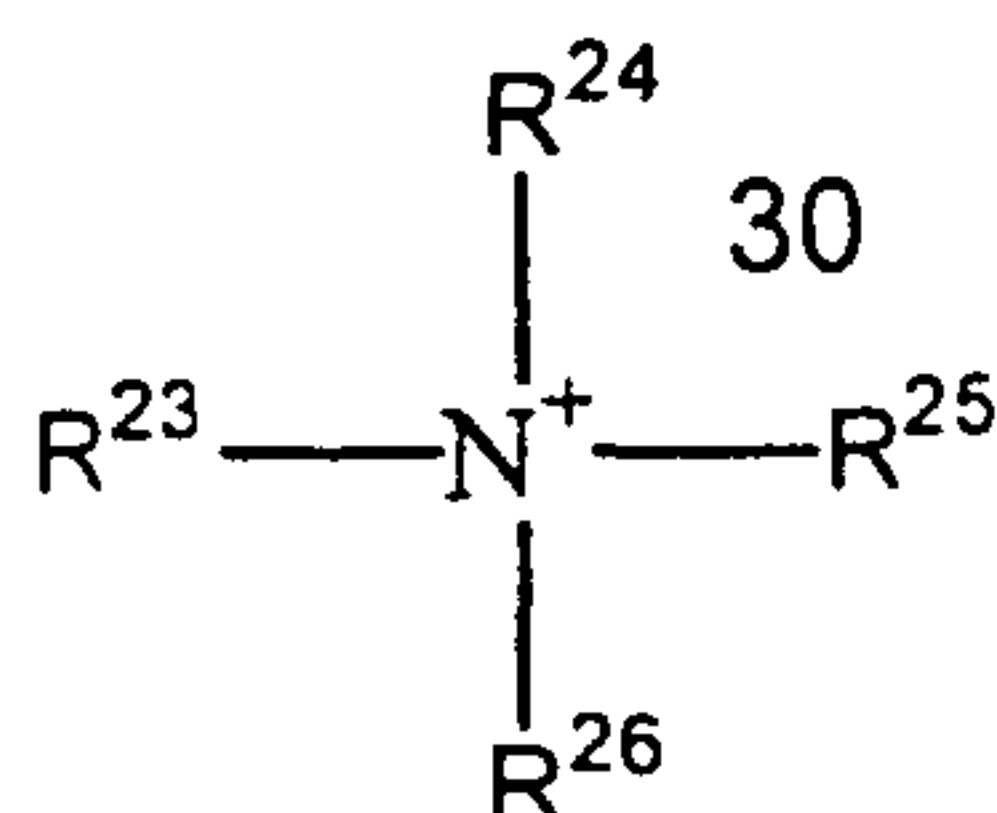
wherein R^{20} is an alkyl group having from about 8 to about 18 carbon atoms and R^{21} and R^{22} are independently selected from the group consisting of hydrogen and alkyl groups having from 1 to about 18 carbon atoms and which can have one or more
 5 substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts and imidazoline. The combination of aromatic compounds and amine compounds are effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

Desirably, R^{20} is derived from fatty acid compounds which include, without
 10 limitation, caprylic, capric, lauric, myristic, palmitic and stearic acid whose carbon chain lengths are 8, 10, 12, 14, 16, and 18, respectively. Highly preferred materials include capric, lauric, and myristic. Preferred unsaturated fatty acids are those having one or two cis-type double bonds and mixtures of these materials. Suitable materials include myristoleic, palmitoleic, linolenic, and mixtures thereof.

The R^{21} and R^{22} alkyl groups can further include one or more substitutional
 15 moieties selected from hydroxyl, carboxyl, carboxyl salts, and R^1 and R^2 can form an unsaturated heterocyclic ring that contains a nitrogen that connects via a double bond to the alpha carbon of the R^1 moiety to form a substituted imidazoline. The carboxyl salts can have one or more cations selected from sodium potassium or both. The R^{20} ,
 20 R^{21} , and R^{22} alkyl groups can be straight or branched and can be saturated or unsaturated.

Preferred amine compounds for use with the isoprenoid compounds described herein include triethanolamide laureth sulfate, lauramine, lauramino propionic acid, sodium lauriminodipropionic acid, lauryl hydroxyethyl imidazoline and mixtures
 25 thereof.

In another embodiment, the amine compound can be an amine salt having the general formula:



wherein R^{23} is an anionic moiety associated with the amine and is derived from an alkyl group having from about 8 to about 18 carbon atoms, and R^{24} , R^{25} , and R^{26} are independently selected from the group consisting of hydrogen and alkyl group having
5 from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts, and imidazoline. R^{24} , R^{25} , and R^{26} can be saturated or unsaturated. Desirably, R^{23} is a polyalkyloxylated alkyl sulfate. A preferred compound illustrative of an amine salt is triethanolamide laureth sulfate.

10 In accordance with the present invention, the absorbent article or non-absorbent substrate contains an effective amount of the combination of the inhibitory isoprenoid and amine and/or amine salt compounds. The amount of amine and/or amine salt compound included in the absorbent article or non-absorbent substrate is at least about 0.0001 millimoles of ether per gram of absorbent article or non-
15 absorbent substrate, and preferably at least about 0.005 millimoles of ether per gram of absorbent article or non-absorbent substrate. In a preferred embodiment, the absorbent article or non-absorbent substrate contains from about 0.005 millimoles per gram of absorbent article or non-absorbent substrate to about 2 millimoles per gram of absorbent article or non-absorbent substrate.

20 The absorbent articles of the present invention containing a combination of two active ingredients can be a variety of absorbent articles including, for example, catamenial tampons, sanitary napkins, panty liners, incontinent undergarments, diapers, wound dressings, dental tampons, medical tampons, surgical tampons, nasal tampons and the like.

25 The non-absorbent articles of the present invention containing a combination of inhibitory or active ingredients such as isoprenoid inhibitory compounds and amide-containing inhibitory compounds can be a variety of non-absorbent articles including, for example, incontinence devices, barrier birth control devices, contraceptive sponges, douches, tampon applicators, and the like.

30 The absorbent articles or non-absorbent substrates of the present invention containing a first inhibitory isoprenoid compound and a second inhibitory amine and/or amine salt compound contain a sufficient amount of both inhibitory compounds to

substantially inhibit the formation of TSST-1 when the absorbent article or non-absorbent substrate is exposed to *S. aureus* bacteria. Preferably, the combination of inhibitory compounds reduces the formation of TSST-1 when the absorbent article or non-absorbent substrate is exposed to *S. aureus* by at least about 40%, more
5 preferably at least about 50%, still more preferably at least about 60%, still more preferably by at least about 70%, still more preferably by at least about 80%, still more preferably by at least about 90%, and still more preferably by at least about 95%.

The absorbent articles or non-absorbent substrates of the present invention containing the combination of isoprenoid inhibitory compounds and amine and/or
10 amine salt inhibitory compounds may additionally employ adjunct components conventionally found in pharmaceutical compositions in their art-established fashion and at their art-established levels. For example, the compositions may contain additional compatible pharmaceutically active materials for combination therapy, such as supplementary antimicrobial, antioxidants, anti-parasitic agents, antipruritics,
15 astringents, local anaesthetics, or anti-inflammatory agents.

Typically, the absorbent article will contain a molar ratio of inhibitory isoprenoid compound to amine and/or amine salt compound of from about 1:2 to about 1:0.05. Typically, the non-absorbent articles or substrates will contain a molar ratio of inhibitory isoprenoid compound to amine and/or amine salt compound of from about
20 1:2 to about 1:0.01.

The present invention is illustrated by the following examples which are merely for the purpose of illustration and are not to be regarded as limiting the scope of the invention or manner in which it may be practiced.

25 EXAMPLE 1

In this Example, the effect of terpineol on the growth of *S. aureus* and the production of TSST-1 was determined. Terpineol, in the desired concentration (expressed in percent of terpineol) was placed in 10mL of a growth medium in a sterile, 50 mL conical polypropylene tube (Sarstedt, Inc. Newton North Carolina).

30 The growth medium was prepared by dissolving 37 grams of brain heart infusion broth (BHI) (Difco Laboratories, Cockeysville, Maryland) in 880 mL of distilled water and sterilizing the broth according to the manufacturer's instructions. The BHI

was supplemented with fetal bovine serum (FBS) (100mL) (Sigma Chemical Company, St. Louis, Missouri). Hexahydrate of magnesium chloride (0.021 M, 10mL) (Sigma Chemical Company, St. Louis, Missouri) was added to the BHI-FBS mixture. Finally, L-glutamine (0.027 M, 10mL) (Sigma Chemical Company, St. Louis, Missouri) was added to the mixture.

Terpineol was added directly to the growth medium and diluted in growth medium to obtain the desired final concentrations.

In preparation for inoculation of the tubes of growth medium containing the terpineol, an inoculating broth was prepared as follows: *S. aureus* (MN8) was streaked onto a tryptic soy agar plate (TSA; Difco Laboratories Cockeysville, Maryland) and incubated at 35°C. The test organism was obtained from Dr. Pat Schlievert, Department of Microbiology, University of Minnesota Medical School, Minneapolis Minnesota. After 24 hours of incubation three to five individual colonies were picked with a sterile inoculating loop and used to inoculate 10mL of growth medium. The tube of inoculated growth medium was incubated at 35°C in atmospheric air. After 24 hours of incubation, the culture was removed from the incubator and mixed well on a S/P brand vortex mixer. A second tube containing 10mL of the growth medium was inoculated with 0.5mL of the above-described 24 hour old culture and incubated at 35°C in atmospheric air. After 24 hours of incubation the culture was removed from the incubator and mixed well on a S/P brand vortex mixer. The optical density of the culture fluid was determined in a microplate reader (Bio-Tek Instruments, Model EL309, Winooski, Vermont). The amount of inoculum necessary to give 5×10^6 CFU/mL in 10 mL of growth medium was determined using a standard curve.

This Example included tubes of growth medium with varying concentrations of terpineol, tubes of growth medium without terpineol, (control) and tubes of growth medium with 20-400 microliters of methanol (control). Each tube was inoculated with the amount of inoculum determined as described above. The tubes were capped with foam plugs (Identi-plug plastic foam plugs, Jaece Industries purchased from VWR Scientific Products, South Plainfield, New Jersey). The tubes were incubated at 35°C in atmospheric air containing 5% by volume CO₂. After 24 hours of incubation the tubes were removed from the incubator and the optical density (600nm) of the culture

fluid was determined and the culture fluid was assayed for the number of colony forming units of *S. aureus* and was prepared for the analysis of TSST-1 as described below.

5 The number of colony forming units per mL after incubation was determined by standard plate count procedures. The culture fluid broth was centrifuged and the supernatant subsequently filter sterilized through an Autovial 5 syringeless filter, 0.2 micrometers pore size (Whatman, Inc., Clifton, New Jersey). The resulting fluid was frozen at -70°C until assayed.

10 The amount of TSST-1 per mL was determined by a non-competitive, sandwich enzyme-linked immunoabsorbent assay (ELISA). Samples of the culture fluid and the TSST-1 reference standard were assayed in triplicate. The method employed was as follows: four reagents, TSST-1 (#TT-606), rabbit polyclonal anti-TSST-1 IgG (LTI-101), rabbit polyclonal anti-TSST-1 IgF conjugated to horseradish peroxidase (LTC-101), and normal rabbit serum (NRS) certified anti-TSST-1 free (NRS-10) were
15 purchased from Toxin Technology (Sarasota, Florida). A 10 microgram/millimeter solution of the polyclonal rabbit anti-TSST-1IgG was prepared in phosphate buffered saline (PBS) (pH=7.4). The PBS was prepared from 0.016 molar NaH₂PO₄, 0.004 molar NaH₂PO₄-H₂O, 0.003 molar KCl and 0.137 molar NaCl, (Sigma Chemical Company, St. Louis, Missouri). One hundred microliters of the polyclonal rabbit anti-
20 TSST-1 IgG solution was pipetted into the inner wells of polystyrene microplates. The plates were covered and incubated at room temperature overnight. Unbound anti-toxin was removed by draining until dry. TSST-1 was diluted to 10 nanograms/milliliter in PBS with phosphate buffered saline (pH=7.4) containing 0.05% (vol/vol) Tween-20 (PBS-Tween) (Sigma Chemical Company, St. Louis, Missouri) and
25 1% NRS (vol/vol) and incubated at 4°C overnight. Test samples were combined with 1%NRS (vol/vol) and incubated at 4°C overnight. The plates were treated with 100 microliters of a 1% solution of the sodium salt of casein in PBS (Sigma Chemical Company, St. Louis, Missouri), covered and incubated at 35°C for one hour. Unbound BSA was removed by 3 washes with PBS-Tween. TSST-1reference standard (10
30 nanograms/milliliter) treated with NRS, test samples treated with NRS, and reagent controls were pipetted in 200 microliter volumes to their respective wells on the first and seventh columns of the plate. One hundred microliters of PBS-Tween was added

to the remaining wells. The TSST-1 reference standard and test samples were then serially diluted 6 times in the PBS-Tween by transferring 100 microliters from well-to-well. The samples were mixed prior to transfer by repeated aspiration and expression. Samples of the test samples and the TSST-1 reference standard were
5 assayed in triplicate. This was followed by incubation for 1.5 hours at 35°C and five washes with PBS-T and three washes with distilled water to remove unbound toxin. The rabbit polyclonal anti-TSST-1 IgG conjugated to horseradish peroxidase wash diluted according to manufacturer's instructions and 50 microliters was added to each microtiter well, except well A-1, the conjugate control well. The plates were covered
10 and incubated at 35°C for one hour.

Following incubation the plates were washed five times in PBS-Tween and three times with distilled water. Following the washes, the wells were treated with 100 microliters of horseradish peroxidase substrate buffer consisting of 5 milligrams of o-phenylenediamine and 5 microliters of 30% hydrogen peroxide in 11 mL of citrate
15 buffer (pH=5.5). The citrate buffer was prepared from 0.012 anhydrous citric acid and 0.026 molar dibasic sodium phosphate. The plates were incubated for 15 minutes at 35°C. The reaction was stopped by the addition of 50 microliters of a 5% sulfuric acid solution. The intensity of the color reaction in each well was evaluated using the BioTek Model EL309 microplate reader (OD 490 nanometers). TSST-1
20 concentrations in the test samples were determined from the reference toxin regression equation derived during each assay procedure. The efficacy of the terpeneol in inhibiting the production of TSST-1 is shown in Table I below.

In accordance with the present invention, the data in Table 1 shows that *S. aureus* (MN8), when compared to the control, produced significantly less TSST-1 in
25 the presence of the terpeneol. The terpeneol reduced the amount of exotoxin production by about 98%. However, although the amount of toxin produced was significantly reduced, there was minimal, if any, effect on the growth of *S. aureus* cells.

Table 1.

Compound	% Test Compound	Optical Density	CFU/mL	ng TSST-1 per OD Unit	Reduction of Toxin (%)
Growth Medium	Zero	0.625	2.8E+08	1504	N/A
Methanol	400 μ L	0.627	2.8E+08	1440	N/A
Terpineol	0.1%	0.811	4.5E+08	36	98%

N/A = Not Applicable

5

EXAMPLE 2

In this Example, the effect of menthol on the growth of *S. aureus* and the production of TSST-1 was determined. Menthol (Sigma Chemical Company, St. Louis, Missouri) was dissolved in methanol, spectrophotometric grade, at a concentration that permitted the addition of 200 microliters of the solution to 10 mL of growth medium for the highest concentration tested. The effect of the menthol tested in this Example was determined by placing the desired concentration, expressed in percent of the menthol, in 10mL of a growth medium as described in Example 1. The test compound was then tested and evaluated as in Example 1.

In accordance with the present invention, Table 2 shows that *S. aureus* (MN8), when compared to the control, produced significantly less TSST-1 in the presence of the menthol. The menthol reduced the amount of exotoxin production by about 97%. However, although the amount of toxin produced was significantly reduced, there was minimal, if any, effect on the growth of *S. aureus* cells.

20 Table 2

Compound	% Test Compound	Optical Density	CFU/mL	ng TSST-1 per OD Unit	Reduction of Toxin %
----------	-----------------	-----------------	--------	-----------------------	----------------------

Growth Medium	Zero	0.606	3.2E+09	1445	N/A
Methanol	100 μ L	0.567	1.3E+09	1151	N/A
Menthol	0.1%	0.621	6.3E+08	33	97%

N/A = Not Applicable

5

EXAMPLE 3

In this Example, the growth of *S. aureus* and the production of TSST-1 in the presence of various monoterpenes (Sigma Chemical Company) was measured. Test compounds were received as liquids or solids. The liquids were added directly to the growth medium and diluted in growth medium to obtain the desired final concentrations.

10 The solids were dissolved in methanol, spectrophotometric grade (Sigma Chemical Company) at a concentration that permitted the addition of 200 microliters of the solution to 10 mL of growth medium for the highest concentration tested. Each test compound that was dissolved in methanol was added to the growth medium in the amount required to obtain the desired final concentration. The effect of the

15 monoterpenes was determined by placing the desired concentration, expressed in percent of the monoterpene, in 10 mL of a growth medium prepared as in Example 1. The monoterpenes were then tested and evaluated as in Example 1. Table 3 below shows that *S. aureus*, when compared to the control, produce significantly less TSST-1 in the presence of the monoterpenes. At the concentrations tested, the

20 monoterpenes reduced the amount of toxin produced by 78% to 100%.

Table 3

Compound	% Test Compound	Optical Density	CFU/mL	ng TSST-1 per OD Unit	Reduction of Toxin %
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Methanol	200uL	0.580	2.0E+09	3652	N/A
Beta-ionone	0.8%	0.688	1.8E+08	none detected	100%
p-menthane- 1,8-diol	0.7%	0.620	2.0E+09	792	78%
Linalool	0.01%	0.600	2.0E+09	421	88%
Geraniol	0.01%	0.0569	3.2E+08	26	99%

N/A = Not Applicable

5

EXAMPLE 4

In this Example, the effect of terpineol on the production of alpha-toxin from *S. aureus* strain RN 6390 was evaluated utilizing a standard hemolytic assay.

The *S. aureus* alpha-toxin is a hemolytic exoprotein that causes target cell membrane damage and cell death. It is produced under environmental conditions similar to those seen with TSST-1 production. The effect of terpineol on the growth and the production of alpha-toxin was carried out by placing the desired concentrations, expressed in percent of the active compound, in 100mL of growth medium in 500 mL fleakers capped with aluminum foil. The growth medium and inoculum were prepared as described in Example 1. The fleakers were incubated in a 37°C water bath with a gyratory shaker set at 180 rpm. Growth was followed by periodic optical density measurements at 600 nm. When the growth obtained an optical density of 1.0, 10 mL aliquots were removed for analysis. Plate counts were performed on the samples to determine cell count and culture purity. The remaining sample was centrifuged at 2500 rpm for 15 minutes and the resulting supernatant filter sterilized and frozen at -70°C until assayed.

Defibrinated rabbit red blood cells (Hema Resources, Aurora, Oregon) were washed 3 times in Tris-saline buffer and re-suspended to a concentration of 0.5% (volume/volume). the Tris-saline buffer consisted of 50 mM Trizma®

hydrochloride/Trizma base and 100 mM sodium chloride, with a final pH of 7.0. Culture supernatants were serially diluted in Tris-saline buffer from 1:2 to 1:256. One hundred microliters of each dilution was added to nine hundred microliters of the rabbit red blood cells. Each dilution was set up in triplicate. The tubes were
5 incubated for 30 minutes at 37°C. The samples were then centrifuged at 800 x g for 6 minutes. Two two-hundred microliter aliquots were transferred to a microtiter plate and the optical density determined at 410 nm. Control fluids used in place of the culture supernatants included tris-saline buffer (zero lysis), 10% sodium dodecyl sulfate (100% lysis), and sterile growth medium containing the test compound. Units
10 of activity are expressed as the reciprocal of the dilution of each test sample giving 50% lysis in samples that were adjusted to the same initial optical density (600nm). As Table 7 below indicates terpineol significantly reduced the production of the alpha toxin.

15 Table 4

Test Compound	% Test Compound	Hemolytic Endpoint 50% lysis	% Toxin Inhibition
None	0	103	N/A
Terpineol	0.05%	77	71%
Terpineol	0.1%	15	94%

EXAMPLE 5

In this Example, the effect of terpineol in combination with the surface active
20 agent Cetiol 1414E (myreth-3-myristate) was tested using a 4x4 checkerboard experimental design. This allowed the evaluation of the interaction of two test compounds on the growth of *S. aureus* and the production of TSST-1.

Four concentrations of terpineol (0.1%, 0.05%, 0.01%, and 0.0%) were combined with four concentrations of Cetiol 1414E (10mM, 5mM, 2.5mM, and 0.0mM)
25 in a sixteen tube array. For example, tube #1 contained 0.0mM Cetiol 1414E and

0.0% terpineol (vol/vol) in 10 mL of growth medium (as prepared in Example 1). Each of the tubes #1-#16 contained a unique combination of terpineol and Cetiol. The solutions were tested and evaluated as in Example 1. The effect of the test compounds on growth of *S. aureus* MN8 and on the production of TSST-1 is shown in Table 5 below.

Table 5

Cetiol mM	Terpineol %	CFU/mL x 10 ⁸	ng TSST-1 per mL	ngTSST-1 per CFU	% Reduction
0	0	6.3	2008	319	NA
0	0.01	7.1	1650	234	27%
0	0.05	6.6	906	137	57%
0	0.1	5.7	249	44	86%
2.5	0	4.2	1556	371	0%
2.5	0.01	5.7	1130	117	38%
2.5	0.05	5.1	800	157	51%
2.5	0.1	2.6	146	57	82%
5.0	0	5.9	1147	196	39%
5.0	0.01	4.0	719	180	44%
5.0	0.05	4.8	288	60	81%
5.0	0.1	6.0	103	17	95%
10.0	0	5.0	989	200	37%
10.0	0.01	4.0	419	105	67%
10.0	0.05	3.8	199	52	84%
10.0	0.1	2.9	62	21	93%

At every concentration of Cetiol 1414E, terpineol increased the inhibition of the production of TSST-1. The effect appears to be additive. Further, the addition of
5 Cetiol 1414E increases the inhibition of TSST-1 production by terpineol.

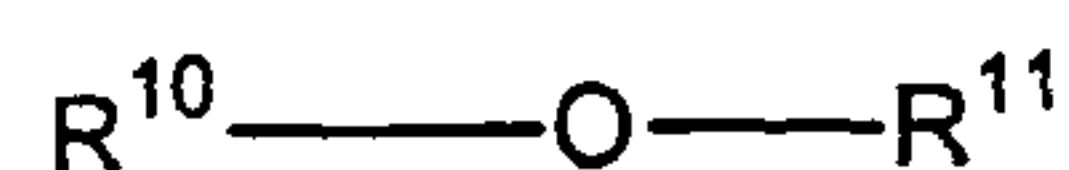
In view of the above, it will be seen that the several objects of the invention are achieved. As various changes could be made in the above-described absorbent articles without departing from the scope of the invention, it is intended that all matter contained in the above description be interpreted as illustrative and not in a limiting
10 sense.

WHAT IS CLAIMED IS:

1. An absorbent article comprising an effective amount of a first active ingredient comprising an isoprenoid compound effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.
2. The absorbent article as set forth in claim 1 wherein the isoprenoid compound is selected from the group consisting of geraniol, cis-terpin, trans-terpin, terpineol, alpha-terpinene, beta-terpinene, gamma-terpinene, beta- myrcene, dipentene, alpha-myrcene, menthol, 2-methyl-6-methylene-1,7-octadiene, linalool,
5 alpha-ionone, beta-ionone, alpha-pinen, beta-pinen, nerol, campher, citral a, nerolidol, farnesol, phytol, alpha-carotin, beta-carotin, and limonen.
3. The absorbent article as set forth in claim 1 wherein the isoprenoid compound is present in an amount of at least about 0.01 micromoles per gram of absorbent article.
4. The absorbent article as set forth in claim 1 wherein the isoprenoid compound is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.
5. The absorbent article as set forth in claim 1 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.
6. The absorbent article as set forth in claim 1 wherein the absorbent article is a tampon and the isoprenoid compound is selected from the group consisting of terpineol, β ionone, cis-terpin, trans-terpin, linalool, geraniol, menthol, and combinations thereof.
7. The absorbent article as set forth in claim 1 further comprising an effective amount of a second active ingredient, said second active ingredient

comprising a compound with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol wherein the second active
 5 ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

8. The absorbent article as set forth in claim 1 further comprising an effective amount of a second active ingredient having the general formula:



5 wherein R¹⁰ is a straight or branched alkyl or straight or branched alkenyl having from 8 to about 18 carbon atoms and R¹¹ is selected from the group consisting of an alcohol, a polyalkoxylated sulfate salt and a polyalkoxylated sulfosuccinate salt wherein the second active ingredient is effective in substantially inhibiting the
 10 production of exoprotein from Gram positive bacteria.

9. The absorbent article as set forth in claim 8 wherein the second active ingredient is selected from the group consisting of laureth-3, laureth-4, laureth-5, PPG-5 lauryl ether, 1-O-dodecyl-rac-glycerol, sodium laureth sulfate, potassium laureth sulfate, disodium laureth (3) sulfosuccinate, dipotassium laureth (3)
 5 sulfosuccinate and polyethylene oxide (2) sorbitol ether.

10. The absorbent article as set forth in claim 8 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

11. The absorbent article as set forth in claim 8 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

12. The absorbent article as set forth in claim 8 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary

napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.

13. The absorbent article as set forth in claim 1 further comprising an effective amount of a second active ingredient, the second active ingredient comprising an alkyl polyglycoside effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

14. The absorbent article as set forth in claim 13 wherein the alkyl polyglycoside has the general formula:



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wherein Z is a saccharide residue having 5 or 6 carbon atoms, n is a whole number from 1 to 6, and R¹⁴ is a linear alkyl group having from about 8 to about 18 carbon atoms.

15. The absorbent article as set forth in claim 13 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent garment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon, and a nasal tampon.

16. The absorbent article as set forth in claim 13 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

17. The absorbent article as set forth in claim 13 wherein the alkyl polyglycoside is selected from the group consisting of Glucopon 220, Glucopon 225, Glucopon 425, Glucopon 600, Glucopon 625, and TL 2141.

18. The absorbent article as set forth in claim 1 further comprising an effective amount of a second active ingredient selected from the group consisting of glycerol monolaurate and myreth-3-myristate wherein said second active

ingredient is effective in substantially inhibiting the production of exoprotein from
5 Gram positive bacteria.

19. The absorbent article as set forth in claim 1 further comprising an effective amount of a second active ingredient having the general formula:



wherein R¹⁷, inclusive of the carbonyl carbon, is an alkyl group having 8 to 18 carbon atoms, and R¹⁸ and R¹⁹ are independently selected from hydrogen or an
10 alkyl group having from 1 to about 12 carbon atoms which may or may not be substituted with groups selected from ester groups, ether groups, amine groups, hydroxyl groups, carboxyl groups, carboxyl salts, sulfonate groups, sulfonate salts, and mixtures thereof wherein said second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

20. The absorbent article as set forth in claim 19 wherein the second active ingredient is selected from the group consisting of sodium lauryl sarcosinate, lauramide monoethanolamide, lauramide diethanolamide, lauramidopropyl dimethylamine, disodium lauramide monoethanolamide sulfosuccinate, and
5 disodium lauroamphodiacetate.

21. The absorbent article as set forth in claim 19 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

22. The absorbent article as set forth in claim 19 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

23. The absorbent article as set forth in claim 19 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.

24. The absorbent article as set forth in claim 1 further comprising an effective amount of a second active ingredient having the general formula:

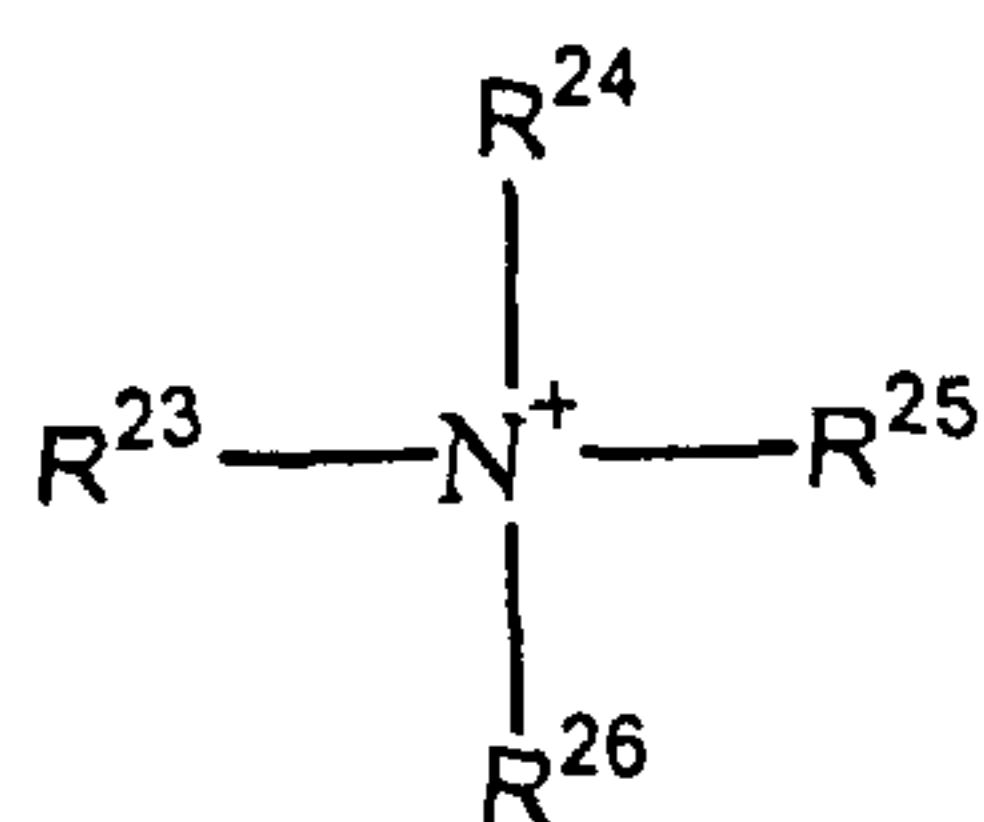


10 wherein R^{20} is an alkyl group having from about 8 to about 18 carbon atoms and R^{21} and R^{22} are independently selected from the group consisting of hydrogen and alkyl groups having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

25. The absorbent article as set forth in claim 24 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

26. The absorbent article as set forth in claim 24 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.

27. The absorbent article as set forth in claim 1 further comprising an effective amount of a second active ingredient having the general formula:



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wherein R^{23} is an alkyl group having from 8 to about 18 carbon atoms and R^{24} , R^{25} , and R^{26} are independently selected from the group consisting of hydrogen and alkyl group having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts, and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

10

28. The absorbent article as set forth in claim 27 wherein the second active ingredient is triethanolamide laureth sulfate.

29. The absorbent article as set forth in claim 27 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

30. The absorbent article as set forth in claim 27 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

31. The absorbent article as set forth in claim 27 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.

5

32. A non-absorbent article comprising an effective amount of a first active ingredient comprising an isoprenoid compound effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

33. The non-absorbent article as set forth in claim 32 wherein the isoprenoid compound is selected from the group consisting of geraniol, cis-terpin, trans-terpin, terpineol, alpha-terpinene, beta-terpinene, gamma-terpinene, beta-myrcene, dipentene, alpha-myrcene, menthol, 2-methyl-6-methylene-1,7-octadiene, linalool, alpha-ionone, beta-ionone, alpha-pinen, beta-pinen, nerol, campher, citral a, nerolidol, farnesol, phytol, alpha-carotin, beta-carotin, and limonen.

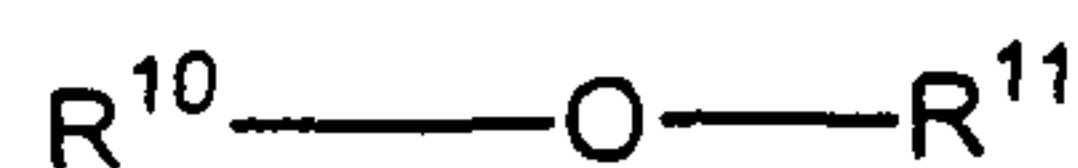
34. The non-absorbent article as set forth in claim 32 wherein the first active ingredient is present in an amount of at least about 0.1 micromoles per gram of non-absorbent article.

35. The non-absorbent article as set forth in claim 32 wherein the first active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

36. The non-absorbent article as set forth in claim 32 wherein the non-absorbent article is selected from the group consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon applicator and a douche.

37. The non-absorbent article as set forth in claim 32 further comprising an effective amount of a second active ingredient, said second active ingredient comprising a compound with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

38. The non-absorbent article as set forth in claim 32 further comprising an effective amount of a second active ingredient having the general formula:



wherein R^{10} is a straight or branched alkyl or straight or branched alkenyl having from 8 to about 18 carbon atoms and R^{11} is selected from the group consisting of an alcohol, a polyalkoxylated sulfate salt and a polyalkoxylated sulfosuccinate salt wherein the second active ingredient is effective in substantially inhibiting the
 10 production of exoprotein from Gram positive bacteria.

39. The non-absorbent article as set forth in claim 38 wherein the second active ingredient is selected from the group consisting of laureth-3, laureth-4, laureth-5, PPG-5 lauryl ether, 1-0-dodecyl-rac-glycerol, sodium laureth sulfate, potassium laureth sulfate, disodium laureth (3) sulfosuccinate, dipotassium laureth
 5 (3) sulfosuccinate and polyethylene oxide (2) sorbitol ether.

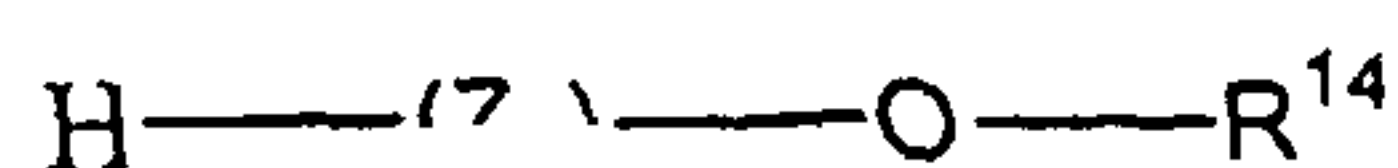
40. The non-absorbent article as set forth in claim 38 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

41. The non-absorbent article as set forth in claim 38 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

42. The non-absorbent article as set forth in claim 38 wherein the non-absorbent article is selected from the group consisting of non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon applicator and a douche.

43. The non-absorbent article as set forth in claim 32 further comprising an effective amount of a second active ingredient, the second active ingredient comprising an alkyl polyglycoside effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

44. The non-absorbent article as set forth in claim 43 wherein the alkyl polyglycoside has the general formula:



5

wherein Z is a saccharide residue having 5 or 6 carbon atoms, n is a whole number from 1 to 6, and R¹⁴ is a linear alkyl group having from about 8 to about 18 carbon atoms.

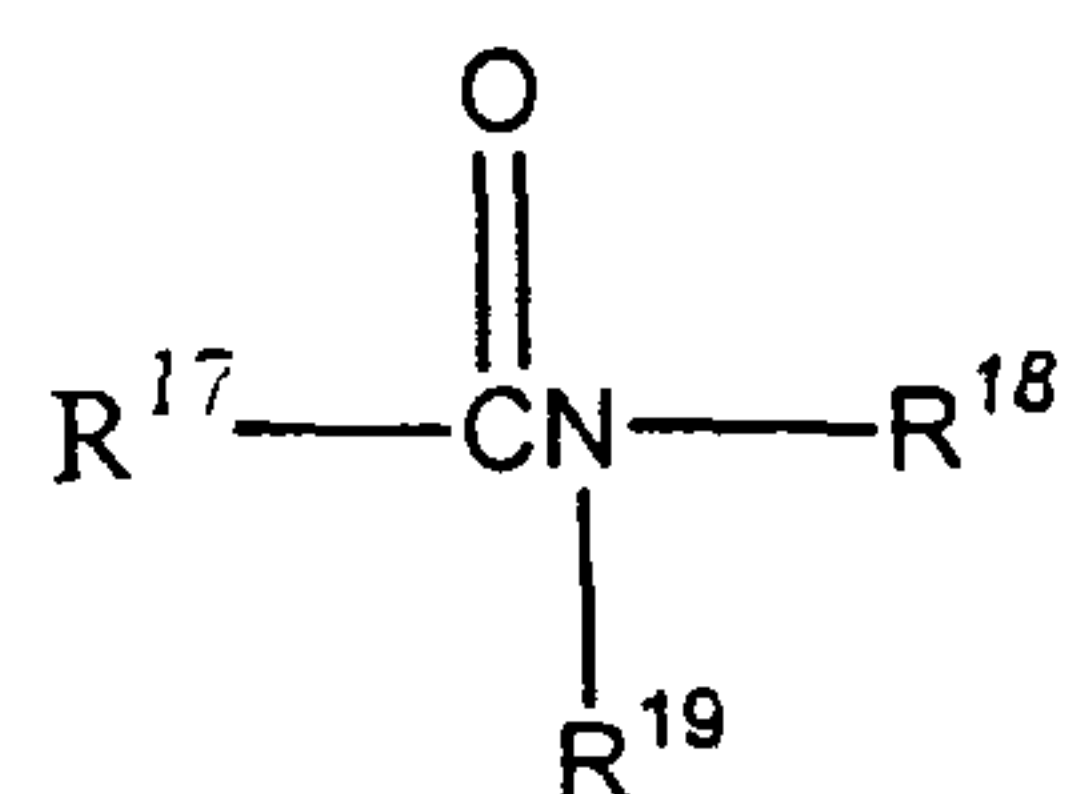
45. The non-absorbent article as set forth in claim 43 wherein the non-absorbent article is selected from the group consisting of consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon applicator and a douche.

46. The non-absorbent article as set forth in claim 43 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

47. The non-absorbent article as set forth in claim 43 wherein the alkyl polyglycoside is selected from the group consisting of Glucopon 220, Glucopon 225, Glucopon 425, Glucopon 600, Glucopon 625, and TL 2141.

48. The non-absorbent article as set forth in claim 32 further comprising an effective amount of a second active ingredient selected from the group consisting of glycerol monolaurate and myreth-3-myristate wherein said active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive
5 bacteria.

49. The non-absorbent article as set forth in claim 32 further comprising an effective amount of a second active ingredient having the general formula:



5

wherein R^{17} , inclusive of the carbonyl carbon, is an alkyl group having 8 to 18 carbon atoms, and R^{18} and R^{19} are independently selected from hydrogen or an alkyl group having from 1 to about 12 carbon atoms which may or may not be substituted with groups selected from ester groups, ether groups, amine groups, hydroxyl groups, carboxyl groups, carboxyl salts, sulfonate groups, sulfonate salts, and mixtures thereof wherein said second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

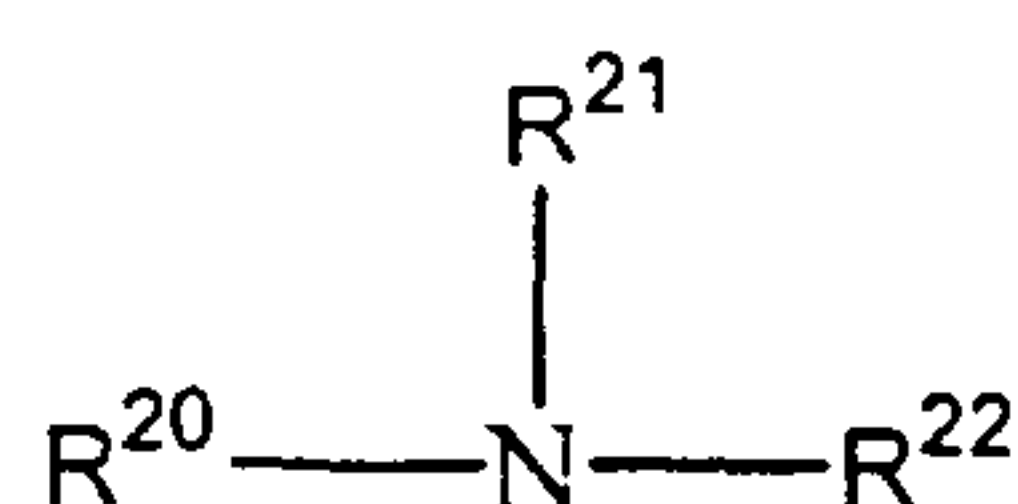
50. The non-absorbent article as set forth in claim 49 wherein the second active ingredient is selected from the group consisting of sodium lauryl sarcosinate, lauramide monoethanolamide, lauramide diethanolamide, lauramidopropyl dimethylamine, disodium lauramide monoethanolamide sulfosuccinate, and disodium lauroamphodiacetate.

51. The non-absorbent article as set forth in claim 49 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

52. The non-absorbent article as set forth in claim 49 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

53. The non-absorbent article as set forth in claim 49 wherein the non-absorbent article is selected from the group consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon applicator and a douche.

54. The non-absorbent article as set forth in claim 32 further comprising an effective amount of a second active ingredient having the general formula:



wherein R^{20} is an alkyl group having from about 8 to about 18 carbon atoms and
5 R^{21} and R^{22} are independently selected from the group consisting of hydrogen and
alkyl groups having from 1 to about 18 carbon atoms and which can have one or
more substitutional moieties selected from the group consisting of hydroxyl,
carboxyl, carboxyl salts and imidazoline wherein the second active ingredient is
effective in substantially inhibiting the production of exoprotein from Gram positive
10 bacteria.

55. The non-absorbent article as set forth in claim 54 wherein the second
active ingredient is present in an amount of at least about 0.0001 millimoles per
gram of non-absorbent article.

56. The non-absorbent article as set forth in claim 54 wherein the non-
absorbent article is selected from the group consisting of a non-absorbent
incontinence device, a barrier birth control device, a contraceptive sponge, a
tampon application and a douche.

57. The non-absorbent article as set forth in claim 32 further comprising an
effective amount of a second active ingredient having the general formula:



wherein R^{23} is an alkyl group having from 8 to about 18 carbon atoms and R^{24} , R^{25} ,
and R^{26} are independently selected from the group consisting of hydrogen and
10 alkyl group having from 1 to about 18 carbon atoms and which can have one or
more substitutional moieties selected from the group consisting of hydroxyl,
carboxyl, carboxyl salts, and imidazoline wherein the second active ingredient is
effective in substantially inhibiting the production of exoprotein from Gram positive
bacteria.

58. The non-absorbent article as set forth in claim 57 wherein the second active ingredient is triethanolamide laureth sulfate.

59. The non-absorbent article as set forth in claim 57 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

60. The non-absorbent article as set forth in claim 57 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

61. The non-absorbent article as set forth in claim 57 wherein the non-absorbent article is selected from the group consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon application and a douche.

5

62. A composition for inhibiting production of exoprotein from Gram positive bacteria comprising an effective amount of a first active ingredient comprising an isoprenoid compound and a pharmaceutically acceptable carrier, wherein the first active ingredient is effective in inhibiting the production of exoprotein from Gram positive bacteria.

10

63. The composition as set forth in claim 62 wherein the isoprenoid compound is selected from the group consisting of geraniol, cis-terpin, trans-terpin, terpineol, alpha-terpinene, beta-terpinene, gamma-terpinene, beta-myrcene, dipentene, alpha-myrcene, menthol, 2-methyl-6-methylene-1,7-octadiene, linalool, alpha-ionone, beta-ionone, alpha-pinen, beta-pinen, nerol, campher, citral a, nerolidol, farnesol, phytol, alpha-carotin, beta-carotin, and limonen.

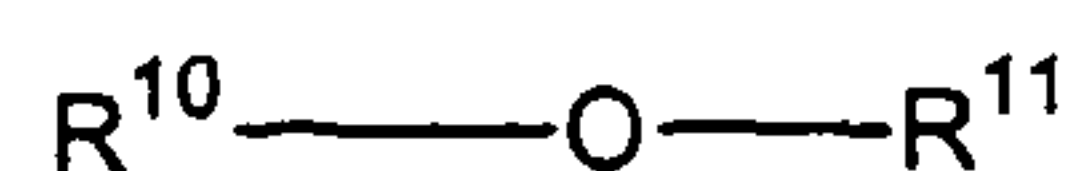
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64. The composition of claim 62 comprising from about 0.25 millimoles/liter to about 10 millimoles/liter of isoprenoid compound.

65. The composition as set forth in claim 62 wherein the first active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

66. The composition as set forth in claim 62 further comprising an effective amount of a second active ingredient, said second active ingredient comprising a compound with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol wherein the second active ingredient is effective in
5 substantially inhibiting the production of exoprotein from Gram positive bacteria.

67. The composition as set forth in claim 62 further comprising an effective amount of a second active ingredient having the general formula:



5 wherein R¹⁰ is a straight or branched alkyl or straight or branched alkenyl having from 8 to about 18 carbon atoms and R¹¹ is selected from the group consisting of an alcohol, a polyalkoxylated sulfate salt and a polyalkoxylated sulfosuccinate salt wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

68. The composition as set forth in claim 67 wherein the second active ingredient is selected from the group consisting of laureth-3, laureth-4, laureth-5, PPG-5 lauryl ether, 1-0-dodecyl-rac-glycerol, sodium laureth sulfate, potassium laureth sulfate, disodium laureth (3) sulfosuccinate, dipotassium laureth (3)
5 sulfosuccinate and polyethylene oxide (2) sorbitol ether.

69. The composition as set forth in claim 67 comprising from about 0.25 millimoles/liter to about 10 millimoles/liter of the second active ingredient.

70. The composition as set forth in claim 67 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

71. The composition as set forth in claim 1 further comprising an effective amount of a second active ingredient, the second active ingredient comprising an alkyl polyglycoside effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

72. The composition as set forth in claim 71 wherein the alkyl polyglycoside has the general formula:



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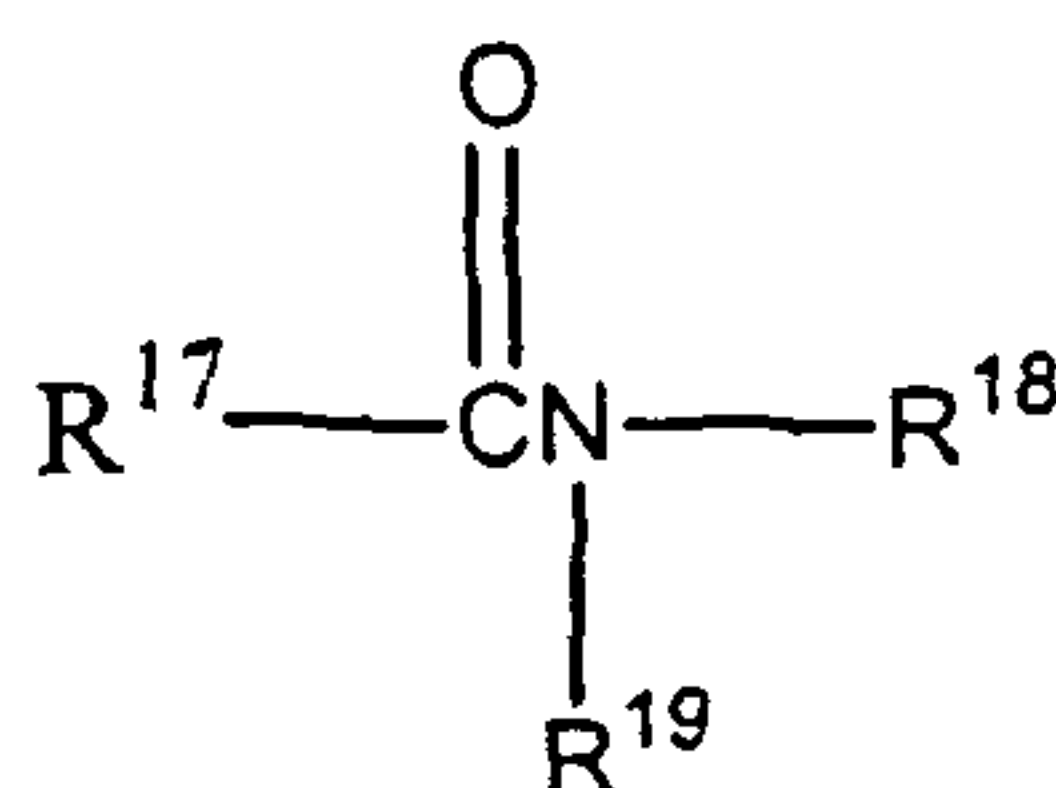
wherein Z is a saccharide residue having 5 or 6 carbon atoms, n is a whole number from 1 to 6, and R¹⁴ is a linear alkyl group having from about 8 to about 18 carbon atoms.

73. The composition as set forth in claim 71 comprising from about 0.25 millimoles/liter to about 5 millimoles/liter of alkyl polyglycoside.

74. The composition as set forth in claim 71 wherein the alkyl polyglycoside is selected from the group consisting of Glucopon 220, Glucopon 225, Glucopon 425, Glucopon 600, Glucopon 625, and TL 2141.

75. The composition as set forth in claim 62 further comprising an effective amount of a second active ingredient selected from the group consisting of glycerol monolaurate and myreth-3-myristate wherein said active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

76. The composition as set forth in claim 62 further comprising an effective amount of a second active ingredient having the general formula:



5

wherein R^{17} , inclusive of the carbonyl carbon, is an alkyl group having 8 to 18 carbon atoms, and R^{18} and R^{19} are independently selected from hydrogen or an alkyl group having from 1 to about 12 carbon atoms which may or may not be substituted with groups selected from ester groups, ether groups, amine groups, hydroxyl groups, carboxyl groups, carboxyl salts, sulfonate groups, sulfonate salts, and mixtures thereof wherein said second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

77. The composition as set forth in claim 76 wherein the second active ingredient is selected from the group consisting of sodium lauryl sarcosinate, lauramide monoethanolamide, lauramide diethanolamide, lauramidopropyl dimethylamine, disodium lauramide monoethanolamide sulfosuccinate, and disodium lauroamphodiacetate.

78. The composition as set forth in claim 76 comprising from about 0.25 millimoles/liter to about 5 millimoles/liter of the second active ingredient.

79. The composition as set forth in claim 76 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

80. The composition as set forth in claim 62 further comprising an effective amount of a second active ingredient having the general formula:



wherein R^{20} is an alkyl group having from about 8 to about 18 carbon atoms and R^{21} and R^{22} are independently selected from the group consisting of hydrogen and alkyl groups having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts and imidazoline wherein the second active ingredient is

effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

81. The composition as set forth in claim 80 comprising from about 0.25 millimoles/liter to about 5 millimoles/liter of the second active ingredient.

82. The composition as set forth in claim 80 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

83. The composition as set forth in claim 62 further comprising an effective amount of a second active ingredient having the general formula:



10 wherein R^{23} is an alkyl group having from 8 to about 18 carbon atoms and R^{24} , R^{25} , and R^{26} are independently selected from the group consisting of hydrogen and alkyl group having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts, and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

84. The composition as set forth in claim 83 wherein the second active ingredient is triethanolamide laureth sulfate.

85. The composition as set forth in claim 83 comprising from about 0.25 millimoles/liter to about 5 millimoles/liter of the second active ingredient.

86. The composition as set forth in claim 83 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

87. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient comprising an isoprenoid compound.

88. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient comprising and a second active ingredient, said first active ingredient comprising an isoprenoid compound and said second active ingredient
5 comprising a compound with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol.

89. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient and a second active ingredient, said first active ingredient comprising an isoprenoid compound and said second active ingredient having the
5 general formula:



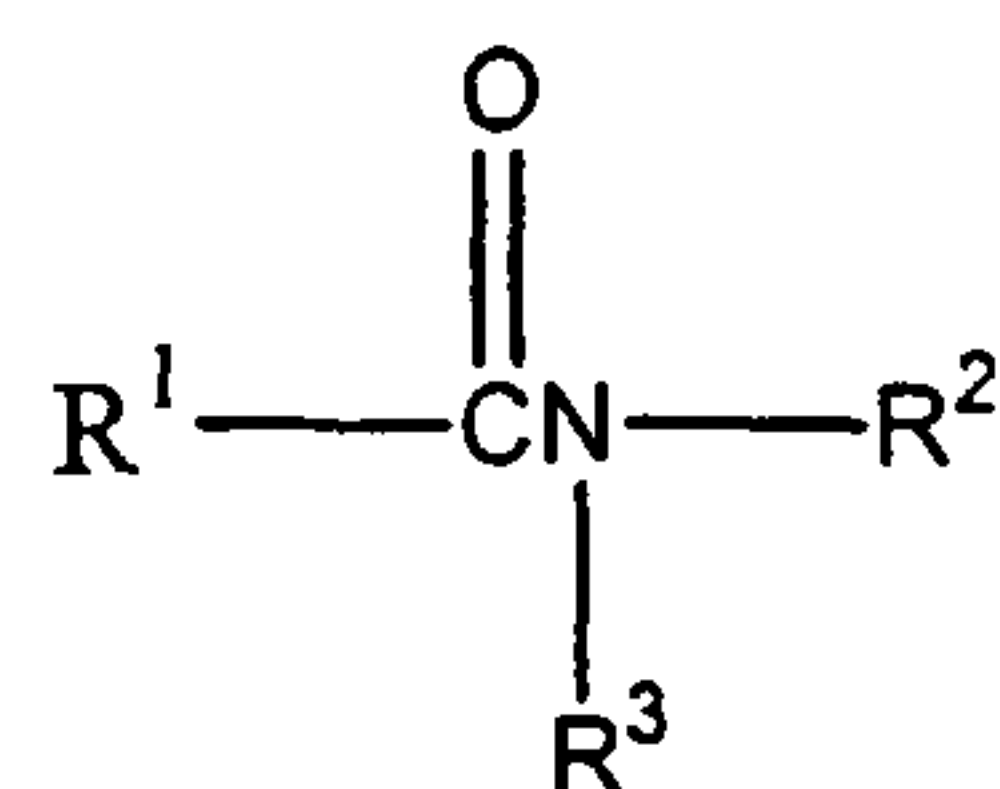
wherein R¹⁰ is a straight or branched alkyl or straight or branched alkenyl having
10 from 8 to about 18 carbon atoms and R¹¹ is selected from the group consisting of an alcohol, a polyalkoxylated sulfate salt and a polyalkoxylated sulfosuccinate salt.

90. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient and a second active ingredient, said first active ingredient comprising an isoprenoid compound and said second active ingredient having the
5 general formula:



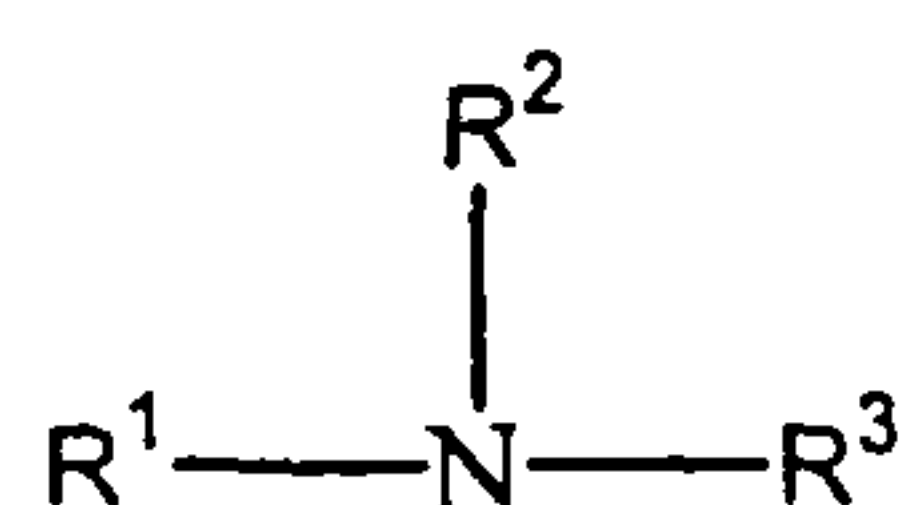
wherein Z is a saccharide residue having 5 or 6 carbon atoms, n is a whole number from 1 to 6, and R¹⁴ is a linear alkyl group having from about 8 to about 18 carbon atoms.

91. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient and a second active ingredient, said first active ingredient comprising an isoprenoid compound and said second active ingredient having the general formula:



wherein R¹, inclusive of the carbonyl carbon, is an alkyl group having 8 to 18 carbon atoms and R² and R³ can be the same or different. Preferably, R² and R³ are selected from hydrogen and an alkyl group having 1 to about 12 carbon atoms. The alkyl group of R² and R³ may contain one or more substituent groups selected from ester, ether, amine, hydroxyl, carboxyl, carboxyl salts, sulfonate and sulfonate salts.

92. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient and a second active ingredient, said first active ingredient comprising an isoprenoid compound and said second active ingredient having the general formula:



wherein R¹ is an alkyl group having from about 8 to about 18 carbon atoms and R² and R³ can be the same or different and are selected from hydrogen and alkyl groups having from 1 to about 18 carbon atoms.

AMENDED CLAIMS

[received by the International Bureau on 24 January 2003 (24.01.03) ;
original claims 1-92 replaced by amended claims 1-90 (18 pages)]

WHAT IS CLAIMED IS:

1. An absorbent, exoprotein-inhibiting article for use against or near the skin to absorb body fluids comprising an absorbent material and an effective amount of a first active ingredient comprising an isoprenoid compound effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.
2. The absorbent, exoprotein-inhibiting article as set forth in claim 1 wherein the isoprenoid compound is selected from the group consisting of geraniol, cis-terpin, trans-terpin, terpineol, alpha-terpinene, beta-terpinene, gamma-terpinene, beta- myrcene, dipentene, alpha-myrcene, menthol, 2-methyl-6-methylene-1,7-octadiene, linalool, alpha-ionone, beta-ionone, alpha-pinen, beta-pinen, nerol, campher, citral a, nerolidol, farnesol, phytol, alpha-carotin, beta-carotin, and limonen.
3. The absorbent, exoprotein-inhibiting article as set forth in claim 1 wherein the isoprenoid compound is present in an amount of at least about 0.01 micromoles per gram of absorbent article.
4. The absorbent, exoprotein-inhibiting article as set forth in claim 1 wherein the isoprenoid compound is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.
5. The absorbent, exoprotein-inhibiting article as set forth in claim 1 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.
6. The absorbent, exoprotein-inhibiting article as set forth in claim 1 wherein the absorbent article is a tampon and the isoprenoid compound is selected from the group consisting of terpineol, β ionone, cis-terpin, trans-terpin, linalool, geraniol, menthol, and combinations thereof.

7. The absorbent, exoprotein-inhibiting article as set forth in claim 1 further comprising an effective amount of a second active ingredient, said second active ingredient comprising a compound with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

8. The absorbent, exoprotein-inhibiting article as set forth in claim 1 further comprising an effective amount of a second active ingredient having the general formula:



wherein R¹⁰ is a straight or branched alkyl or straight or branched alkenyl having from 8 to about 18 carbon atoms and R¹¹ is selected from the group consisting of an alcohol, a polyalkoxylated sulfate salt and a polyalkoxylated sulfosuccinate salt wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

9. The absorbent, exoprotein-inhibiting article as set forth in claim 8 wherein the second active ingredient is selected from the group consisting of laureth-3, laureth-4, laureth-5, PPG-5 lauryl ether, 1-O-dodecyl-rac-glycerol, sodium laureth sulfate, potassium laureth sulfate, disodium laureth (3) sulfosuccinate, dipotassium laureth (3) sulfosuccinate and polyethylene oxide (2) sorbitol ether.

10. The absorbent, exoprotein-inhibiting article as set forth in claim 8 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

11. The absorbent, exoprotein-inhibiting article as set forth in claim 8 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

12. The absorbent, exoprotein-inhibiting article as set forth in claim 8 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.

13. The absorbent, exoprotein-inhibiting article as set forth in claim 1 further comprising an effective amount of a second active ingredient, the second active ingredient comprising an alkyl polyglycoside effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

14. The absorbent, exoprotein-inhibiting article as set forth in claim 13 wherein the alkyl polyglycoside has the general formula:



wherein Z is a saccharide residue having 5 or 6 carbon atoms, n is a whole number from 1 to 6, and R¹⁴ is a linear alkyl group having from about 8 to about 18 carbon atoms.

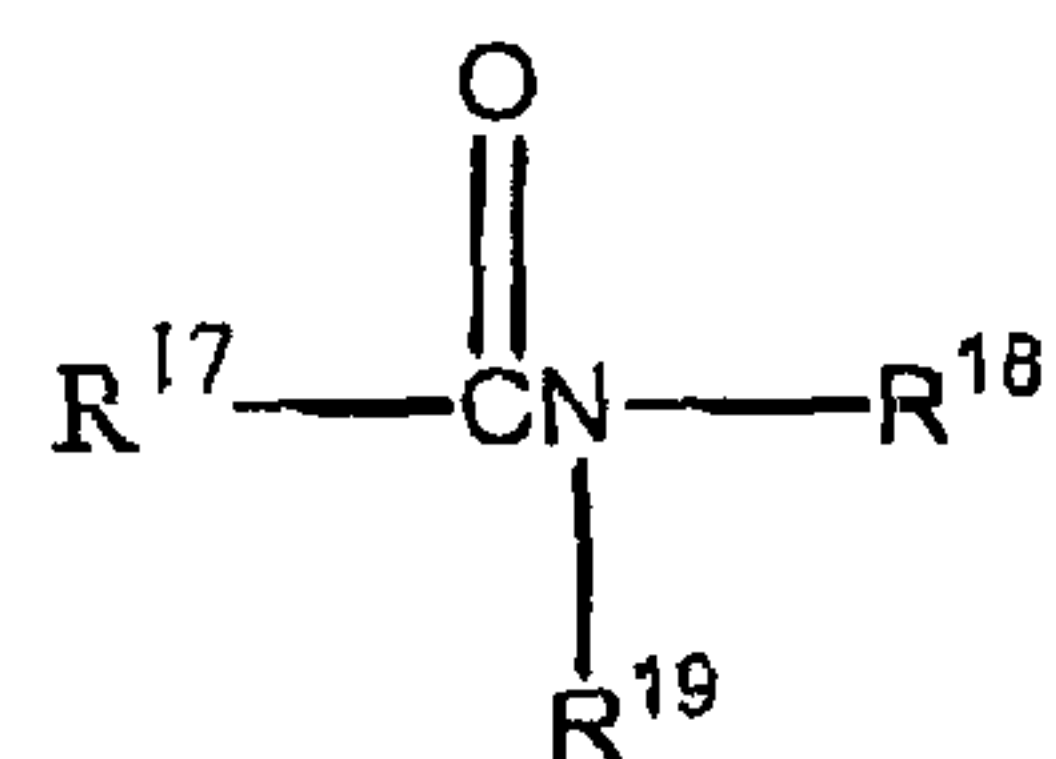
15. The absorbent, exoprotein-inhibiting article as set forth in claim 13 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent garment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon, and a nasal tampon.

16. The absorbent, exoprotein-inhibiting article as set forth in claim 13 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

17. The absorbent, exoprotein-inhibiting article as set forth in claim 13 wherein the alkyl polyglycoside is selected from the group consisting of Glucopon 220, Glucopon 225, Glucopon 425, Glucopon 600, Glucopon 625, and TL 2141.

18. The absorbent, exoprotein-inhibiting article as set forth in claim 1 further comprising an effective amount of a second active ingredient selected from the group consisting of glycerol monolaurate and myreth-3-myristate wherein said second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

19. The absorbent, exoprotein-inhibiting article as set forth in claim 1 further comprising an effective amount of a second active ingredient having the general formula:



wherein R^{17} , inclusive of the carbonyl carbon, is an alkyl group having 8 to 18 carbon atoms, and R^{18} and R^{19} are independently selected from hydrogen or an alkyl group having from 1 to about 12 carbon atoms which may or may not be substituted with groups selected from ester groups, ether groups, amine groups, hydroxyl groups, carboxyl groups, carboxyl salts, sulfonate groups, sulfonate salts, and mixtures thereof wherein said second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

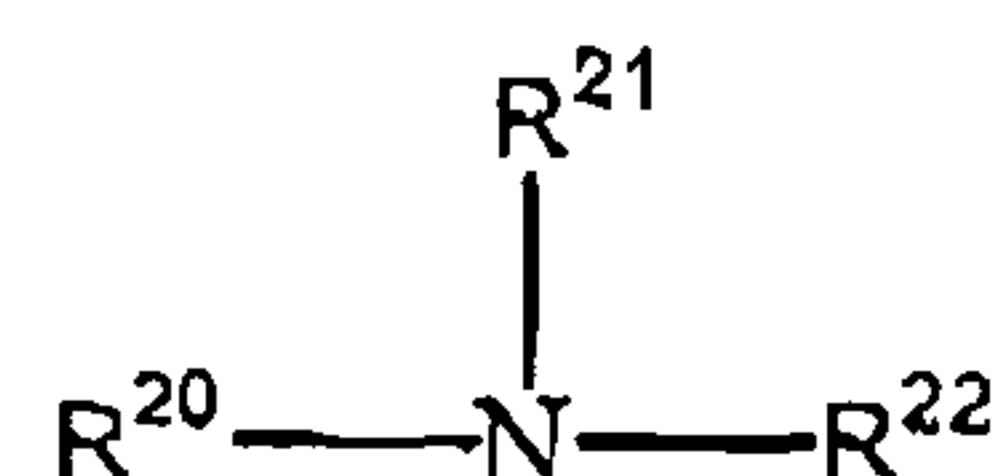
20. The absorbent, exoprotein-inhibiting article as set forth in claim 19 wherein the second active ingredient is selected from the group consisting of sodium lauryl sarcosinate, lauramide monoethanolamide, lauramide diethanolamide, lauramidopropyl dimethylamine, disodium lauramide monoethanolamide sulfosuccinate, and disodium lauroamphodiacetate.

21. The absorbent, exoprotein-inhibiting article as set forth in claim 19 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

22. The absorbent, exoprotein-inhibiting article as set forth in claim 19 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

23. The absorbent, exoprotein-inhibiting article as set forth in claim 19 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.

24. The absorbent, exoprotein-inhibiting article as set forth in claim 1 further comprising an effective amount of a second active ingredient having the general formula:

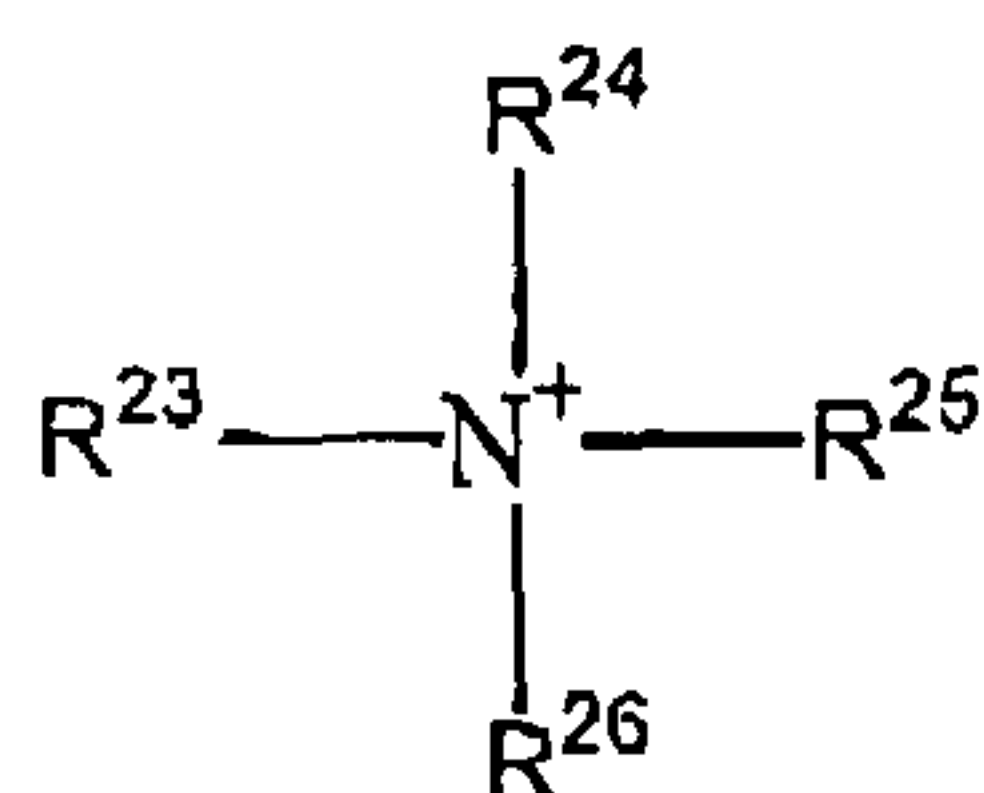


wherein R^{20} is an alkyl group having from about 8 to about 18 carbon atoms and R^{21} and R^{22} are independently selected from the group consisting of hydrogen and alkyl groups having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

25. The absorbent, exoprotein-inhibiting article as set forth in claim 24 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

26. The absorbent, exoprotein-inhibiting article as set forth in claim 24 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.

27. The absorbent, exoprotein-inhibiting article as set forth in claim 1 further comprising an effective amount of a second active ingredient having the general formula:



wherein R^{23} is an alkyl group having from 8 to about 18 carbon atoms and R^{24} , R^{25} , and R^{26} are independently selected from the group consisting of hydrogen and alkyl group having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts, and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

28. The absorbent, exoprotein-inhibiting article as set forth in claim 27 wherein the second active ingredient is triethanolamide laureth sulfate.

29. The absorbent, exoprotein-inhibiting article as set forth in claim 27 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of absorbent article.

30. The absorbent, exoprotein-inhibiting article as set forth in claim 27 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

31. The absorbent, exoprotein-inhibiting article as set forth in claim 27 wherein the absorbent article is selected from the group consisting of a catamenial tampon, a sanitary napkin, a panty liner, an incontinent undergarment, a diaper, a wound dressing, a dental tampon, a medical tampon, a surgical tampon and a nasal tampon.

32. An exoprotein inhibitor for use in a vagina for inhibiting the production of exoproteins from Gram positive bacteria comprising a non-absorbent substrate having deposited thereon an effective amount of a first active ingredient comprising an isoprenoid compound effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

33. The exoprotein inhibitor as set forth in claim 32 wherein the isoprenoid compound is selected from the group consisting of geraniol, cis-terpin, trans-terpin, terpineol, alpha-terpinene, beta-terpinene, gamma-terpinene, beta-myrcene, dipentene, alpha-myrcene, menthol, 2-methyl-6-methylene-1,7-octadiene, linalool, alpha-ionone, beta-ionone, alpha-pinen, beta-pinen, nerol, campher, citral a, nerolidol, farnesol, phytol, alpha-carotin, beta-carotin, and limonen.

34. The exoprotein inhibitor as set forth in claim 32 wherein the first active ingredient is present in an amount of at least about 0.1 micromoles per gram of non-absorbent article.

35. The exoprotein inhibitor as set forth in claim 32 wherein the first active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

36. The exoprotein inhibitor as set forth in claim 32 wherein the non-absorbent article is selected from the group consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon applicator and a douche.

37. The exoprotein inhibitor as set forth in claim 32 further comprising an effective amount of a second active ingredient, said second active ingredient

comprising a compound with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

38. The exoprotein inhibitor as set forth in claim 32 further comprising an effective amount of a second active ingredient having the general formula:



wherein R¹⁰ is a straight or branched alkyl or straight or branched alkenyl having from 8 to about 18 carbon atoms and R¹¹ is selected from the group consisting of an alcohol, a polyalkoxylated sulfate salt and a polyalkoxylated sulfosuccinate salt wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

39. The exoprotein inhibitor as set forth in claim 38 wherein the second active ingredient is selected from the group consisting of laureth-3, laureth-4, laureth-5, PPG-5 lauryl ether, 1-O-dodecyl-rac-glycerol, sodium laureth sulfate, potassium laureth sulfate, disodium laureth (3) sulfosuccinate, dipotassium laureth (3) sulfosuccinate and polyethylene oxide (2) sorbitol ether.

40. The exoprotein inhibitor as set forth in claim 38 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

41. The exoprotein inhibitor as set forth in claim 38 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

42. The exoprotein inhibitor as set forth in claim 38 wherein the non-absorbent article is selected from the group consisting of non-absorbent

incontinence device, a barrier birth control device, a contraceptive sponge, a tampon applicator and a douche.

43. The exoprotein inhibitor as set forth in claim 32 further comprising an effective amount of a second active ingredient, the second active ingredient comprising an alkyl polyglycoside effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

44. The exoprotein inhibitor as set forth in claim 43 wherein the alkyl polyglycoside has the general formula:



wherein Z is a saccharide residue having 5 or 6 carbon atoms, n is a whole number from 1 to 6, and R¹⁴ is a linear alkyl group having from about 8 to about 18 carbon atoms.

45. The exoprotein inhibitor as set forth in claim 43 wherein the non-absorbent article is selected from the group consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon applicator and a douche.

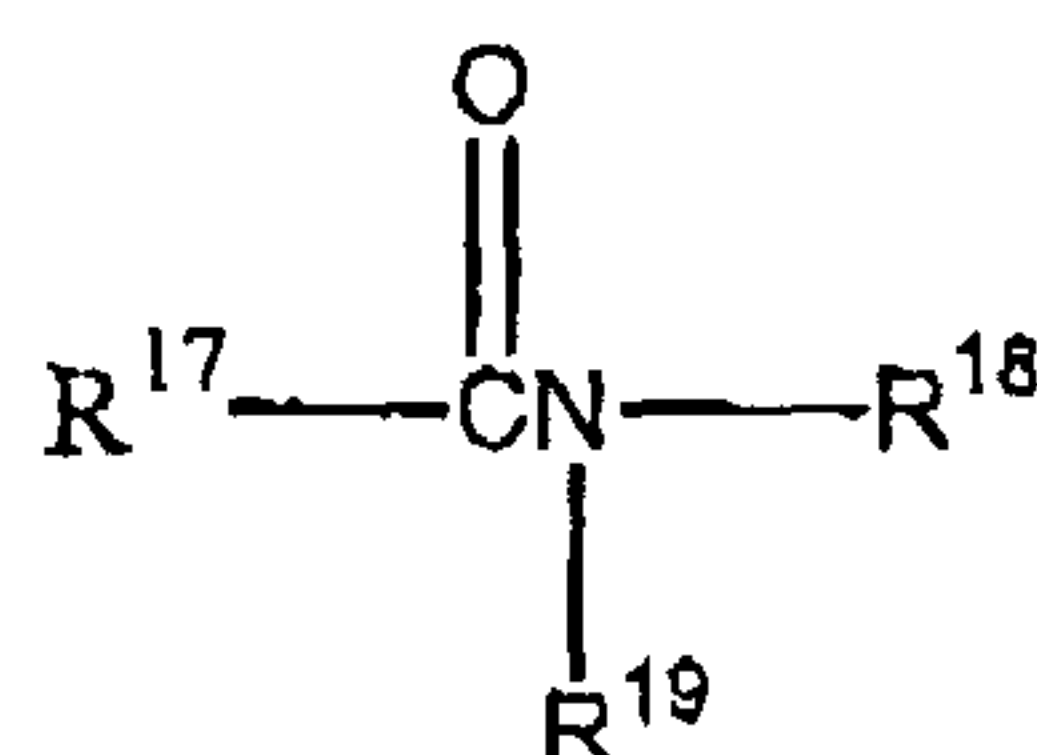
46. The exoprotein inhibitor as set forth in claim 43 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

47. The exoprotein inhibitor as set forth in claim 43 wherein the alkyl polyglycoside is selected from the group consisting of Glucopon 220, Glucopon 225, Glucopon 425, Glucopon 600, Glucopon 625, and TL 2141.

48. The exoprotein inhibitor as set forth in claim 32 further comprising an effective amount of a second active ingredient selected from the group consisting of

glycerol monolaurate and myreth-3-myristate wherein said active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

49. The exoprotein inhibitor as set forth in claim 32 further comprising an effective amount of a second active ingredient having the general formula:



wherein R^{17} , inclusive of the carbonyl carbon, is an alkyl group having 8 to 18 carbon atoms, and R^{18} and R^{19} are independently selected from hydrogen or an alkyl group having from 1 to about 12 carbon atoms which may or may not be substituted with groups selected from ester groups, ether groups, amine groups, hydroxyl groups, carboxyl groups, carboxyl salts, sulfonate groups, sulfonate salts, and mixtures thereof wherein said second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

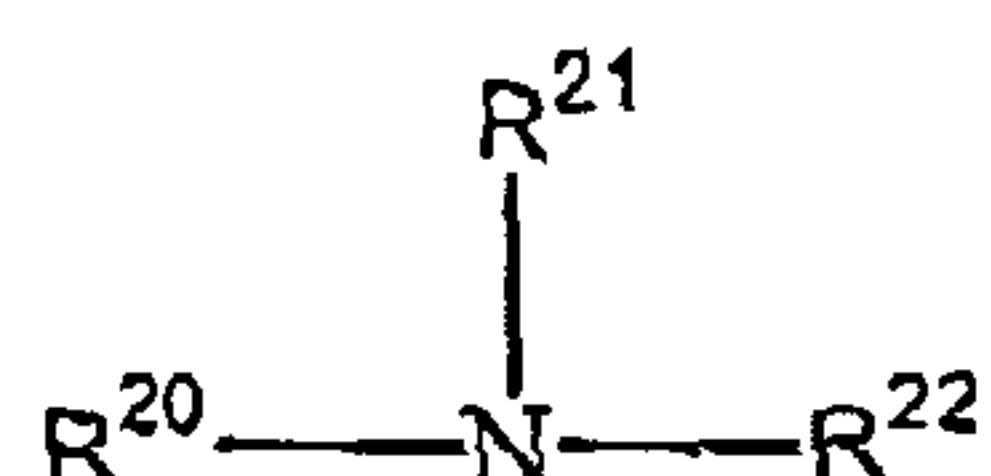
50. The exoprotein inhibitor as set forth in claim 49 wherein the second active ingredient is selected from the group consisting of sodium lauryl sarcosinate, lauramide monoethanolamide, lauramide diethanolamide, lauramidopropyl dimethylamine, disodium lauramide monoethanolamide sulfosuccinate, and disodium lauroamphodiacetate.

51. The exoprotein inhibitor as set forth in claim 49 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

52. The exoprotein inhibitor as set forth in claim 49 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

53. The exoprotein inhibitor as set forth in claim 49 wherein the non-absorbent article is selected from the group consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon applicator and a douche.

54. The exoprotein inhibitor as set forth in claim 32 further comprising an effective amount of a second active ingredient having the general formula:

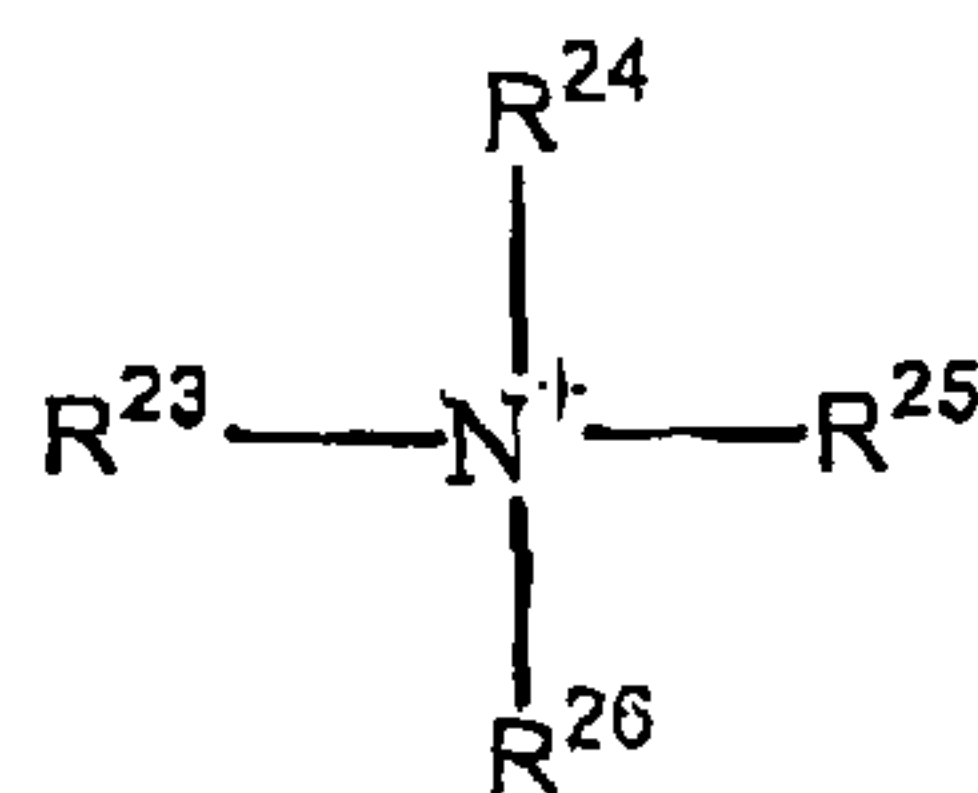


wherein R^{20} is an alkyl group having from about 8 to about 18 carbon atoms and R^{21} and R^{22} are independently selected from the group consisting of hydrogen and alkyl groups having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

55. The exoprotein inhibitor as set forth in claim 54 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

56. The exoprotein inhibitor as set forth in claim 54 wherein the non-absorbent article is selected from the group consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon application and a douche.

57. The exoprotein inhibitor as set forth in claim 32 further comprising an effective amount of a second active ingredient having the general formula:



wherein R^{23} is an alkyl group having from 8 to about 18 carbon atoms and R^{24} , R^{25} , and R^{26} are independently selected from the group consisting of hydrogen and alkyl group having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts, and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

58. The exoprotein inhibitor as set forth in claim 57 wherein the second active ingredient is triethanolamide laureth sulfate.

59. The exoprotein inhibitor as set forth in claim 57 wherein the second active ingredient is present in an amount of at least about 0.0001 millimoles per gram of non-absorbent article.

60. The exoprotein inhibitor as set forth in claim 57 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

61. The exoprotein inhibitor as set forth in claim 57 wherein the non-absorbent article is selected from the group consisting of a non-absorbent incontinence device, a barrier birth control device, a contraceptive sponge, a tampon application and a douche.

62. A vaginal cleansing composition for inhibiting production of exoprotein from Gram positive bacteria in and around the vagina comprising a pharmaceutically-acceptable carrier and an effective amount of a first active ingredient comprising an isoprenoid compound, wherein the first active ingredient is effective in inhibiting the production of exoprotein from Gram positive bacteria.

63. The vaginal cleansing composition as set forth in claim 62 wherein the isoprenoid compound is selected from the group consisting of geraniol, cis-terpin, trans-terpin, terpineol, alpha-terpinene, beta-terpinene, gamma-terpinene, beta-myrcene, dipentene, alpha-myrcene, menthol, 2-methyl-6-methylene-1,7-octadiene, linalool, alpha-ionone, beta-ionone, alpha-pinen, beta-pinen, nerol, campher, citral a, nerolidol, farnesol, phytol, alpha-carotin, beta-carotin, and limonen.

64. The vaginal cleansing composition as set forth in claim 62 comprising from about 0.25 millimoles/liter to about 10 millimoles/liter of isoprenoid compound.

65. The vaginal cleansing composition as set forth in claim 62 wherein the first active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

66. The vaginal cleansing composition as set forth in claim 62 further comprising an effective amount of a second active ingredient, said second active ingredient comprising a compound with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

67. The vaginal cleansing composition as set forth in claim 62 further comprising an effective amount of a second active ingredient having the general formula:



wherein R¹⁰ is a straight or branched alkyl or straight or branched alkenyl having from 8 to about 18 carbon atoms and R¹¹ is selected from the group consisting of an alcohol, a polyalkoxylated sulfate salt and a polyalkoxylated sulfosuccinate salt wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

68. The vaginal cleansing composition as set forth in claim 67 wherein the second active ingredient is selected from the group consisting of laureth-3, laureth-4, laureth-5, PPG-5 lauryl ether, 1-O-dodecyl-rac-glycerol, sodium laureth sulfate, potassium laureth sulfate, disodium laureth (3) sulfosuccinate, dipotassium laureth (3) sulfosuccinate and polyethylene oxide (2) sorbitol ether.

69. The vaginal cleansing composition as set forth in claim 67 comprising from about 0.25 millimoles/liter to about 10 millimoles/liter of the second active ingredient.

70. The vaginal cleansing composition as set forth in claim 67 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

71. The vaginal cleansing composition as set forth in claim 1 further comprising an effective amount of a second active ingredient, the second active ingredient comprising an alkyl polyglycoside effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

72. The vaginal cleansing composition as set forth in claim 71 wherein the alkyl polyglycoside has the general formula:



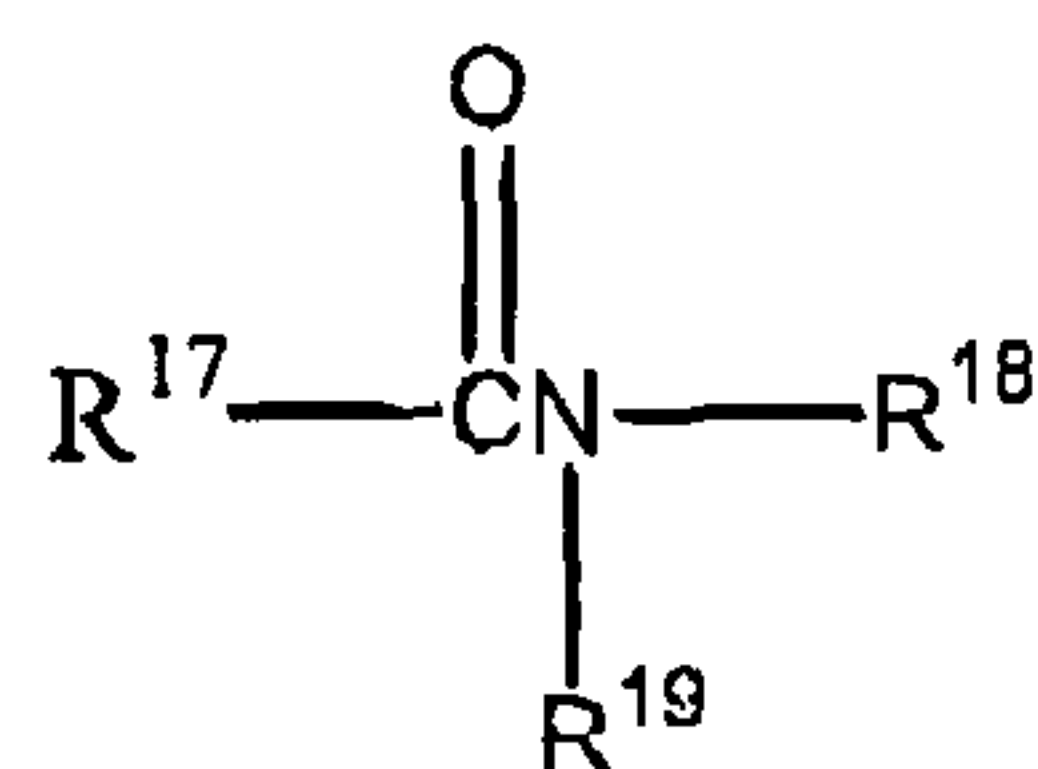
wherein Z is a saccharide residue having 5 or 6 carbon atoms, n is a whole number from 1 to 6, and R¹⁴ is a linear alkyl group having from about 8 to about 18 carbon atoms.

73. The vaginal cleansing composition as set forth in claim 71 comprising from about 0.25 millimoles/liter to about 5 millimoles/liter of alkyl polyglycoside.

74. The vaginal cleansing composition as set forth in claim 71 wherein the alkyl polyglycoside is selected from the group consisting of Glucopon 220, Glucopon 225, Glucopon 425, Glucopon 600, Glucopon 625, and TL 2141.

75. The vaginal cleansing composition as set forth in claim 62 further comprising an effective amount of a second active ingredient selected from the group consisting of glycerol monolaurate and myreth-3-myristate wherein said active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

76. The vaginal cleansing composition as set forth in claim 62 further comprising an effective amount of a second active ingredient having the general formula:



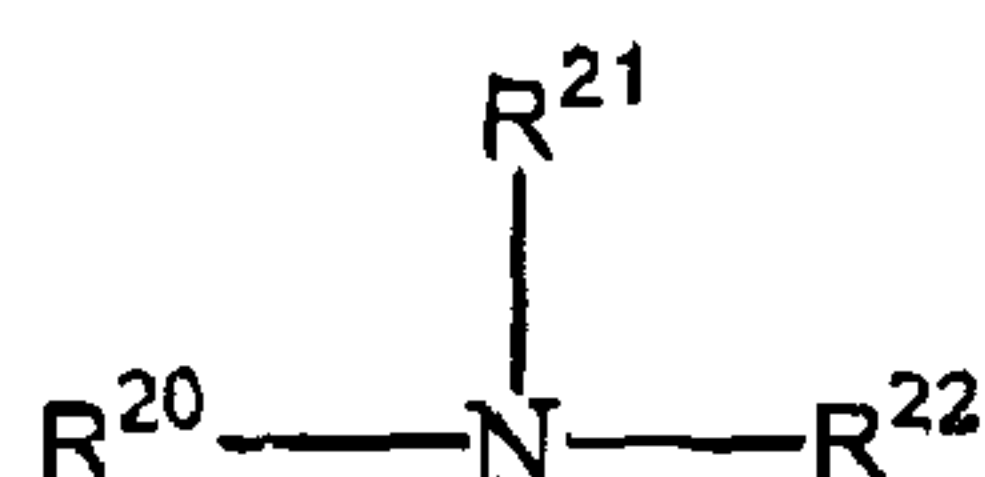
wherein R^{17} , inclusive of the carbonyl carbon, is an alkyl group having 8 to 18 carbon atoms, and R^{18} and R^{19} are independently selected from hydrogen or an alkyl group having from 1 to about 12 carbon atoms which may or may not be substituted with groups selected from ester groups, ether groups, amine groups, hydroxyl groups, carboxyl groups, carboxyl salts, sulfonate groups, sulfonate salts, and mixtures thereof wherein said second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

77. The vaginal cleansing composition as set forth in claim 76 wherein the second active ingredient is selected from the group consisting of sodium lauryl sarcosinate, lauramide monoethanolamide, lauramide diethanolamide, lauramidopropyl dimethylamine, disodium lauramide monoethanolamide sulfosuccinate, and disodium lauroamphodiacetate.

78. The vaginal cleansing composition as set forth in claim 76 comprising from about 0.25 millimoles/liter to about 5 millimoles/liter of the second active ingredient.

79. The vaginal cleansing composition as set forth in claim 76 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

80. The vaginal cleansing composition as set forth in claim 62 further comprising an effective amount of a second active ingredient having the general formula:

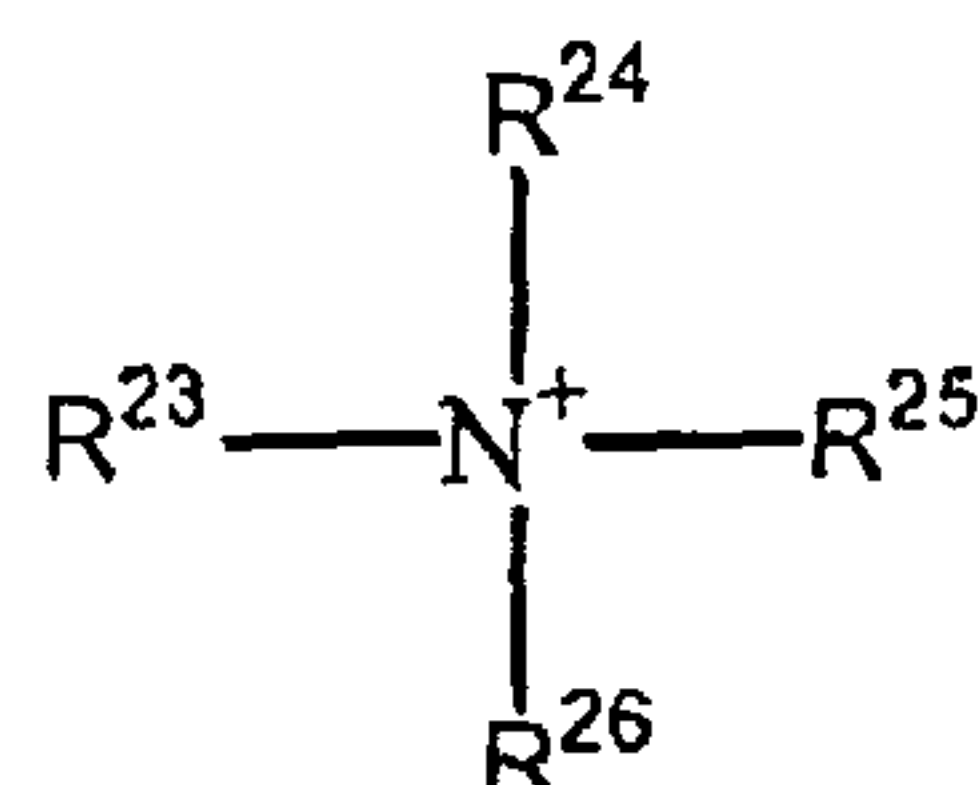


wherein R^{20} is an alkyl group having from about 8 to about 18 carbon atoms and R^{21} and R^{22} are independently selected from the group consisting of hydrogen and alkyl groups having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

81. The vaginal cleansing composition as set forth in claim 80 comprising from about 0.25 millimoles/liter to about 5 millimoles/liter of the second active ingredient.

82. The vaginal cleansing composition as set forth in claim 80 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

83. The vaginal cleansing composition as set forth in claim 62 further comprising an effective amount of a second active ingredient having the general formula:



wherein R^{23} is an alkyl group having from 8 to about 18 carbon atoms and R^{24} , R^{25} , and R^{26} are independently selected from the group consisting of hydrogen and alkyl group having from 1 to about 18 carbon atoms and which can have one or more substitutional moieties selected from the group consisting of hydroxyl, carboxyl, carboxyl salts, and imidazoline wherein the second active ingredient is effective in substantially inhibiting the production of exoprotein from Gram positive bacteria.

84. The vaginal cleansing composition as set forth in claim 83 wherein the second active ingredient is triethanolamide laureth sulfate.

85. The vaginal cleansing composition as set forth in claim 83 comprising from about 0.25 millimoles/liter to about 5 millimoles/liter of the second active ingredient.

86. The vaginal cleansing composition as set forth in claim 83 wherein the second active ingredient is effective in substantially inhibiting the production of TSST-1 from *S. aureus* bacteria.

87. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient comprising an isoprenoid compound.

88. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient comprising and a second active ingredient, said first active

ingredient comprising an isoprenoid compound and said second active ingredient comprising a compound with an ether, ester, amide, glycosidic, or amine bond linking a C₈-C₁₈ fatty acid to an aliphatic alcohol.

89. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient and a second active ingredient, said first active ingredient comprising an isoprenoid compound and said second active ingredient having the general formula:



wherein R¹⁰ is a straight or branched alkyl or straight or branched alkenyl having from 8 to about 18 carbon atoms and R¹¹ is selected from the group consisting of an alcohol, a polyalkoxylated sulfate salt and a polyalkoxylated sulfosuccinate salt.

90. A method of inhibiting the production of exoprotein from Gram positive bacteria comprising exposing said Gram positive bacteria to an effective amount of a first active ingredient and a second active ingredient, said first active ingredient comprising an isoprenoid compound and said second active ingredient having the general formula:

