Claims

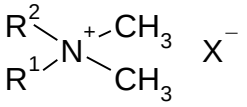
1. An anti-microbial composition comprising:

(i) a compound of formula:

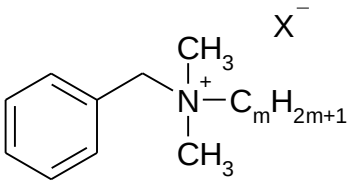
$$[N(CH_3)_3Q^2]^+ Y^- \quad (C^2)$$

wherein Q^2 has structure $–(CH_2)_aNHC(O)(CH_2)_bCHCH_2$, wherein a + b is an integer of from 8 to 18, provided that a and b are each independently an integer of from 1 to 9, wherein Y^- is a halide anion, alkylsulphate, sulphonate, saccharinate, or bicarbonate, or a mixture of compounds of formula (C^2);

(ii) at least one anti-microbial quaternary ammonium compound of formula (A)



wherein R_1 and R_2 are each independently a straight chain, un-substituted and uninterrupted $C_{8–12}$ alkyl group and X^- is a halide anion such as chloride, bromide, fluoride, iodide or sulphonate, saccharinate, or bicarbonate and/or at least one benzalkonium compound of formula (B)



wherein m is from 8 to 18, optionally m is 8, 10 or 12, and X- is a halide anion such as chloride, bromide, fluoride, iodide or sulphonate, saccharinate, or bicarbonate; and/or benzethonium chloride, diisobutylphenoxyethoxyethyl-dimethylbenzyl ammonium chloride (otherwise known as Benzethonium Chloride) or benzyl-cocoalkyl-dimethyl-ammonium chloride; and

chlorhexidine or a chlorhexidine salt; and

(iii) a polar solvent.

2. A composition according to claim 1, wherein in the compound of formula (C^2) a is from 1 to 5 and b is from 5 to 9.

3. A composition according to claim 1 or 2, wherein component (i) comprises $[N(CH_3)_3(CH_2)_3NHC(O)(CH_2)_8CHCH_2]^+ \ CH_3SO_4^-$, undecylenamidopropyltrimonium methosulfate.

4. A composition according to claim 1, wherein the benzalkonium compound of formula (B) is benzyldimethyl-n-tetradecyl-ammonium chloride, benzyldimethyl-n-dodecyl-ammonium chloride, benzyl-C_{12}-C_{16}-alkyl-dimethyl-ammonium chloride, and/or the compound of formula (A) is di-n-decyldimethyl ammonium chloride, octyl decyl dimethyl ammonium chloride or dioctyl dimethyl ammonium chloride,
optionally wherein the anti-microbial quaternary ammonium compound is selected from the group consisting of di-n-decyldimethyl ammonium chloride (DDAC), benzalkonium chloride (BAC), and benzethonium chloride (BENZ) and mixtures thereof.

5. A composition according to any one of the preceding claims comprising a quaternary ammonium compound of CAS number 7173-51-5 and/or 68424-85-1.

6. A composition according to claim 1, wherein the compound of formula (A) is di-n-decyldimethyl ammonium chloride, octyl decyl dimethyl ammonium chloride or dioctyl dimethyl ammonium chloride or a mixture thereof, optionally wherein the compound of formula (A) is di-n-decyldimethyl ammonium chloride, and wherein the composition optionally additionally comprises a compound of formula (B) as defined in claim 4 and/or diisobutylphenoxyethoxyethyl-dimethylbenzyl ammonium chloride (otherwise known as Benzethonium Chloride) or benzyl-cocoalkyl-dimethyl-ammonium chloride.

7. A composition according to any one of the preceding claims, wherein the chlorhexidine is chlorhexidine di-gluconate.

8. A composition according to any one of the preceding claims, wherein
(a) the amount of component (i) is from 0.01 to 5% by weight of the composition or from 0.05 to 2% by weight of the composition, optionally wherein the amount of component (i) is from 0.08 to 0.5% by weight of the composition; and/or
(b) the amount of component (ii), and if present an additional antimicrobial component (b) is from 0.01 to 5% by weight of the composition or from 0.02 to 2% by weight of the composition, optionally wherein the amount of component (ii) and component (b) if present is from 0.05 to 0.6% by weight of the composition; and/or
(c) the ratio of component (i) to component (ii) is from 15:1 to 1:10 or from 5:1 to 1:5; and/or
(d) the ratio of the at least one anti-microbial quaternary ammonium compound to chlorhexidine or a chlorhexidine salt is from 1:1 to 3:1.

9. A composition according to any one of the preceding claims, wherein

(a) the pH of the composition is from 4 to 7; and/or
(b) the polar solvent is selected from water, ethanol, n-propanol, isopropanol, ethylene glycol ethers, propylene glycol ethers, butyl diglycol (BDG) and dipropylene glycol methyl ether (Trade name Dowanol DPM) and mixtures thereof; and/or
(c) the composition is substantially free of alcohol.

10. A composition according to any one of the preceding claims, wherein the ratio of the at least one anti-microbial quaternary ammonium compound to chlorhexidine or a chlorhexidine salt is from 1:1 to 3:1 and the ratio of component (i) to component (ii) is from 15:1 to 1:10 or from 5:1 to 1:5;
optionally wherein the amount of component (i) is from 0.01 to 5% by weight of the composition and the amount of component (ii) and component (b) if present is from 0.05 to 0.6% by weight of the composition.

11. The use of a composition according to any one of the preceding claims to substantially reduce or control the formation of microbial colonies on or at a surface, wherein the surface is selected from hard surfaces optionally selected from bathroom surfaces, kitchen surfaces, living area surfaces, hard floors, carpets, furniture, glass/mirrors, toilet surfaces, outdoor surfaces such as wood, stone, concrete or plastics, BBQ surfaces, walls, fences; plant surfaces and food surfaces, optionally wherein the use comprises reducing or controlling the formation of biofilms.

12. A method of substantially reducing or controlling the formation of microbial colonies on or at a surface, wherein the surface is selected from hard surfaces optionally selected from bathroom surfaces, kitchen surfaces, living area surfaces, hard floors, carpets, furniture, glass/mirrors, toilet surfaces, outdoor surfaces such as wood, stone, concrete or plastics, BBQ surfaces, walls, fences; plant surfaces and food surfaces, which method comprises applying a composition according to any one of claims 1 to 10 to that surface, optionally wherein the method is to reduce or control the formation of biofilms.

13. A method of disrupting, preventing or reducing the adhesion and/or attachment of micro-organisms to a surface, wherein the surface is selected from hard surfaces optionally selected from bathroom surfaces, kitchen surfaces, living area surfaces, hard floors, carpets, furniture, glass/mirrors, toilet surfaces, outdoor surfaces such as wood, stone, concrete or plastics, BBQ surfaces, walls, fences; plant surfaces and food

surfaces; which method comprises applying a composition according to any one of claims 1 to 10 to that surface.

14. A hand sanitizer, wound care product or anti-microbial wipe comprising an anti-microbial composition as defined in any one of claims 1 to 10.

15. A composition according to any one of claims 1 to 10 for use to reduce or control the formation of microbial colonies on the skin or a wound; optionally wherein the use comprises the reducing or controlling the formation of biofilms.

16. A composition according to any one of claims 1 to 10 for use in a method of preventing or reducing the adhesion and/or attachment of micro-organisms to the skin.