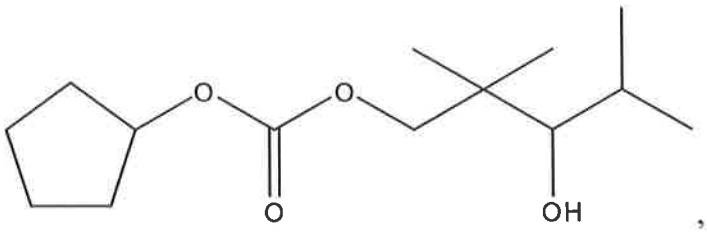
CLAIMS

What is claimed:

1. An oral care composition comprising a therapeutically effective amount of at least one carbonate compound of **Formula 1** selected from the group consisting of:



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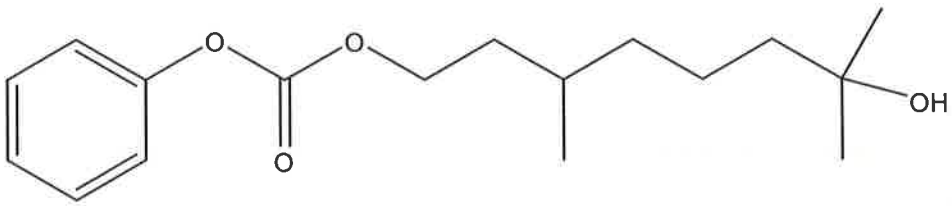

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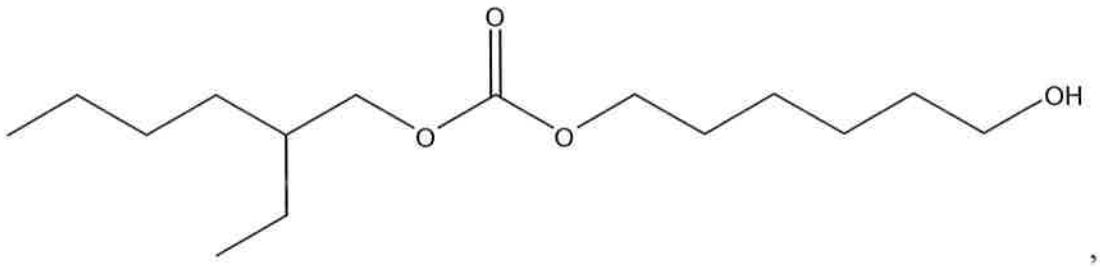


,

and at least one excipient,

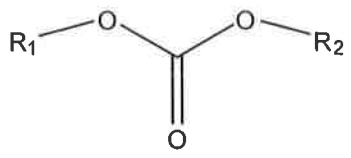
and wherein the oral care composition has at least one of the following oral care benefits:

anti-microbial activity,

anti-oxidant activity,

and biofilm anti-attachment activity.

2. An oral care composition comprising a therapeutically effective amount of at least one carbonate compound of **Formula 1** and at least one excipient:

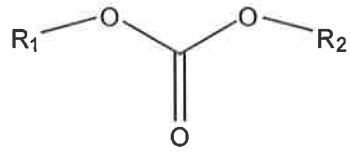


Formula 1

wherein,

R_1 is an aryl radical, and R_2 is a hydroxyaliphatic radical.

3. An oral care composition comprising a therapeutically effective amount of at least one carbonate compound of **Formula 1** and at least one excipient:



Formula 1

wherein,

R_1 is a branched aliphatic radical, and R_2 is a hydroxyaliphatic radical.

4. The oral care composition of any one of claims 1-3, wherein at least one excipient is selected from the group consisting of: surfactants, desensitizing agents, whitening agents, tartar control agents, antibacterial agents, abrasives including silica, binders and thickening agents, detergents, adhesion agents, foam modulators, pH modifying agents, mouth-feel agents, sweeteners, flavorants, colorants, preservatives, combinations thereof, and the like.

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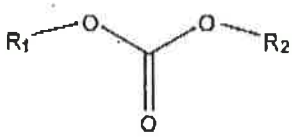
CLAIMS

What is claimed:

1. An oral care composition comprising a therapeutically effective amount of at least one carbonate compound of **Formula** 1 and at least one excipient:



Formula 1

wherein,

R_1 and R_2 are independently: an aliphatic radical; a hydroxyaliphatic radical; or an aryl radical,

and wherein the oral care composition has at least one of the following oral care benefits:

anti-microbial activity,

anti-oxidant activity,

and biofilm anti-attachment activity.

2. The oral care composition of claim 1, wherein R_1 and R_2 are independently: a cyclic or branched aliphatic radical; a linear or branched hydroxyaliphatic radical; or an unsubstituted aryl radical.

3. The oral care composition of claim 2, wherein R_1 and R_2 are independently: a cyclic or branched aliphatic radical having up to 10 carbon atoms; a linear or branched hydroxyaliphathic radical having up to 10 carbon atoms; or an unsubstituted aryl radical.

4. The oral care composition of claim 3, wherein R_1 is chosen from a cyclic or branched aliphatic radical having up to 10 carbon atoms.

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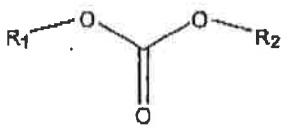
5. The oral care composition of claim 4, wherein R_2 is chosen from a linear or branched hydroxyaliphatic radical.

6. The oral care composition of claim 3, wherein R_1 is an unsubstituted aryl radical.

7. The oral care composition of claim 6, wherein R_2 is a linear or branched hydroxyaliphatic radical having up to 10 carbons.

8. An oral care composition comprising a therapeutically effective amount of at least one carbonate compound of **Formula 1** and at least one excipient:

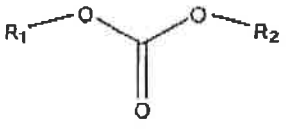


Formula 1

wherein,

R_1 is an aryl radical, and R_2 is a hydroxyaliphatic radical.

9. An oral care composition comprising a therapeutically effective amount of at least one carbonate compound of **Formula 1** and at least one excipient:



Formula 1

wherein,

R_1 is a branched aliphatic radical, and R_2 is a hydroxyaliphatic radical.

10. The oral care composition of claim 1, wherein the at least one carbonate compound of **Formula 1** is:

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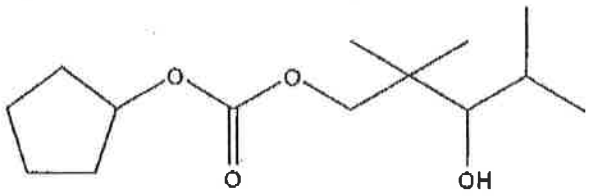
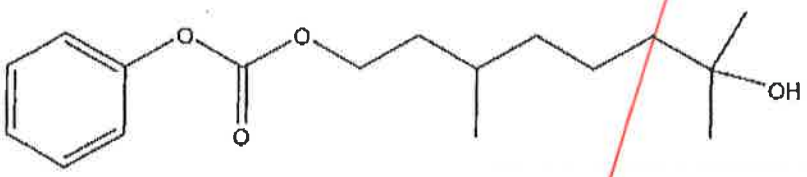
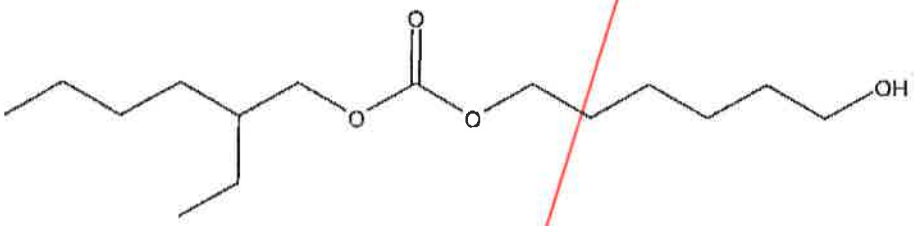


11. The oral care composition of claim 1 or claim 8, wherein the at least one carbonate compound of **Formula 1** is:



12. The oral care composition of claim 1 or claim 9, wherein the at least one carbonate compound of **Formula 1** is:



13. The oral care composition of claim 1 or claim 8, wherein at least one excipient is selected from the group consisting of: surfactants, desensitizing agents, whitening agents, tartar control agents, antibacterial agents, abrasives including silica, binders and thickening agents, detergents, adhesion agents, foam modulators, pH modifying agents, mouth-feel agents, sweeteners, flavorants, colorants, preservatives, combinations thereof, and the like.

14. A method of providing oral care benefits comprising applying to an oral cavity an oral care composition containing a therapeutically effective amount of at least one carbonate compound of **Formula 1** and at least one excipient:

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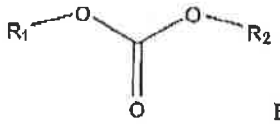


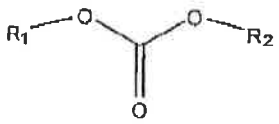
Formula 1

wherein R_1 and R_2 are independently: an aliphatic radical; a hydroxyaliphatic radical; or an aryl radical;

and wherein the oral care benefits comprise anti-microbial activity and/or anti-oxidant activity.

15. The method of claim 14, wherein at the oral care benefits comprise biofilm anti-attachment.

16. A method of up-regulating or down-regulating periodontal disease metabolites comprising applying to an oral cavity an oral care composition containing a therapeutically effective amount of at least one carbonate compound of **Formula 1** and at least one excipient:



Formula 1

wherein,

R_1 and R_2 are independently: an aliphatic radical; a hydroxyaliphatic radical; or an aryl radical,

17. The method of claim 16, wherein the oral care composition up-regulates or down-regulates at least one member chosen from: a compound generated by amino acid metabolism; a compound generated in the urea cycle; a compound generated in glutathion conversion; a compound generated in lipid metabolism; a compound generated in carbohydrate metabolism; a compound generated by nucleic acid metabolism; vitamins; and co-factors.

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18. The method of claim 17, wherein the oral care composition up-regulates at least one metabolite chosen from: uric acid, reduced glutathione, oxidized glutathion, ascorbic acid, and glutamine.

19. The method of claim 17, wherein the oral care composition down-regulates at least one metabolite chosen from: inosine, hypoxanthine, guanosine, guanine, leucine, isoleucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, phenylacetic acid, α-hydroxyioscaproic acid, 5-amino valeric acid, choline, glycerol-3-phosphate, and N-acetylneuraminic acid.

20. Use of at least one carbonate compound of **Formula 1** and at least one excipient:



Formula 1

wherein,

R_1 and R_2 are independently: an aliphatic radical; a hydroxyaliphatic radical; or an aryl radical,

in a method for up-regulating or down-regulating periodontal disease metabolites, wherein the method comprises applying to an oral cavity an oral care composition containing a therapeutically effective amount of the at least one carbonate compound.

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