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(72) Inventors:  
• **SINKINSON, Cecile  
01210 Versonnex (FR)**  
• **ANGUIANO, Oswaldo  
1217 Meyrin (CH)**

(74) Representative: **Appleyard Lees IP LLP  
15 Clare Road  
Halifax HX1 2HY (GB)**

(71) Applicant: **JT International SA  
1202 Geneva (CH)**

(54) **NICOTINE COMPOSITION**

(57) A nicotine composition comprising:  
nicotine  
an organic acid composition, and  
a carrier  
wherein the organic acid composition comprises benzoic  
acid and/or citric acid and at least one further organic

acid; wherein the nicotine is present in the nicotine com-  
position in a molar excess compared to the total of the  
organic acids present in the organic acid composition;  
and wherein the nicotine is present in an amount of less  
than 1.5 wt% based on the total weight of the nicotine  
composition.

**EP 4 406 424 A1**

**Description****Field**

**[0001]** The present invention relates to a nicotine composition. The present invention also relates to an aerosol generation cartridge and an aerosol generation device comprising the nicotine composition, as well as to uses of the nicotine composition and methods of generating an inhalable aerosol using the aerosol generation device.

**Background**

**[0002]** Aerosol generation devices (or electronic cigarettes or "e-cigarettes") have been developed as an alternative to traditional cigarettes as a means for volatilizing active components (for example nicotine) for inhalation without combustion, while at the same time providing the user with an oral experience similar to that of traditional cigarette smoking.

**[0003]** Such aerosol generation devices comprise nicotine compositions (particularly nicotine liquid compositions) that can be volatilized and inhaled as a vapour by a user (such as an adult vaper). It is desirable for such nicotine compositions to provide an improved sensory experience and therefore provide enhanced user satisfaction.

**[0004]** The overall sensory experience of inhaling vapour is believed to include a taste satisfaction and a sensory effect. The sensory effect is often referred to as a "throat sensation". The "initial" or "later" nicotine impact also has a significant influence on the sensory experience.

**[0005]** There is a need to provide nicotine compositions that can provide a desirable taste satisfaction as well as an improved sensory effect experience, i.e., for example by providing a less bitter taste and/or an improved throat sensation and/or nicotine impact. Further, there is a need to provide compositions with different tastes and aroma notes that can provide an improved taste satisfaction and/or flavour experience.

**[0006]** Nicotine compositions (for example in the form of nicotine liquid compositions) may be sold as stand-alone products. Some devices such as aerosol generation devices that can be used with the nicotine composition may contain components that can be adversely affected by the nicotine composition, for example the device may be damaged and/or undesirable compounds may be generated in the vapour produced by the device.

**[0007]** Therefore, there is a need to provide a nicotine composition that can be used with different devices, thereby avoiding the risk of adversely affecting and/or damaging the device and/or also minimising the release of undesirable compounds.

**[0008]** It is one aim of the present invention, amongst others, to provide a nicotine composition that addresses at least one disadvantage of the prior art, whether identified here or elsewhere, or to provide an alternative to existing nicotine compositions.

**Summary of the Invention**

**[0009]** According to aspects of the present invention, there are provided a nicotine composition, an aerosol generation cartridge, the use of the nicotine composition or the aerosol generation cartridge in an aerosol generation device, an aerosol generation device, and a method of generating an inhalable aerosol comprising nicotine.

**[0010]** According to a first aspect of the present invention, there is provided a nicotine composition comprising:

nicotine  
an organic acid composition, and  
a carrier

wherein the organic acid composition comprises benzoic acid and/or citric acid and at least one further organic acid; wherein the nicotine is present in the nicotine composition in a molar excess compared to the total of the organic acids present in the organic acid composition; and wherein the nicotine is present in an amount of less than 1.5 wt% based on the total weight of the nicotine composition.

**[0011]** According to a second aspect of the present invention, there is provided a nicotine composition comprising:

a salt composition comprising nicotine, an organic acid composition, and a nicotine salt formed by reaction of the nicotine and at least one organic acid present in the organic acid composition; and  
a carrier

wherein the organic acid composition comprises benzoic acid and/or citric acid and at least one further organic acid; wherein the nicotine is present in the salt composition in a molar excess compared to the total of the organic acids

present in the organic acid composition; and  
wherein the nicotine is present in an amount of less than 1.5 wt% based on the total weight of the nicotine composition.

**[0012]** According to a third aspect of the present invention, there is provided a nicotine composition comprising:

nicotine  
an organic acid composition, and  
a carrier

wherein the organic acid composition comprises at least one first organic acid and at least one second organic acid;  
wherein the nicotine is present in a molar ratio compared to the total of the organic acids present in the organic acid composition of from 1.0:0.1 to 1.0:0.45; and wherein the nicotine is present in an amount of less than 1.5 wt.% based on the total weight of the nicotine composition.

**[0013]** According to a fourth aspect of the present invention, there is provided an aerosol generation cartridge comprising the nicotine composition according to the first, second or third aspect of the present invention.

**[0014]** According to a fifth aspect of the present invention, there is provided use of the nicotine composition according to the first, second or third aspect of the present invention or the aerosol generation cartridge according to the fourth aspect of the present invention in an aerosol generation device.

**[0015]** According to a sixth aspect of the present invention, there is provided an aerosol generation device comprising the nicotine composition according to the first, second or third aspect of the present invention or the aerosol generation cartridge according to the fourth aspect of the present invention.

**[0016]** According to a seventh aspect of the present invention, there is provided a method of generating an inhalable aerosol comprising nicotine for delivery to a user comprising:

using an aerosol generation device comprising a nicotine composition according to the first, second or third aspect of the present invention and a heater,  
the method comprising:

- (i) providing an amount of the nicotine composition to the heater; and
- (ii) forming an aerosol by heating the amount of the nicotine composition.

**[0017]** According to an eighth aspect of the present invention, there is provided a mousse comprising a nicotine composition according to the first, second or third aspect of the present invention. According to a ninth aspect of the present invention, there is provided a consumable item comprising a non-woven fibrous material comprising a nicotine composition according to the first, second or third aspect of the present invention.

**[0018]** Other features of the invention will be apparent from the dependent claims, and from the description which follows.

**[0019]** Features described in relation to the second, third, fourth, fifth, sixth, seventh, eighth and ninth aspects may have any of the suitable features and advantages described in relation to the first aspect.

## Detailed Description of the Invention

**[0020]** Unless otherwise stated, the following terms used in the specification and claims have the meanings set out below.

**[0021]** According to a first aspect of the present invention there is provided a nicotine composition comprising:

nicotine  
an organic acid composition, and  
a carrier

wherein the organic acid composition comprises benzoic acid and/or citric acid and at least one further organic acid;  
wherein the nicotine is present in the nicotine composition in a molar excess compared to the total of the organic acids present in the organic acid composition; and wherein the nicotine is present in an amount of less than 1.5 wt% based on the total weight of the nicotine composition.

**[0022]** According to a second aspect of the present invention, there is provided a nicotine composition comprising:

a salt composition comprising nicotine, an organic acid composition, and a nicotine salt formed by reaction of the nicotine and at least one organic acid present in the organic acid composition; and a carrier;  
 wherein the organic acid composition comprises benzoic acid and/or citric acid and at least one further organic acid;  
 wherein the nicotine is present in the salt composition in a molar excess compared to the total of the organic acids  
 present in the organic acid composition; and  
 wherein the nicotine is present in an amount of less than 1.5 wt% based on the total weight of the nicotine composition.

**[0023]** According to a third aspect of the present invention, there is provided a nicotine composition comprising:

nicotine  
 an organic acid composition, and  
 a carrier

wherein the organic acid composition comprises at least one first organic acid and at least one second organic acid;  
 wherein the nicotine is present in a molar ratio compared to the total of the organic acids present in the organic acid composition of from 1.0:0.1 to 1.0:0.45; and wherein the nicotine is present in an amount of less than 1.5 wt.% based on the total weight of the nicotine composition.

**[0024]** The inventors have surprisingly found that using a molar excess of nicotine in the nicotine compositions (suitably nicotine liquid compositions) of the present invention compared to the total of organic acids present provides an enhanced taste satisfaction in use, for example by providing a less bitter taste as well as a satisfying throat sensation and/or nicotine impact. Thus, the use of such a nicotine composition surprisingly provides an enhanced sensory experience.

**[0025]** The nicotine compositions of the invention can be used with different devices and may avoid damaging the device. For example, use of a nicotine composition according to the invention may minimize the risk of free acid reacting with any of the components present in the device.

**[0026]** The nicotine compositions of the first and second aspects of the present invention comprise an organic acid composition, wherein the organic acid composition comprises benzoic acid and/or citric acid and at least one further organic acid.

**[0027]** The nicotine compositions of the first and second aspects of the present invention may preferably comprise an organic acid composition, wherein the organic acid composition comprises benzoic acid and at least one further organic acid.

**[0028]** The nicotine compositions of the first and second aspects of the present invention may comprise an organic acid composition, wherein the organic acid composition comprises citric acid and at least one further organic acid.

**[0029]** The term "organic acid" as used herein refers to an organic compound with acidic properties, suitably as defined using the Brønsted-Lowry theory. For example, the term "organic acid" may be used to refer to an organic acid having a pKa in H<sub>2</sub>O of less than 7, for example of from 1 to 6, such as from 2 to 5 or from 3 to 4.5 or 3 to 4. For example, the pKa of the organic acid may be from 2.5 to 5.5. When an organic acid comprises more than one acid group, at least one of the acid groups has a pKa value as hereinbefore defined, and preferably all of the acid groups have such a pKa value. In addition, the term "organic acid" as used herein refers to an organic compound comprising at least one carboxyl functional group, which is also referred to as a carboxylic acid moiety. The carboxyl functional group can also be referred to as a "R-COOH" moiety, where the "-COOH" functional group corresponds to a carboxylic acid according to the IUPAC system. An "organic acid" as defined herein may comprise more than one carboxylic acid moiety. The terms "organic acid" or "organic acid compound" or "carboxylic acid" or "carboxylic acid compound" have the same meaning and can be used equally. Benzoic acid and citric acid are both examples of organic acids.

**[0030]** In the first and second aspects of the invention, the organic acid composition comprises at least one further organic acid. The organic acid composition may comprise any suitable further organic acid, i.e. in addition to the benzoic acid and/or citric acid. Thus, the at least one further acid is not benzoic acid or citric acid. The at least one further organic acid is suitably a carboxylic acid. Suitable carboxylic acids include monocarboxylic acids, dicarboxylic acids and polycarboxylic acids. Examples of suitable further organic acids that are monocarboxylic acids include cinnamic acid and lactic acid. Examples of suitable further organic acids that are dicarboxylic acids include succinic acid and glutaric acid.

**[0031]** Suitable carboxylic acids may comprise a hydrocarbon chain, for example a linear or an optionally substituted chain with a carbon backbone. The optionally linear or substituted chain with a carbon backbone may be saturated or unsaturated. For example, an unsaturated carbon backbone chain can comprise at least one double bond or at least one triple bond or a combination thereof. The optionally linear or substituted carbon backbone may be interrupted by one or more heteroatoms. For example, the optionally linear or substituted carbon backbone may be interrupted by one or more oxygen, sulfur or nitrogen atoms. Suitable carboxylic acids may comprise a substituted chain with a carbon backbone. Suitable substituents may comprise one or more heteroatoms. For example, suitable substituents may be selected from one or more of an alcohol, a thiol, an aldehyde, a ketone, an acid halide, an ester, a nitrile, an ether, a

thioether, an amine, an amide, an anhydride or a disulfide moiety. The carboxylic acid may be predominantly aliphatic or predominantly aromatic in nature.

**[0032]** The at least one further organic acid may suitably be selected from levulinic acid, tartaric acid, capric acid, pyruvic acid, fumaric acid, lactic acid, malic acid, sorbic acid, adipic acid, aspartic acid, glutamic acid, succinic acid, gluconic acid, linoleic acid, saccharic acid, 3,7 dimethyl-6-octenoic acid, 2-methyl pentanoic acid, trans-2-hexenoic acid, lauric acid, stearic acid, butyric acid, linolenic acid, malonic acid, myristic acid, oleic acid, palmitic acid, phenylacetic acid, propionic acid, valeric acid, hexanoic acid, octanoic acid, acetic acid, oxalic acid, formic acid, salicylic acid and mixtures thereof. Preferably, the at least one further organic acid may suitably be selected from one or more of levulinic acid, tartaric acid, fumaric acid, lactic acid, malic acid, adipic acid, aspartic acid, succinic acid, gluconic acid, phenylacetic acid, ascorbic acid, formic acid, and mixtures thereof. More preferably, the at least one further organic acid may suitably be selected from tartaric acid and lactic acid, and mixtures thereof.

**[0033]** References to named compounds herein include isomers thereof, for example stereoisomers thereof. For example, the reference to "tartaric acid" includes "D-tartaric acid" and "L-tartaric acid". Tartaric acid may therefore be referred to herein as "D/L-tartaric acid" in reference to both enantiomers.

**[0034]** The nicotine composition of the third aspect of the present invention comprises at least one first organic acid and at least one second organic acid.

**[0035]** The term "first organic acid" as used herein refers to an organic acid (as defined herein) that has a carbon atom in the  $\alpha$ -position (i.e., the first carbon after the carbon to which the carboxyl functional group is attached) that is a tertiary or quaternary carbon or a carbon that is included in a double or triple bond and in which the carbon atom in the  $\alpha$ -position does not include a hydrogen atom. Examples of suitable first organic acids include benzoic acid, citric acid, and mixtures thereof.

**[0036]** The term "second organic acid" as used herein refers to an organic acid (as defined herein) that has a carbon atom in the  $\alpha$ -position (i.e., the first carbon after the carbon to which the carboxyl functional group is attached) that is a primary, secondary or tertiary carbon or is a carbon that is included in a double bond and in which the carbon atom in the  $\alpha$ -position includes at least one hydrogen atom. Preferably, the second organic acid has a carbon atom in the  $\alpha$ -position that is a secondary carbon.

**[0037]** Examples of suitable second organic acids include levulinic acid, tartaric acid, capric acid, fumaric acid, lactic acid, malic acid, adipic acid, aspartic acid, glutamic acid, succinic acid, gluconic acid, linoleic acid, saccharic acid, 3,7 dimethyl-6-octenoic acid, 2-methyl pentanoic acid, trans-2-hexenoic acid, lauric acid, stearic acid, butyric acid, linolenic acid, malonic acid, myristic acid, oleic acid, palmitic acid, phenylacetic acid, propionic acid, valeric acid, hexanoic acid, octanoic acid, acetic acid, and mixtures thereof. Preferred second organic acids are lactic acid, tartaric acid and mixtures thereof.

**[0038]** When an organic acid comprises more than one carboxyl functional group, the classification under "first" or "second" organic acid will depend on the carbon atoms at an  $\alpha$ -position. In such a case, if at least one of the carbon atoms at an  $\alpha$ -position is a tertiary or quaternary carbon or a carbon that is included in a double or triple bond and does not include a hydrogen atom, the corresponding organic acid is a first organic acid.

**[0039]** Features of the nicotine compositions of the first and second aspects of the invention as described above apply equally to the nicotine composition of the third aspect (including features relating to the nicotine and organic acid composition).

**[0040]** Suitably in the first, second or third aspect, the organic acid composition may comprise benzoic acid and lactic acid. Suitably in the first, second or third aspect, the organic acid composition may consist essentially of benzoic acid and lactic acid. Suitably in the first, second or third aspect, the organic acid composition may consist of benzoic acid and lactic acid.

**[0041]** Suitably in the first, second or third aspect, the organic acid composition may comprise benzoic acid and tartaric acid. Suitably in the first, second or third aspect, the organic acid composition may consist essentially of benzoic acid and tartaric acid. Suitably in the first, second or third aspect, the organic acid composition may consist of benzoic acid and tartaric acid.

**[0042]** Suitably in the first, second or third aspect, the organic acid composition may comprise benzoic acid, lactic acid and tartaric acid. Suitably in the first, second or third aspect, the organic acid composition may consist essentially of benzoic acid, lactic acid and tartaric acid. Suitably in the first, second or third aspect, the organic acid composition may consist of benzoic acid, lactic acid and tartaric acid.

**[0043]** Suitably in the first or second aspect, the benzoic acid and/or citric acid may be present in the organic acid composition in a molar ratio compared to the at least one further organic acid of from 1.0:0.35 to 1.0:0.80, for example of from 1.0:0.45 to 1.0:0.75 or of from 1.0:0.55 to 1.0:0.80, for example of from 1.0:0.5 to 1.0:0.70. Preferably in the first or second aspect, the benzoic acid and/or citric acid may be present in the organic acid composition in a molar ratio compared to the at least one further organic acid of from 1.0:0.6 to 1.0:0.70. More preferably in the first or second aspect, the benzoic acid and/or citric acid may be present in the organic acid composition in a molar ratio compared to the at least one further organic acid of 1.0:0.35, of 1.0:0.45, of 1.0:0.50, of 1.0:0.55, of 1.0:0.60, of 1.0:0.65, of 1.0:0.70, of



acid) and at least one second organic acid, wherein the benzoic acid may be present in the organic acid composition in a molar ratio compared to the at least one second organic acid of from 1.0:0.6 to 1.0:0.70. More preferably in the third aspect, the organic acid composition may consist essentially of or consist of benzoic acid (as the first organic acid) and at least one second organic acid, wherein the benzoic acid may be present in the organic acid composition in a molar ratio compared to the at least one second organic acid of 1.0:0.35, of 1.0:0.45, of 1.0:0.50, of 1.0:0.55, of 1.0:0.60, of 1.0:0.65, of 1.0:0.70, of 1.0:0.75, or of 1.0:0.80.

**[0051]** Suitably in the first or second aspect, the organic acid composition may consist essentially of or consist of citric acid and at least one further organic acid, wherein the citric acid may be present in a molar ratio compared to the at least one further organic acid of from 1.0:0.35 to 1:0 to 0.80, for example of from 1.0:0.45 to 1.0:0.75 or of from 1.0:0.55 to 1.0:0.80, for example of from 1.0:0.5 to 1.0:0.70. Preferably in the first or second aspect, the organic acid composition may consist essentially of or consist of citric acid and at least one further organic acid, wherein the citric acid may be present in the organic acid composition in a molar ratio compared to the at least one further organic acid of from 1.0:0.6 to 1.0:0.70. More preferably in the first or second aspect, the organic acid composition may consist essentially of or consist of citric acid and at least one further organic acid, wherein the citric acid may be present in the organic acid composition in a molar ratio compared to the at least one further organic acid of 1.0:0.35, of 1.0:0.45, of 1.0:0.50, of 1.0:0.55, of 1.0:0.60, of 1.0:0.65, of 1.0:0.70, of 1.0:0.75, or of 1.0:0.80.

**[0052]** Suitably in the third aspect, the organic acid composition may consist essentially of or consist of citric acid (as the first organic acid) and at least one second organic acid, wherein the citric acid may be present in a molar ratio compared to the at least one second organic acid of from 1.0:0.35 to 1:0 to 0.80, for example of from 1.0:0.45 to 1.0:0.75 or of from 1.0:0.55 to 1.0:0.80, for example of from 1.0:0.5 to 1.0:0.70. Preferably in the third aspect, the organic acid composition may consist essentially of or consist of citric acid (as the first organic acid) and at least one second organic acid, wherein the citric acid may be present in the organic acid composition in a molar ratio compared to the at least one second organic acid of from 1.0:0.6 to 1.0:0.70. More preferably in the third aspect, the organic acid composition may consist essentially of or consist of citric acid (as the first organic acid) and at least one second organic acid, wherein the citric acid may be present in the organic acid composition in a molar ratio compared to the at least one second organic acid of 1.0:0.35, of 1.0:0.45, of 1.0:0.50, of 1.0:0.55, of 1.0:0.60, of 1.0:0.65, of 1.0:0.70, of 1.0:0.75, or of 1.0:0.80.

**[0053]** Suitably in the first, second or third aspect, the organic acid composition may comprise benzoic acid, lactic acid and tartaric acid, wherein the benzoic acid may be present in the organic acid composition in a molar ratio compared to the sum of the molar ratios of lactic acid and tartaric acid of from 1.0:0.35 to 1:0 to 0.80, for example of from 1.0:0.45 to 1.0:0.75 or of from 1.0:0.55 to 1.0:0.80, for example of from 1.0:0.5 to 1.0:0.70. Preferably in the first, second or third aspect, the organic acid composition may comprise benzoic acid, lactic acid and tartaric acid, wherein the benzoic acid may be present in the organic acid composition in a molar ratio compared to the sum of the molar ratio of lactic acid and tartaric acid of from 1.0:0.6 to 1.0:0.70. More preferably in the first, second or third aspect, the organic acid composition may comprise benzoic acid, lactic acid and tartaric acid, wherein the benzoic acid may be present in the organic acid composition in a molar ratio compared to the sum of the molar ratios of lactic acid and tartaric acid of 1.0:0.35, of 1.0:0.45, of 1.0:0.50, of 1.0:0.55, of 1.0:0.60, of 1.0:0.65, of 1.0:0.70, of 1.0:0.75, or of 1.0:0.80.

**[0054]** Suitably in the first, second or third aspect, the organic acid composition may consist essentially of or consist of benzoic acid, lactic acid and tartaric acid, wherein the benzoic acid may be present in the organic acid composition in a molar ratio compared to the sum of the molar ratios of lactic acid and tartaric acid of from 1.0:0.35 to 1:0 to 0.80, for example of from 1.0:0.45 to 1.0:0.75 or from 1.0:0.55 to 1.0:0.80. Preferably in the first, second or third aspect, the organic acid composition may consist essentially of or consist of benzoic acid, lactic acid and tartaric acid, wherein the benzoic acid may be present in the organic acid composition in a molar ratio compared to the sum of the molar ratio of lactic acid and tartaric acid of from 1.0:0.6 to 1.0:0.70. More preferably in the first, second or third aspect, the organic acid composition may consist essentially of or consist of benzoic acid, lactic acid and tartaric acid, wherein the benzoic acid may be present in the organic acid composition in a molar ratio compared to the sum of the molar ratios of lactic acid and tartaric acid of 1.0:0.35, of 1.0:0.45, of 1.0:0.50, of 1.0:0.55, of 1.0:0.60, of 1.0:0.65, of 1.0:0.70, of 1.0:0.75, or of 1.0:0.80.

**[0055]** The nicotine compositions of the first, second and third aspects of the present invention comprise nicotine. The nicotine is typically provided as free base (or un-protonated) nicotine and may be present in the nicotine composition in any suitable form. As the skilled person would appreciate, the form of the nicotine will depend on the pH of the nicotine composition, with di-, mono- and un-protonated forms of nicotine being possible. The nicotine compositions of the first, second and third aspects of the present invention typically have a pH in the range of from about 6 to about 9, such that the nicotine typically is present in the compositions in the mono- and/or un-protonated form.

**[0056]** The nicotine may be extracted from tobacco or may be synthetic nicotine.

**[0057]** The nicotine compositions of the first, second and third aspects of the invention may comprise tobacco (i.e. wherein the tobacco provides the nicotine).

**[0058]** The nicotine compositions of the first, second and third aspects of the invention may comprise tobacco and nicotine (for example synthetic nicotine provided in the form of free base nicotine).

**[0059]** The nicotine compositions of the first, second and third aspects of the present invention may be substantially free of tobacco. The nicotine oral delivery composition of the present invention may be completely free of tobacco.

**[0060]** As used herein, the term "substantially free" means that the material being discussed is present in the composition, if at all, as an incidental impurity. In other words, the material does not affect the properties of the composition.

As used herein, the term "completely free" means that the material being discussed is not present in the composition at all.

**[0061]** The nicotine is present in the nicotine compositions of the first and second aspects of the present invention in a molar excess compared to the total of the organic acids present in the organic acid composition.

**[0062]** In the third aspect of the invention the nicotine is present in a molar ratio compared to the total of the organic acids present in the organic acid composition of from 1.0:0.1 to 1.0:0.45.

**[0063]** In the second aspect of the present invention, the nicotine composition comprises a salt composition comprising nicotine and a nicotine salt. The nicotine salt is formed by reaction of the nicotine and at least one organic acid present in the organic acid composition. This reaction provides the salt composition comprising nicotine and the nicotine salt. Thus, the nicotine salt is in the form of protonated nicotine (for example mono-protonated nicotine) and a counter anion of at least one organic acid of the organic acid composition. The skilled person would readily understand how the nicotine salt is formed and what counter anion would be present according to the organic acid(s) used. In the second aspect of the present invention, the nicotine is present in the salt composition in a molar excess compared to the total of the organic acids present in the organic acid composition.

**[0064]** The skilled person would appreciate that nicotine salt(s) are also formed upon contact of the nicotine and the organic acid(s) present in the compositions of the first and third aspects of the invention at an appropriate pH.

**[0065]** References herein to a molar excess may also be referred to as a non-equimolar ratio.

**[0066]** By "compared to the total of the organic acids" we mean to refer to the sum of the molar ratios of each of the organic acids present in the organic acid composition, including benzoic acid and/or citric acid.

**[0067]** By providing the nicotine in a molar excess compared to the total of the organic acids present in the organic acid composition this means that not all of the nicotine reacts with organic acid, such that free nicotine remains in the nicotine composition. This may provide advantages in use. For example using an excess of nicotine means that all or most of the organic acids react with the nicotine so that there is no or little free organic acid available to corrode components of a cartridge or device with which the nicotine composition is used and/or to react with other components of the nicotine composition to provide undesirable compounds. The use of excess nicotine also improves the sensory experience (such as "throat sensation" and nicotine impact) of the user of a device with which the nicotine composition is used.

**[0068]** Suitably in the first or second aspect, the nicotine is present in a molar ratio compared to the total of the organic acids present in the organic acid composition of from 1.0:0.1 to 1.0:0.95, for example of from 1.0:0.1 to 1.0:0.45. In these aspects, the nicotine may be present in a molar ratio compared to the total of the organic acids present in the organic acid composition of from 1.0:0.1 to 1.0:0.4, such as from 1.0:0.2 to 1.0:0.4.

**[0069]** In the third aspect, the nicotine is present in a molar ratio compared to the total of the organic acids present in the organic acid composition of from 1.0:0.1 to 1.0:0.45. In this aspect, the nicotine may be present in a molar ratio compared to the total of the organic acids present in the organic acid composition of from 1.0:0.1 to 1.0:0.4, such as from 1.0:0.2 to 1.0:0.4.

**[0070]** Suitably, the organic acid composition of the first or second aspect may comprise benzoic acid, lactic acid and tartaric acid, and the nicotine may be present in a molar ratio compared to the total of benzoic acid, lactic acid and tartaric acid of from 1.0:0.1 to 1.0:0.95, for example of from 1.0:0.1 to 1.0:0.45. In these aspects, the nicotine may be present in a molar ratio compared to the total of benzoic acid, lactic acid and tartaric acid of from 1.0:0.1 to 1.0:0.4, such as from 1.0:0.2 to 1.0:0.4.

**[0071]** Suitably, the organic acid composition of the first or second aspect may consist essentially of or consist of benzoic acid, lactic acid and tartaric acid, and the nicotine may be present in a molar ratio compared to the total of benzoic acid, lactic acid and tartaric acid of from 1.0:0.1 to 1.0:0.95, for example of from 1.0:0.1 to 1.0:0.45, from 1.0:0.1 to 1.0:0.4, or from 1.0:0.2 to 1.0:0.4.

**[0072]** Suitably, the organic acid composition of the third aspect may comprise benzoic acid, lactic acid and tartaric acid, and the nicotine may be present in a molar ratio compared to the total of benzoic acid, lactic acid and tartaric acid of from 1.0:0.1 to 1.0:0.45. In this aspect, the nicotine may be present in a molar ratio compared to the total of benzoic acid, lactic acid and tartaric acid of from 1.0:0.1 to 1.0:0.4, such as from 1.0:0.2 to 1.0:0.4.

**[0073]** Suitably, the organic acid composition of the third aspect may consist essentially of or consist of benzoic acid, lactic acid and tartaric acid, and the nicotine may be present in a molar ratio compared to the total of benzoic acid, lactic acid and tartaric acid of from 1.0:0.1 to 1.0:0.45, from 1.0:0.1 to 1.0:0.4, or from 1.0:0.2 to 1.0:0.4.

**[0074]** The nicotine is present in an amount of less than 1.5 wt% based on the total weight of the nicotine composition. Suitably, the nicotine is present in an amount of at least 0.3 wt% based on the total weight of the nicotine composition.

**[0075]** Suitably, the nicotine is present in an amount of from 0.3 wt% to 1.5 wt% based on the total weight of the nicotine composition. Suitably, the nicotine is present in an amount of from 0.3 wt% to 1.2 wt% based on the total weight



of the nicotine composition.

**[0076]** The nicotine composition of the first, second and third aspects of the invention may take any suitable form, for example the nicotine composition may be in a liquid form (at ambient temperature and pressure). The nicotine composition may be in a vaporisable form.

**[0077]** The nicotine composition of the first, second and third aspects of the present invention comprises a carrier. Any suitable carrier may be used. The carrier may suitably be in a liquid form. The nicotine compositions of the first, second and third aspects of the present invention are therefore suitably liquid compositions. Suitably, the nicotine compositions of the first, second and third aspects of the present invention may be referred to as nicotine liquid compositions.

**[0078]** Any suitable liquid carrier may be used. Examples include, but are not limited to, glycerol, propylene glycol, trimethylene glycol, 1,3-propanediol, and ethanol, as well as combinations thereof.

**[0079]** For example, the carrier may comprise 0 wt% to 100 wt% of propylene glycol (PG) and 100 wt% to 0 wt% of glycerol, preferably vegetable glycerol (VG). For example, the carrier may comprise 0 wt% to 100 wt% of propylene glycol and 100 wt% to 0 wt% of glycerol, suitably vegetable glycerol. For example, the carrier may comprise 10 wt% to 70 wt% of propylene glycol and 90 wt% to 30 wt% of glycerol, suitably vegetable glycerol. For example, the carrier may comprise 20 wt% to 50 wt% of propylene glycol and 80 wt% to 50 wt% of glycerol, suitably vegetable glycerol. For example, the carrier may comprise 30 wt% propylene glycol and 70 wt% glycerol, suitably vegetable glycerol.

**[0080]** For example, the carrier may comprise vegetable glycerol or a mixture of vegetable glycerol and propylene glycol, preferably in a weight ratio of vegetable glycerol to propylene glycol from 100:0 to 40:60. The carrier may be a mixture of vegetable glycerol and propylene glycol in a molar ratio of 100:0, for example 90:10, such as 80:20, preferably 70:30 and more preferably 60:40, even more preferably 50:50 and most preferably 40:60.

**[0081]** The nicotine composition may further comprise water. The nicotine composition may comprise water in an amount up to about 20 wt%, for example up to about 10 wt% or up to about 5 wt%, based on the total weight of the composition. The total water content of the nicotine composition is suitably from 0 to 20 wt%, for example from 5 to 10 wt%, based on the total weight of the composition. When the nicotine composition contains small amounts of water, for example up to about 5 wt% based on the total weight of the composition, this may be absorbed from the atmosphere.

**[0082]** The nicotine composition of the first, second and third aspects of the invention has any suitable pH. For example, the nicotine composition suitably has a pH of from 6 to 9, such as 5 to 8, such as from 5.5 to 7.5. Suitably, the pH is selected to allow the formation of a suitable nicotine salt as discussed above.

**[0083]** The nicotine compositions described herein may comprise additional suitable components, which would be well known to persons skilled in the art. Suitable such additional components may include for example one or more of a flavourant, stabilizer, diluent, dispersing agent, suspending agent, thickening agent, preservative, buffering agent and excipient. When present, the amount of each additional component used may depend on the particular additional component chosen.

**[0084]** By the term "flavourant" we mean a compound (or mixture of compounds) that provide a flavour upon administration of the nicotine composition. A "flavourant" may alternatively be referred to as a flavour.

**[0085]** Suitable flavourants may comprise menthol or a derivative thereof.

**[0086]** The compositions of the first, second and third aspects of present invention may further comprise a buffering agent, for example to control pH and/or to prevent pH drift under storage conditions. Suitably the buffering agent is a pharmaceutically acceptable buffering agent. Suitable buffering agents are well known to persons skilled in the art. Examples of suitable buffering agents include zinc sulfate, boric acid, sodium borate, potassium bicarbonate, sodium phosphate, sodium acetate and sodium citrate.

**[0087]** The compositions of the first, second and third aspects of the present invention may comprise a preservative. Any known preservative may be used, such as a preservative suitable for inhalation. Examples of suitable preservatives include quaternary ammonium preservative agents (such as benzalkonium chloride), sorbic acid, disodium ethylenediaminetetraacetate, ethylenediaminetetraacetic acid (EDTA), and methyl- and propyl-paraben.

**[0088]** The nicotine composition of the first, second and third aspect may be manufactured by mixing all the components thereof. Liquid components are generally miscible with each other, while any solid components may need to be dissolved in the mixture. As will be appreciated by the skilled person, gentle heating of the mixture may help to dissolve any solid components more rapidly.

**[0089]** A fourth aspect of the present invention provides an aerosol generation cartridge comprising a nicotine composition (suitably a nicotine liquid composition) according to the first, second or third aspect.

**[0090]** The aerosol generation cartridge can be any cartridge suitable to be used with an aerosol generation device. The aerosol generation cartridge comprises a fluid storage compartment, wherein the fluid storage compartment stores a nicotine composition (suitably a nicotine liquid composition) according to the first, second or third aspect of the invention.

**[0091]** A fifth aspect of the present invention provides a use of the nicotine composition (suitably nicotine liquid composition) according to the first, second or third aspect or the aerosol generation cartridge according to the fourth aspect in an aerosol generation device.

**[0092]** A sixth aspect of the present invention provides an aerosol generation device comprising the nicotine composition (suitably nicotine liquid composition) according to the first, second or third aspect or the aerosol generation cartridge according to the fourth aspect.

**[0093]** The aerosol generation device according to the sixth aspect of the present invention can be any type of aerosol generation device known to a person skilled in the art. In general, the term "aerosol generation device", "electronic cigarette", "e-cigarette" or "low temperature vaporization device", refers to an electronic inhaler that vaporizes a liquid composition or solution into an aerosol mist, simulating the act of tobacco smoking. In general, an aerosol generation device contains four main components: a mouthpiece, a reservoir for liquid, an atomizer that vaporizes the liquid, and a battery. The reservoir stores the nicotine composition.

**[0094]** In the aerosol generation device according to the sixth aspect of the invention the reservoir stores the nicotine composition (suitably nicotine liquid composition) according to the first, second or third aspect of the present invention. The reservoir may be replaceable or not. Suitably the aerosol generation device according to the sixth aspect of the present invention comprises an aerosol generation cartridge according to the fourth aspect of the invention and the aerosol generation cartridge forms the reservoir of the aerosol generation device.

**[0095]** Other components of the aerosol generation devices may include a combined atomizer and reservoir that may or may not be disposable, a mouthpiece that may be integrated with the combined atomizer and reservoir or not, and a battery.

**[0096]** The vaporizer of the aerosol generation device is not further restricted and can implement different techniques. Exemplary embodiments of the vaporizer are an induction heated device, a light heated device, or an electrically heated device. The induction heated device includes a generator for generating an alternating electromagnetic field and one or more susceptors which generate heat used to vaporize the nicotine composition (suitably nicotine liquid composition) when energized by the generated alternating electromagnetic field. The light heated device uses a light source such as a laser or high-power LED directing light to an absorber element which is heated by the light absorbed from the light source in order to vaporize the nicotine composition (suitably nicotine liquid composition). In the electrically heated device a heat transfer element absorbs heat from an electrical heater and transfers it to a wick for vaporization of the e-liquid.

**[0097]** A seventh aspect of the present invention provides a method of generating an inhalable aerosol comprising nicotine for delivery to a user comprising using an aerosol generation device comprising a nicotine composition (suitably nicotine liquid composition) and a heater, wherein the nicotine composition is a nicotine composition (suitably nicotine liquid composition) according to the first, second or third aspect, the method comprising (i) providing an amount of the nicotine composition (suitably nicotine liquid composition) to the heater; and (ii) forming an aerosol by heating the amount of the nicotine composition (suitably nicotine liquid composition).

**[0098]** The aerosol generation device is not further restricted. Preferably the aerosol generation device is an electronic cigarette.

**[0099]** An eighth aspect of the present invention provides a mousse comprising a nicotine composition according to the first, second or third aspect of the present invention. The mousse suitably further comprises a foam, wherein the foam comprises components known to persons skilled in the art. The mousse of the eighth aspect of the invention may comprise one or more suitable additional components such as an aerosol forming agent, a foam stabilizing agent and a foam forming agent. Suitably, the mousse may comprise from 0.1 to 33 wt% of the nicotine composition according to the first, second or third aspect of the invention and from 99.9 to 67 wt% of a foam.

**[0100]** That is, the nicotine composition according to the first, second or third aspect of the present invention can be used as tobacco ingredient containing agent and/or an inhalable agent in a mousse/foam as known by a skilled person and described in WO 2018/122375, which is hereby incorporated by reference.

**[0101]** A ninth aspect of the present invention provides a consumable item comprising a non-woven fibrous material comprising a nicotine composition (suitably nicotine liquid composition) according to the first, second or third aspect of the present invention. The non-woven fibrous material may comprise paper made from cellulose fibers or reconstituted tobacco fibers. Suitably the consumable item is in the form of a pod, preferably comprising an outer shell or wrapping formed of paper or plastic and/or preferably being pierceable to permit an airflow to flow through the pod.

**[0102]** Suitably the consumable item may be in the form of a rod having a paper wrapping and including a mouthpiece formed from a filter, such as a center hold filter or an acetate filter.

**[0103]** In any of the consumable items as described above the fibrous material is suitably formed by generating a fibrous material by processing cellulose fibers and or tobacco fibers to make a sheet (for example by forming a slurry of fibers and then pressing the slurry) and then adding a nicotine composition (suitably a nicotine liquid composition) according to the first, second or third aspect.

**[0104]** For a better understanding of the invention, and to show how exemplary embodiments of the same may be brought into effect, reference will be made to the following non-limiting examples.

## Examples

### Assessing the sensorial experience of nicotine liquid formulations

**[0105]** A standard method for the assessment of flavours and fragrances may be used to assess the sensorial experience of nicotine liquid compositions in an objective manner

**[0106]** The assessment of the sensorial effect would use the methodology of Quantitative Descriptive Analysis (QDA™). Through this method, the sensory characteristics of all products would be determined by a trained sensory panel. The assessors included in the panel would be selected based on their sensory acuity and descriptive ability.

#### Description of the methodology

**[0107]** The assessors initially generate a vocabulary list to best describe the samples to include initial impact and during vaping modalities. The discussion regarding differences and similarities between the samples are facilitated by a panel leader whose role is to ensure there is consensus within the group for each attribute and their corresponding definition (see the sensory attributes list in Table 1).

**[0108]** The panel practices scoring these different attributes by evaluating the samples to determine which is higher and lower in the particular attribute evaluated.

**[0109]** The samples are then rated against this vocabulary, on an individual basis and according to a balanced experimental design, which minimizes bias due to sample presentation order. Evaluation for the QDA is usually conducted in triplicate using an unstructured line scale with no anchor points.

**[0110]** Results are collected via a data capture system and analyzed using Analysis Of Variance (ANOVA).

**[0111]** Time points evaluated would be as indicated below:

Time Points:

Break in between samples: 5 minutes

0-1 min (Initial Impact)

1-5 min (During Vaping)

Table 1: Sensory Attributes list

| Attribute                    | Description                                                                                                                                                       | Scale           |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Initial Throat Sensation     | Measure the feeling you get in the back of your throat and chest when you inhale vapour for the first vape                                                        | Low to High     |
| Vapour Volume                | Measure the amount of vapour perceived in the mouth when inhaling and exhaling                                                                                    | Low to High     |
| Overall Flavour              | Measure of an overall perception of the flavour intensity (of any kind)                                                                                           | Low to High     |
| Tobacco                      | Measure of flavour associated with tobacco (like Golden Virginia, Old Holborn or Amber leaf)                                                                      | Low to High     |
| Bitter                       | Measure of bitter taste perceived on tongue, like in coffee                                                                                                       | Low to High     |
| Off-Taste                    | Measure of any kind of unwanted bad notes perceived including plastic notes                                                                                       | Low to High     |
| Complexity of taste          | More than one dominant taste component mingling with each other                                                                                                   | Low to High     |
| Mouth/Nose/Throat scratching | Measure of a tingling, prickling and/or scratching sensation perceived on the lips, tongue or back of the throat from none which is smooth to very which is harsh | Smooth to Harsh |
| Perceived Nicotine Strength  | Perceived level of nicotine in the product                                                                                                                        | Low to High     |

Sensory test objective:

The following QDA™ could be designed to understand the sensory differences between the e-liquids at 12mg/ml with mix of acids at two different molar ratios (molar ratio of nicotine to acid 1.0:0.2 and 1.0:0.4) and the standard sample of tobacco flavour e-liquid at 12mg/ml without acids.

**[0112]** The objective of the study would be to determine which of the two formulations combined: Reduced bitterness level in taste

Reduced nose and throat irritation level.

Reduced off-taste

Same level of other attributes

**[0113]** Trials would be formulated to achieve same nicotine strength and different molar ratios of acids to nicotine at 12mg/ml as summarised in the Table 2 below.

Table 2

| Example                                                                                                                                                           | Nicotine conc. (mg/ml) | PG/G* | Molar ratio Nicotine:Acid | Organic acid composition      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------|---------------------------|-------------------------------|
| 1                                                                                                                                                                 | 12                     | 50/50 | 1.0:0.2                   | Yes, mixture of acids BA/TA** |
| 2                                                                                                                                                                 | 12                     | 50/50 | 1.0:0.4                   | Yes, mixture of acids BA/TA** |
| 3                                                                                                                                                                 | 12                     | 50/50 | n/a                       | no                            |
| * PG = propylene glycol, G = glycerol                                                                                                                             |                        |       |                           |                               |
| ** Mixture of acids contains a mixture of benzoic acid (BA) mixed with tartaric acid (TA) according to a molar ratio of 1.0:0.5 of benzoic acid to tartaric acid. |                        |       |                           |                               |

**[0114]** The preparation method comprises the following steps at room temperature and under normal atmospheric pressure:

1- Prepare the propylene glycol

2- Add the nicotine working under air extractor and wearing protective gloves and glasses

3- Add the flavour concentrate

4- Add the vegetable glycerol to equal amount of propylene glycol

5- Uniformly mix the propylene glycol, the vegetable glycerol, the flavour concentrate and the nicotine to obtain the nicotine composition.

**[0115]** Results from ANOVA:

| Summary of attributes mean scores for each e-liquids and of the significant differences. Attributes + significance_symbol |      | Example 3     | Example 1     | Example 2     | p-values |
|---------------------------------------------------------------------------------------------------------------------------|------|---------------|---------------|---------------|----------|
| Initial Throat Sensation                                                                                                  |      | 40.3          | same          | same or lower | >90%     |
| Vapour Volume                                                                                                             |      | 42.6          | same          | same          | >90%     |
| Overall Flavour                                                                                                           |      | 34.0          | higher        | higher        | >90%     |
| Bitter                                                                                                                    |      | 11.5          | lower         | lower         | <90%     |
| Off-Taste                                                                                                                 | 19.8 | lower         | lower         | <90%          |          |
| Complexity of Taste                                                                                                       | 27.8 | same          | same          | <90%          |          |
| Mouth/Nose/Throat Scratching                                                                                              | 34.0 | lower         | lower         | <90%          |          |
| Perceived nicotine strength                                                                                               | 45.0 | same or lower | same or lower | >90%          |          |

**[0116]** The results show that the addition of an organic acid composition with an excess of nicotine has an impact on the sensory profile. Namely, compared to the tobacco composition/flavour e-liquid without the acid composition at 12mg/ml, the nicotine compositions with acid compositions at 1.0:0.2 and 1.0:0.4 molar ratios (nicotine:acid) demonstrate less bitter, less off-taste and less mouth, throat and nose scratching. The addition of the acid composition does not impact on the vapour volume but displays a positive impact on the overall flavour compared to the control composition without the acid composition. Hence, the addition of the acid composition to a nicotine composition in a non-equimolar ratio improves the overall user sensory experience by maintaining an appropriate vapour volume while improving the overall flavour and decreasing the bitterness, the off-taste and the mouth, throat and nose scratching.

**[0117]** Throughout this specification, the term "comprising" or "comprises" means including the component(s) specified but not to the exclusion of the presence of other components. The term "consisting essentially of" or "consists essentially of" means including the components specified but excluding other components except for materials present as impurities, unavoidable materials present as a result of processes used to provide the components, and components added for a purpose other than achieving the technical effect of the invention. Typically, when referring to compositions, a composition consisting essentially of a set of components will comprise less than 5% by weight, typically less than 3% by weight, more typically less than 1% by weight of non-specified components.

**[0118]** For the avoidance of doubt, wherein amounts of components in a composition are described in wt%, this means the weight percentage of the specified component in relation to the whole composition referred to. For example, "wherein the nicotine oral delivery composition comprises from 1 to 15 wt% of the source of nicotine" means that 1 wt% to 15 wt% of the nicotine oral delivery composition is provided by the source of nicotine.

**[0119]** The optional features set out herein may be used either individually or in combination with each other where appropriate and particularly in the combinations as set out in the accompanying claims. The optional features for each aspect or exemplary embodiment of the invention as set out herein are also to be read as applicable to any other aspect or exemplary embodiments of the invention, where appropriate. In other words, the skilled person reading this specification should consider the optional features for each exemplary embodiment of the invention as interchangeable and combinable between different exemplary embodiments.

**[0120]** Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

**[0121]** All of the features disclosed in this specification (including any accompanying claims, and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

**[0122]** Each feature disclosed in this specification (including any accompanying claims, and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

**[0123]** The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

## Claims

### 1. A nicotine composition comprising:

nicotine  
an organic acid composition, and  
a carrier  
wherein the organic acid composition comprises benzoic acid and/or citric acid and at least one further organic acid;  
wherein the nicotine is present in the nicotine composition in a molar excess compared to the total of the organic acids present in the organic acid composition; and  
wherein the nicotine is present in an amount of less than 1.5 wt% based on the total weight of the nicotine composition.

2. The nicotine composition according to claim 1, wherein the at least one further organic acid is selected from levulinic acid, tartaric acid, capric acid, pyruvic acid, fumaric acid, lactic acid, malic acid, sorbic acid, adipic acid, aspartic acid, glutamic acid, succinic acid, gluconic acid, linoleic acid, saccharic acid, 3,7 dimethyl-6-octenoic acid, 2-methyl pentanoic acid, trans-2-hexenoic acid, lauric acid, stearic acid, butyric acid, linolenic acid, malonic acid, myristic acid, oleic acid, palmitic acid, phenylacetic acid, propionic acid, valeric acid, hexanoic acid, octanoic acid, acetic acid, oxalic acid, formic acid, salicylic acid and mixtures thereof.

3. The nicotine composition according to any preceding claim, wherein the organic acid composition comprises benzoic acid, suitably wherein the organic acid composition comprises benzoic acid and lactic acid.

4. The nicotine composition according to any preceding claim, wherein the organic acid composition consists of benzoic acid, lactic acid and tartaric acid.

5. The nicotine composition according to any preceding claim, wherein the nicotine is present in the nicotine composition or in the salt composition in a molar ratio compared to the total of the organic acids present in the organic acid composition of from 1.0:0.1 to 1.0:0.95, for example of from 1.0:0.1 to 1.0:0.45.

6. The nicotine composition according to any preceding claim, wherein the nicotine is present in an amount of at least 0.3 wt% based on the total weight of the nicotine composition, suitably wherein the nicotine is present in an amount of from 0.3 to 1.2 wt% based on the total weight of the nicotine composition.

7. The nicotine composition according to any preceding claim, wherein the benzoic acid and/or citric acid is present in the organic acid composition in a molar ratio compared to the at least one further organic acid of from 1.0:0.35 to 1.0:0.80, for example of from 1.0:0.45 to 1.0:0.75.

8. The nicotine composition according to any preceding claim, wherein the nicotine composition further comprises water.

9. The nicotine composition according to any preceding claim, wherein the nicotine composition has a pH of from 5 to 8, preferably from 5.5 to 7.

10. An aerosol generation cartridge comprising the nicotine composition according to any one of claims 1 to 10.

11. Use of the nicotine composition according to any one of claims 1 to 9 or the aerosol generation cartridge according to claim 11 in an aerosol generation device.

12. An aerosol generation device comprising the nicotine composition according to any one of claims 1 to 9 or the aerosol generation cartridge according to claim 10.

13. A method of generating an inhalable aerosol comprising nicotine for delivery to a user comprising:

using an aerosol generation device comprising a nicotine composition according to any one of claims 1 to 9 and a heater,

the method comprising:

- (i) providing an amount of the nicotine composition to the heater; and
- (ii) forming an aerosol by heating the amount of the nicotine composition.



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Application Number

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                       |                                                           |
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| X                                                                                                                                                                                                                                                      | <b>US 2022/264932 A1 (TALUSKIE KAREN V [US] ET AL) 25 August 2022 (2022-08-25)</b><br>* paragraph [0006] *<br>* paragraph [0008] - paragraph [0011] *<br>* paragraph [0034] - paragraph [0038] *<br>* paragraph [0086] *<br>* paragraph [0070] *<br>* paragraph [0148]; table 1 *<br>* claims 1-14, 23-27 *<br>----- | 1-13                                                                                                                                                                                                                                                                                  | <b>INV.</b><br><b>A24B15/167</b><br><b>A24B15/30</b>      |
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| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                       |                                                           |
| Place of search<br><b>The Hague</b>                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                      | Date of completion of the search<br><b>22 June 2023</b>                                                                                                                                                                                                                               | Examiner<br><b>Dimoula, Kerasina</b>                      |
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