US 20240245093A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0245093 A1**

**Ulrich et al.** (43) **Pub. Date: Jul. 25, 2024**

(54) **AEROSOL GENERATING COMPOSITION COMPRISING NICOTINE AND ACID OR NICOTINE SALT**

(71) Applicant: **RAI Strategic Holdings, Inc.**, Winston-Salem, NC (US)

(72) Inventors: **John Ulrich**, Pittsboro, NC (US); **Jennifer Rowe**, Clemmons, NC (US); **Michael F. Davis**, Clemmons, NC (US); **John Will Caraway, Jr.**, Clemmons, NC (US)

(21) Appl. No.: **18/564,401**

(22) PCT Filed: **May 23, 2022**

(86) PCT No.: **PCT/US2022/030560**

§ 371 (c)(1),
(2) Date: **Nov. 27, 2023**

**Related U.S. Application Data**

(60) Provisional application No. 63/193,877, filed on May 27, 2021.

**Publication Classification**

(51) **Int. Cl.**

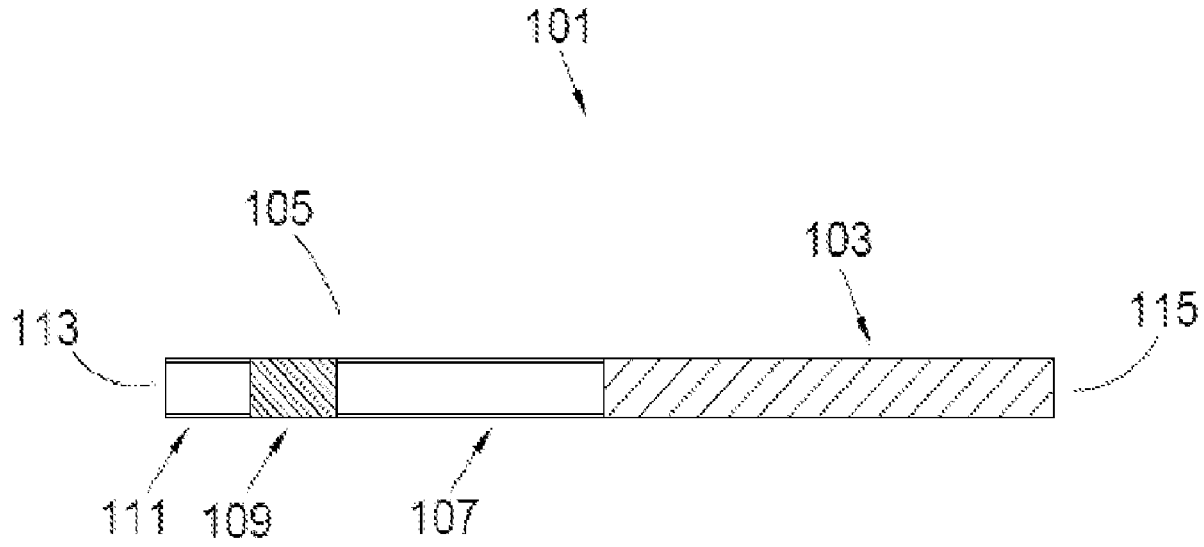
| | |
|---|---|
| ***A24B 15/167*** | (2006.01) |
| ***A24B 15/30*** | (2006.01) |
| ***A24B 15/40*** | (2006.01) |
| ***A24D 1/20*** | (2006.01) |
| ***A24F 40/20*** | (2006.01) |

(52) **U.S. Cl.**

CPC ..... ***A24B 15/167*** (2016.11); ***A24B 15/301*** (2013.01); ***A24B 15/403*** (2013.01); ***A24D 1/20*** (2020.01); ***A24F 40/20*** (2020.01)

(57) **ABSTRACT**

An aerosol-generating material having aerosol generating compositions, consumables for use within a non-combustible aerosol provision system and non-combustible aerosol provision systems. The consumables can include the aerosol-generating composition. The aerosol-generating composition can include an aerosol-generating material, wherein the aerosol-generating material includes about 1 to about 30 wt % nicotine, about 15 to about 80 wt % gelling agent, about 10 to about 60 wt % aerosol-former material, about 1 to about 30 wt % acid; and optionally filler, wherein the molar ratio of nicotine to acid is 2.2:1 or less.



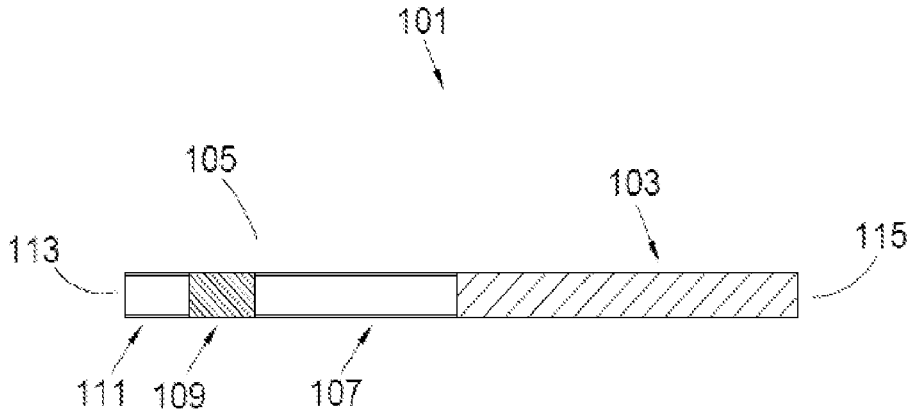



Figure 1

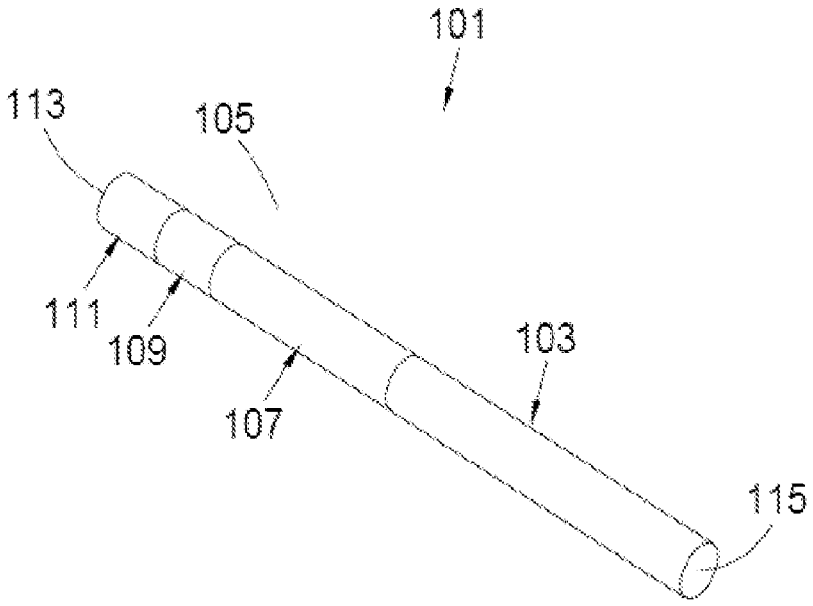



Figure 2

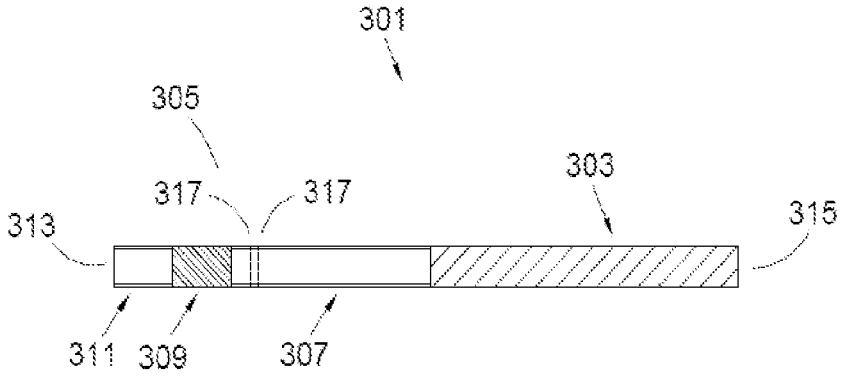



Figure 3

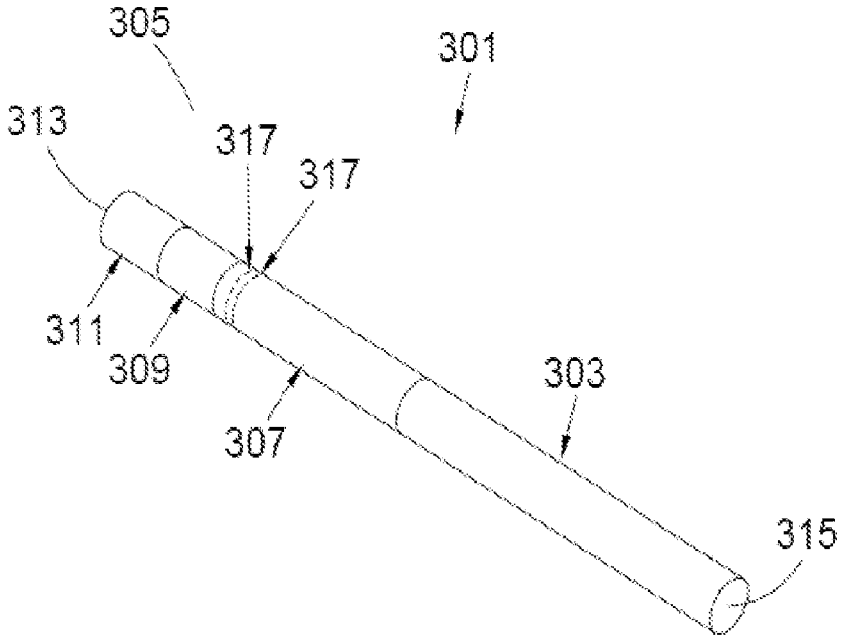



Figure 4

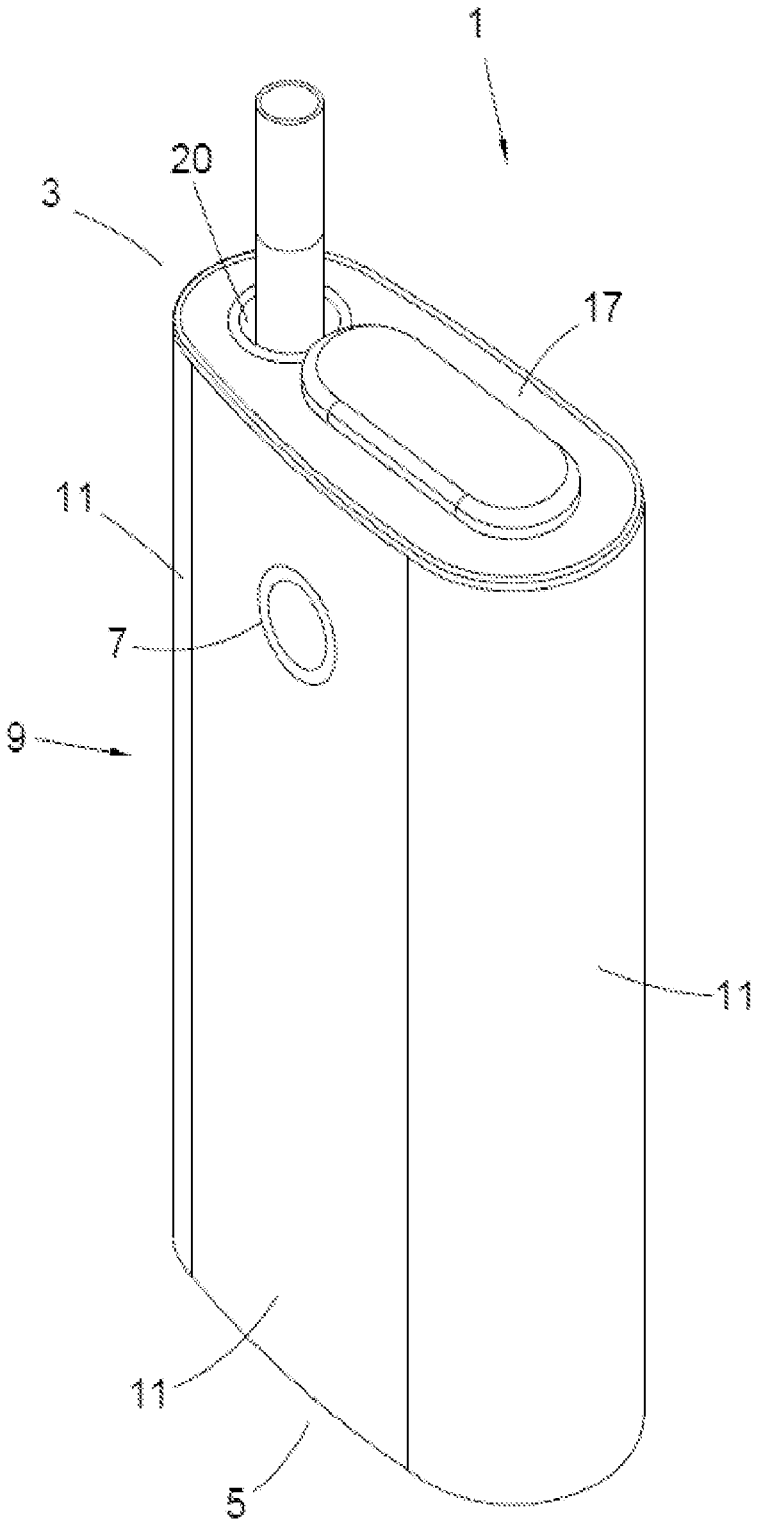



Figure 5

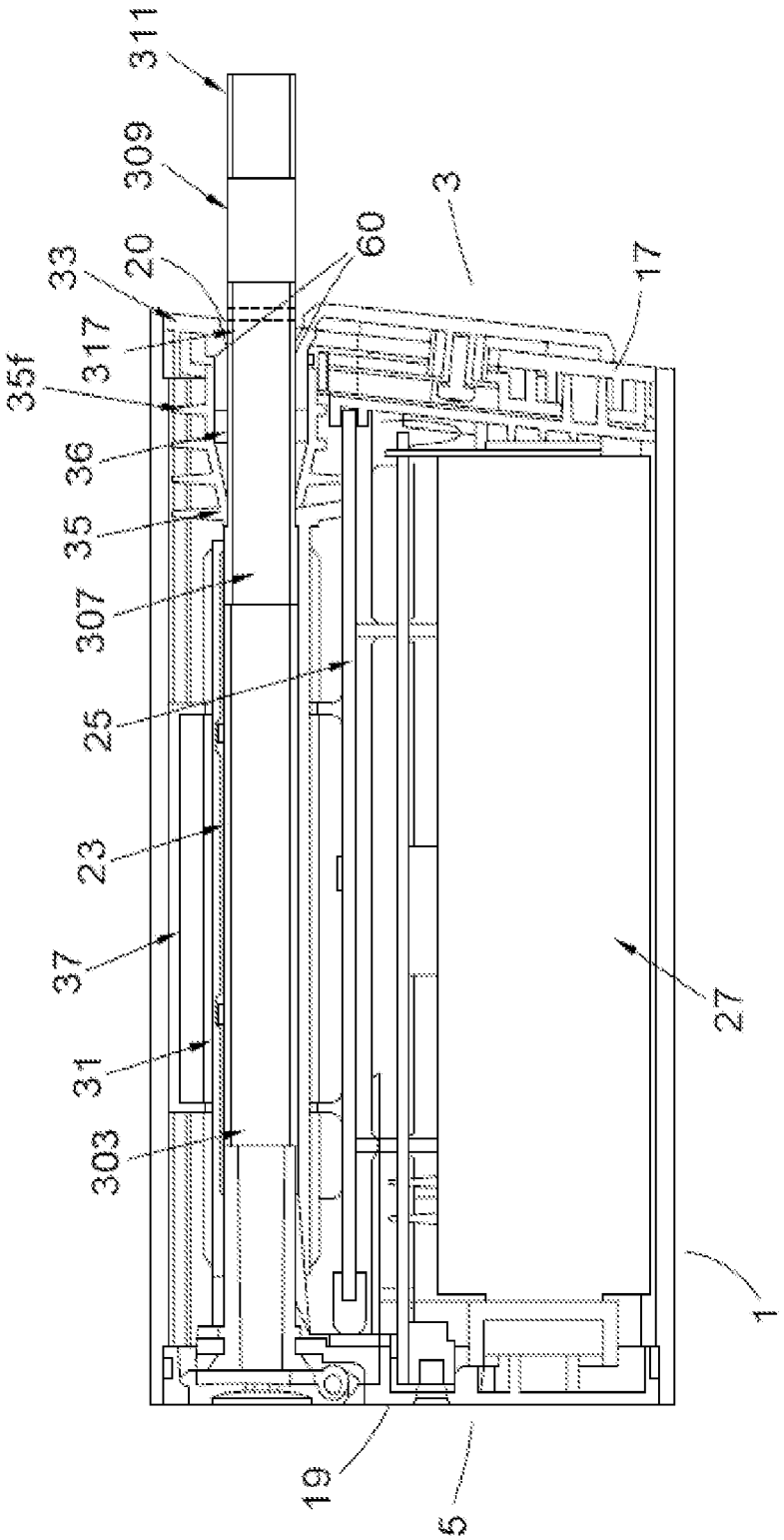



Figure 6

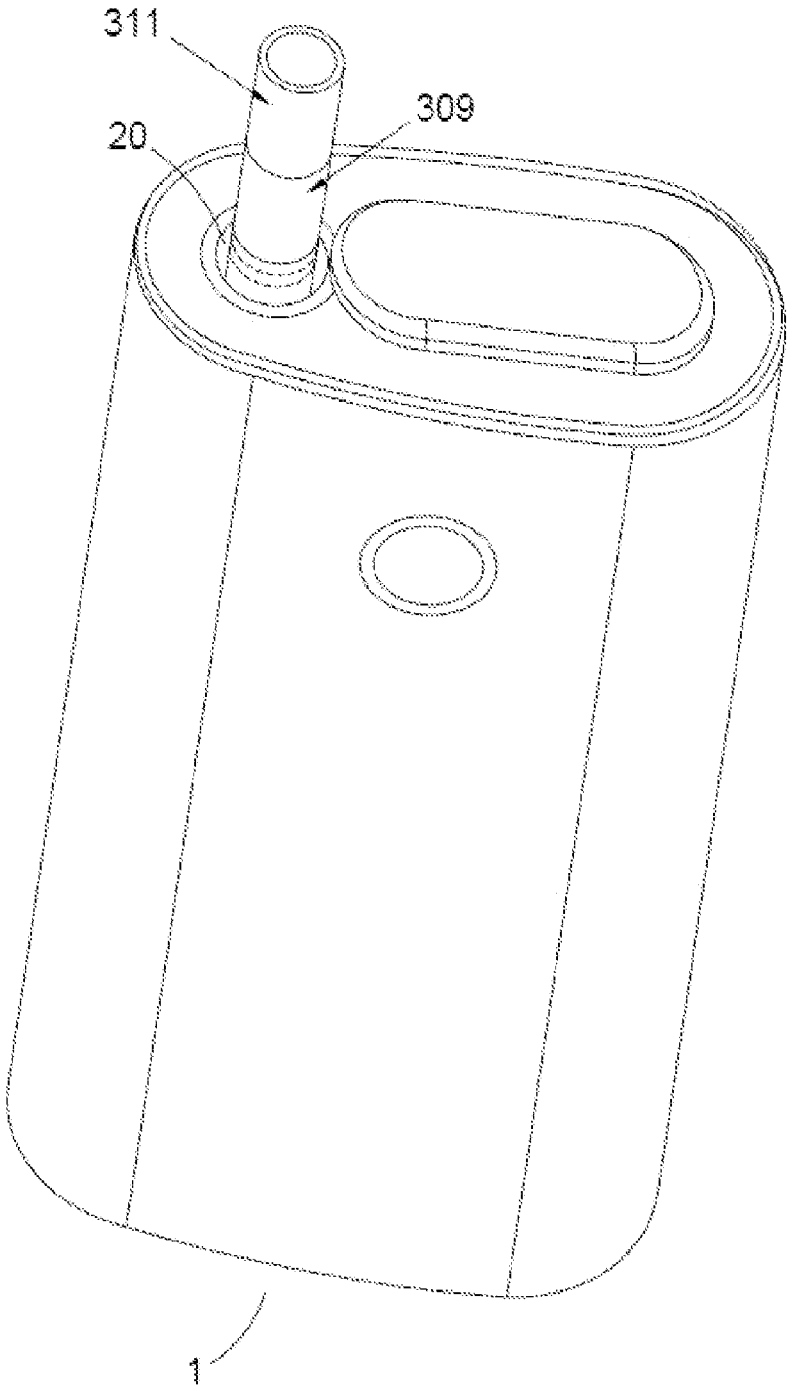



Figure 7

# AEROSOL GENERATING COMPOSITION COMPRISING NICOTINE AND ACID OR NICOTINE SALT

## PRIORITY CLAIM

[0001] The present application claims priority from U.S. Provisional Application No. 63/193,877, filed May 27, 2021, which is hereby fully incorporated herein by reference.

## TECHNICAL FIELD

[0002] The present invention relates to aerosol-generating compositions comprising an aerosol-generating material; consumables for use within a non-combustible aerosol provision system, the consumables comprising the aerosol-generating composition; and non-combustible aerosol provision systems.

## BACKGROUND

[0003] Smoking articles such as cigarettes, cigars and the like burn tobacco during use to create tobacco smoke. Alternatives to these types of articles release an inhalable aerosol or vapour by releasing compounds from a substrate material by heating without burning. These may be referred to as non-combustible smoking articles, aerosol generating assemblies or non-combustible aerosol provision systems.

[0004] One example of such a product is a heating device which release compounds by heating, but not burning, a solid aerosolisable material. This solid aerosolisable material may, in some cases, contain a tobacco material. The heating volatilises at least one component of the material, typically forming an inhalable aerosol. These products may be referred to as heat-not-burn devices, tobacco heating devices or tobacco heating products (THP). Various different arrangements for volatilising at least one component of the solid aerosolisable material are known.

[0005] As another example, there are e-cigarette/tobacco heating product hybrid devices, also known as electronic tobacco hybrid devices. These hybrid devices contain a liquid source (which may or may not contain nicotine) which is vaporised by heating to produce an inhalable vapour or aerosol. The device additionally contains a solid aerosolisable material (which may or may not contain a tobacco material) and components of this material are entrained in the inhalable vapour or aerosol to produce the inhaled medium.

## SUMMARY OF THE DISCLOSURE

[0006] According to a first aspect of the present invention, there is provided an aerosol-generating composition comprising an aerosol-generating material, wherein the aerosol-generating material comprises:

[0007] about 1 to about 30 wt % nicotine;

[0008] about 15 to about 80 wt % gelling agent;

[0009] about 10 to about 60 wt % aerosol-former material;

[0010] about 1 to about 30 wt % acid; and

[0011] optionally filler,

[0012] wherein the wt % values are calculated on a dry weight basis; and

[0013] wherein the molar ratio of nicotine to acid is 2.2:1 or less.

[0014] According to a further aspect of the present invention, there is provided an aerosol-generating composition comprising an aerosol-generating material, wherein the aerosol-generating material comprises:

[0015] about 5 to about 30 wt % nicotine salt;

[0016] about 15 to about 80 wt % gelling agent;

[0017] about 10 to about 60 wt % aerosol-former material; and

[0018] optionally filler,

[0019] wherein the wt % values are calculated on a dry weight basis.

[0020] According to a further aspect of the present invention, there is provided an aerosol-generating composition comprising an aerosol-generating material, wherein the aerosol-generating material comprises:

[0021] about 1 to about 30 wt % nicotine salt;

[0022] about 45 to about 80 wt % gelling agent;

[0023] about 10 to about 54 wt % aerosol-former material; and

[0024] optionally filler,

[0025] wherein the wt % values are calculated on a dry weight basis.

[0026] According to a further aspect of the present invention, there is provided a consumable for use within a non-combustible aerosol provision system, the consumable comprising the aerosol-generating composition as defined herein.

[0027] According to a further aspect of the present invention, there is provided a non-combustible aerosol provision system comprising the consumable as defined herein and a non-combustible aerosol provision device, the non-combustible aerosol provision device comprising an aerosol-generation device arranged to generate aerosol from the consumable when the consumable is used with the non-combustible aerosol provision device.

[0028] Further aspects of the invention described herein may provide the use of the aerosol-generating material, the aerosol-generating composition, the consumable or the non-combustible aerosol provision system, in the generation of an inhalable aerosol.

[0029] According to a further aspect of the present invention, there is provided a method of making an aerosol-generating composition as described herein.

[0030] Further features and advantages of the invention will become apparent from the following description of preferred embodiments of the invention, given by way of example only, which is made with reference to the accompanying figures.

## BRIEF DESCRIPTION OF THE FIGURES

[0031] FIG. **1** shows a section view of an example of a consumable.

[0032] FIG. **2** shows a perspective view of the article of FIG. **1**.

[0033] FIG. **3** shows a sectional elevation of an example of a consumable.

[0034] FIG. **4** shows a perspective view of the article of FIG. **3**.

[0035] FIG. **5** shows a perspective view of an example of a non-combustible aerosol provision system.

[0036] FIG. **6** shows a section view of an example of a non-combustible aerosol provision system.

[0037] FIG. **7** shows a perspective view of an example of a non-combustible aerosol provision system.

## DETAILED DESCRIPTION

**[0038]** The aerosol-generating compositions described herein are compositions that are capable of generating aerosol, for example when heated, irradiated or energized in any other way. The aerosol-generating composition may, for example, be in the form of a solid, liquid or gel which contain nicotine. The aerosol-generating material may be an "amorphous solid". In some embodiments, the amorphous solid is a "monolithic solid". The aerosol-generating material may be non-fibrous or fibrous. In some embodiments, the aerosol-generating material may be a dried gel. The aerosol-generating material may be a solid material that may retain some fluid, such as liquid, within it. In some embodiments the retained fluid may be water (such as water absorbed from the surroundings of the aerosol-generating material) or the retained fluid may be solvent (such as when the aerosol-generating material is formed from a slurry). In some embodiments, the solvent may be water. In some embodiments, the aerosol-generating composition may for example comprise from about 50 wt %, 60 wt % or 70 wt % of aerosol-generating material, to about 90 wt %, 95 wt % or 100 wt % of aerosol-generating material. These wt % values are calculated on a wet weight basis (WWB), i.e. including any water or other solvent present in the aerosol-generating composition or aerosol-generating material. In some cases, the aerosol-generating composition consists of aerosol-generating material.

**[0039]** As described hereinabove, the invention provides an aerosol-generating composition comprising (or consisting of) an aerosol-generating material, wherein the aerosol-generating material comprises:

**[0040]** about 1 to about 30 wt % nicotine;

**[0041]** about 15 to about 80 wt % gelling agent;

**[0042]** about 10 to about 60 wt % aerosol-former material;

**[0043]** about 1 to about 30 wt % acid; and

**[0044]** optionally filler,

**[0045]** wherein the wt % values are calculated on a dry weight basis; and

**[0046]** wherein the molar ratio of nicotine to acid is 2.2:1 or less.

**[0047]** Also provided is an aerosol-generating composition comprising (or consisting of) an aerosol-generating material, wherein the aerosol-generating material comprises:

**[0048]** about 5 to about 30 wt % nicotine salt;

**[0049]** about 15 to about 80 wt % gelling agent;

**[0050]** about 10 to about 60 wt % aerosol-former material; and

**[0051]** optionally filler,

**[0052]** wherein the wt % values are calculated on a dry weight basis.

**[0053]** Also provided is an aerosol-generating composition comprising (or consisting of) an aerosol-generating material, wherein the aerosol-generating material comprises:

**[0054]** about 1 to about 30 wt % nicotine salt;

**[0055]** 45 to about 80 wt % gelling agent;

**[0056]** about 10 to about 54 wt % aerosol-former material; and

**[0057]** optionally filler,

**[0058]** wherein the wt % values are calculated on a dry weight basis.

**[0059]** The presence of either an acid or a nicotine salt in the aerosol-generating material may improve the sensory attributes of the aerosol by reducing the harshness. When present, the acid protonates the nicotine to form a nicotine salt in situ, either in the material or in the aerosol once it is formed. The presence of the nicotine salt results in an aerosol which some users find more satisfying.

**[0060]** In some embodiments, the aerosol-generating material and/or the aerosol-generating composition consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; nicotine; acid; and optionally a flavour and/or optionally an additional active substance and/or optionally filler.

**[0061]** In some embodiments, the aerosol-generating material and/or the aerosol-generating composition consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; nicotine; acid; and optionally a flavour and/or optionally filler.

**[0062]** In some cases, the aerosol-generating material and/or the aerosol-generating composition consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; nicotine; acid; and a flavour.

**[0063]** In some cases, the aerosol-generating material and/or the aerosol-generating composition consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; nicotine and acid.

**[0064]** In some embodiments, the aerosol-generating material and/or the aerosol-generating composition consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; nicotine salt; and optionally a flavour and/or optionally an additional active substance and/or optionally filler.

**[0065]** In some embodiments, the aerosol-generating material and/or the aerosol-generating composition consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; nicotine salt; and optionally a flavour and/or optionally filler.

**[0066]** In some cases, the aerosol-generating material and/or the aerosol-generating composition consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; nicotine salt; and a flavour.

**[0067]** In some cases, the aerosol-generating material and/or the aerosol-generating composition consists essentially of, or consists of, gelling agent; solvent; aerosol-former material and nicotine salt.

**[0068]** In each case, the solvent may be water. In some embodiments, the aerosol-generating material is a hydrogel and may comprise less than about 20 wt % of water calculated on a wet weight basis. In some cases, the hydrogel may comprise less than about 15 wt %, 12 wt % or 10 wt % of water calculated on a wet weight basis (WWB). In some cases, the hydrogel may comprise at least about 1 wt %, 2 wt % or at least about 5 wt % of water (WWB). Suitably, the water content of the aerosol-generating material may be from about 5 wt %, 7 wt % or 9 wt % to about 15 wt %, 13 wt % or 11 wt % (WWB), such as 5-15 wt %, 7-13 wt % or 9-11 wt % (WWB). The water content of the aerosol-generating material may, for example, be determined by Karl-Fischer-titration or Gas Chromatography with Thermal Conductivity Detector (GC-TCD).

### Aerosol-Former Material

**[0069]** The aerosol-generating material may comprise one or more constituents capable of forming an aerosol.

**[0070]** Suitably, the aerosol-generating material may comprise about 10 wt % to about 60 wt % of aerosol-former material (calculated on a dry weight basis), for example about 20 wt %, 25 wt % or 30 wt % to about 50 wt % or 55 wt %. In exemplary embodiments, the aerosol-generating material comprises about 15 to about 60 wt % of aerosol-former material (calculated on a dry weight basis). In other exemplary embodiments, the aerosol-generating material comprises about 15-54 wt %, 20-50 wt %, 25-50 wt % or 30-50 wt % of an aerosol-former material.

**[0071]** In some embodiments, the aerosol-former material may comprise one or more of glycerol, propylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, 1,3-butylene glycol, erythritol, meso-Erythritol, ethyl vanillate, ethyl laurate, a diethyl suberate, triethyl citrate, triacetin, a diacetin mixture, benzyl benzoate, benzyl phenyl acetate, tributyrin, lauryl acetate, lauric acid, myristic acid, and propylene carbonate.

**[0072]** In some embodiments, the aerosol former material comprises one or more polyhydric alcohols, such as glycerol, propylene glycol, triethylene glycol, 1,3-butanediol and glycerin; esters of polyhydric alcohols, such as glycerol mono-, di- or triacetate; and/or aliphatic esters of mono-, di- or polycarboxylic acids, such as dimethyl dodecanedioate and dimethyl tetradecanedioate.

**[0073]** In some cases, the aerosol-former material comprises, consists essentially of or consists of glycerol and/or propylene glycol.

**[0074]** In some embodiments, the aerosol-former material comprises a mixture of glycerol and propylene glycol in a weight ratio of glycerol to propylene glycol of about 3:1 to 1:3, about 2:1 to 1:2, about 1.5:1 to 1:1.5, about 55:45 to 45:55, or about 45:55.

**[0075]** In some cases, the aerosol-former material comprises, consists essentially of or consists of glycerol.

Gelling Agent

**[0076]** Suitably, the aerosol-generating material comprises about 15 wt % to about 80 wt % gelling agent, for example from about 20 wt %, 25 wt %, 30 wt %, 40 wt % or 45 wt % to about 65 wt %, 70 wt % or 75 wt % (all calculated on a dry weight basis). In exemplary embodiments, the aerosol-generating material comprises about 20-80 wt %, 35-80 wt %, 45-80 wt %, 40-70 wt % or 45-70 wt % gelling agent.

**[0077]** In some embodiments, the gelling agent comprises a hydrocolloid.

**[0078]** In some embodiments, the gelling agent comprises (or is) one or more compounds selected from polysaccharide gelling agents, such as alginate, pectin, starch or a derivative thereof, cellulose or a derivative thereof, pullulan, carrageenan, agar and agarose; gelatin; gums, such as xanthan gum, guar gum and acacia gum; silica or silicone compounds, such as PDMS and sodium silicate; clays, such as kaolin; and polyvinyl alcohol.

**[0079]** In some embodiments, the gelling agent comprises (or is) one or more polysaccharide gelling agents.

**[0080]** In some embodiments, the polysaccharide gelling agent is selected from alginate, pectin, starch or a derivative thereof, cellulose or a derivative thereof, and combinations thereof.

**[0081]** In some embodiments, the polysaccharide gelling agent is selected from alginate, a cellulose derivative and combinations thereof.

**[0082]** In some embodiments, the gelling agent is a polysaccharide gelling agent, optionally wherein the polysaccharide gelling agent is selected from alginate, a cellulose derivative, and combinations thereof.

**[0083]** In some embodiments, the alginate is sodium alginate.

**[0084]** In some embodiments, the polysaccharide gelling agent is a cellulose derivative.

**[0085]** In some embodiments, the polysaccharide gelling agent is alginate.

**[0086]** In some embodiments the gelling agent is not crosslinked. The absence of crosslinks in the gelling agent facilitates quicker delivery of the constituent, derivative or extract of cannabis (and any optional additional active substances and/or flavours) from the aerosol-generating material.

**[0087]** Examples of cellulosic gelling agents (also referred to herein as cellulose derivatives) include, but are not limited to, hydroxymethyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, carboxymethylcellulose (CMC), hydroxypropyl methylcellulose (HPMC), methyl cellulose, ethyl cellulose, cellulose acetate (CA), cellulose acetate butyrate (CAB), and cellulose acetate propionate (CAP). In some embodiments the cellulose or derivative thereof is selected from hydroxymethyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, carboxymethylcellulose (CMC), hydroxypropyl methylcellulose (HPMC), methyl cellulose, ethyl cellulose, cellulose acetate (CA), cellulose acetate butyrate (CAB), and cellulose acetate propionate (CAP). In some embodiments, the cellulose derivative is CMC.

**[0088]** For example, in some embodiments, the gelling agent comprises (or is) one or more of alginate, pectin, hydroxyethyl cellulose, hydroxypropyl cellulose, carboxymethylcellulose, pullulan, xanthan gum guar gum, carrageenan, agarose, acacia gum, fumed silica, PDMS, sodium silicate, kaolin and polyvinyl alcohol.

**[0089]** In some embodiments, the gelling agent comprises (or is) one or more of hydroxyethyl cellulose, hydroxypropyl cellulose, carboxymethylcellulose, guar gum, acacia gum, alginate and/or pectin.

**[0090]** In some cases, the gelling agent comprises (or is) alginate and/or pectin, and may be combined with a crosslinking agent (such as a calcium source) during formation of the aerosol-generating material. In some cases, the aerosol-generating material may comprise a calcium-crosslinked alginate and/or a calcium-crosslinked pectin.

**[0091]** In some embodiments, the gelling agent comprises (or is) alginate.

**[0092]** In some embodiments, alginate is the only gelling agent present in the aerosol-generating material.

**[0093]** In other embodiments, the gelling agent comprises alginate and at least one further gelling agent, such as pectin.

**[0094]** In particular embodiments, the gelling agent is carboxymethylcellulose.

**[0095]** In some embodiments, CMC is the only gelling agent present in the aerosol-generating material.

**[0096]** In some embodiments, the aerosol-generating composition comprises a crosslinking agent. In some cases, the crosslinking agent comprises calcium ions. In some cases, the aerosol-generating composition may comprise carboxymethyl cellulose and a calcium-crosslinked alginate.

**[0097]** In some embodiments, the aerosol-generating composition does not comprise a crosslinking agent.

Nicotine

**[0098]** In some embodiments, the aerosol-generating material comprises about 1 wt % to about 30 wt % nicotine, for example from about 3 wt % or 5 wt % to about 10 wt %, 15 wt %, 20 wt % or 25 wt % nicotine (all calculated on a dry weight basis). In exemplary embodiments, the aerosol-generating material comprises 5-30 wt %, 6-30 wt %, 1-20 wt %, 1-15 wt %, 1-10 wt % or 2-10 wt % nicotine.

**[0099]** In some embodiments, the aerosol-generating material comprises about 1 wt % to about 30 wt % acid, for example from about 3 wt % or 5 wt % to about 10 wt %, 15 wt %, 20 wt % or 25 wt % acid (all calculated on a dry weight basis). In exemplary embodiments, the aerosol-generating material comprises 5-30 wt %, 6-30 wt %, 1-20 wt %, 1-15 wt %, 1-10 wt % or 2-10 wt % acid.

**[0100]** In some embodiments, the acid is an organic acid. In some embodiments, the acid may be at least one of a monoprotic acid, diprotic acid and a triprotic acid. In some embodiments, the acid may contain at least one carboxy functional group. In some such embodiments, the acid may be at least one of an alpha-hydroxy acid, carboxylic acid, dicarboxylic acid, tricarboxylic acid and keto acid. In some such embodiments, the acid may be an alpha-keto acid.

**[0101]** In some such embodiments, the acid may be at least one of succinic acid, lactic acid, benzoic acid, citric acid, tartaric acid, fumaric acid, levulinic acid, acetic acid, malic acid, formic acid, sorbic acid, benzoic acid, propanoic acid and pyruvic acid. In some embodiments, the acid is at least one of lactic acid, benzoic acid, levulinic acid and pyruvic acid.

**[0102]** Suitably the acid is benzoic acid. In other embodiments, the acid is lactic acid. In other embodiments the acid may be an inorganic acid. In some of these embodiments, the acid may be a mineral acid. In some such embodiments, the acid may be at least one of sulphuric acid, hydrochloric acid, boric acid and phosphoric acid.

**[0103]** Suitably, the aerosol-generating material comprises nicotine and an acid. In some embodiments, the molar ratio of nicotine to acid is 2.2:1 or less, 1.5:1 or less or 1:1 or less.

**[0104]** In some embodiments, the molar ratio of nicotine to acid is 0.5:1 or more, 0.7:1 or more or 0.8:1 or more. In some embodiments, the molar ratio is from 0.5:1 to 2.2:1, 0.7:1 to 2:1 or 0.7:1 to 1.5:1.

**[0105]** In some embodiments, the molar ratio of acid to nicotine is 0.5:1 or more, 0.7:1 or more or 0.8:1 or more. In some embodiments, the molar ratio of acid to nicotine is from 0.5:1 to 2.2:1, 0.7:1 to 2:1 or 0.7:1 to 1.5:1.

**[0106]** In some embodiments, the aerosol-generating material comprises about 1 wt % to about 30 wt % nicotine salt, for example from about 3 wt % or 5 wt % to about 10 wt %, 15 wt %, 20 wt % or 25 wt % nicotine salt (all calculated on a dry weight basis). In exemplary embodiments, the aerosol-generating material comprises 5-30 wt %, 6-30 wt %, 1-20 wt %, 1-15 wt %, 1-10 wt % or 2-10 wt % nicotine salt.

**[0107]** In some embodiments, the nicotine salt comprises nicotine lactate or nicotine benzoate.

**[0108]** In some embodiments, the nicotine salt comprises, consists essentially of or consists of nicotine benzoate.

Filler

**[0109]** The aerosol-generating material may further comprise a filler. Use of a filler may help to reduce tackiness of the aerosol-generating material, for example if high levels of aerosol-former material are present.

**[0110]** In some embodiments, the aerosol-generating material comprises less than about 10 wt % of a filler, such as less than about 5 wt % filler (all calculated on a dry weight basis). In some embodiments, the aerosol-generating material comprises from about 1 wt %, 2 wt % or 3 wt % to about 5 wt %, 7 wt % or 10 wt %, such as 1-10 wt %, 2-7 wt % or 3-5 wt %.

**[0111]** In some cases, the aerosol-generating material comprises less than 1 wt % of a filer.

**[0112]** In some cases, the aerosol-generating material comprises no filler. In some cases, the aerosol-generating composition comprises no filler.

**[0113]** The filler, if present, may comprise one or more inorganic filler materials, such as calcium carbonate, perlite, vermiculite, diatomaceous earth, colloidal silica, magnesium oxide, magnesium sulphate, magnesium carbonate, and suitable inorganic sorbents, such as molecular sieves. The filler, if present, may comprise one or more organic filler materials such as wood pulp, cellulose and cellulose derivatives. In particular cases, aerosol-generating material comprises no calcium carbonate such as chalk.

**[0114]** In particular embodiments which include filler, the filler is fibrous. For example, the filler may be a fibrous organic filler material such as wood pulp, hemp fibre, cellulose or cellulose derivatives. In some embodiments, the filler comprises wood pulp. Without wishing to be bound by theory, it is believed that including fibrous filler in an aerosol-generating material may increase the tensile strength of the material. This may be particularly advantageous in examples wherein the aerosol-generating material is provided as a sheet, such as when an aerosol-generating material sheet circumscribes a rod of aerosol-generating composition.

**[0115]** In some embodiments, the aerosol-generating material may further comprise one or more other functional material(s).

Additional Active Substances

**[0116]** In particular embodiments, nicotine or nicotine salt is or are the only active(s) present in the aerosol-generating material. In particular embodiments, nicotine or nicotine salts is or are the only active(s) present in the aerosol-generating composition. However, the aerosol-generating material and/or the aerosol-generating composition may further comprise additional active ingredients

**[0117]** In some cases, the aerosol-generating material may comprise from about 1 wt %, 5 wt %, 10 wt %, 15 wt %, 20 wt % or 25 wt % to about 65 wt %, 50 wt %, 45 wt %, 40 wt %, 35 wt % or 30 wt % (calculated on a dry weight basis) of another active substance in additional to nicotine or nicotine salt.

**[0118]** The additional active substance as used herein may be a physiologically active material, which is a material intended to achieve or enhance a physiological response. The additional active substance may for example be selected from nutraceuticals, nootropics and psychoactives. The additional active substance may be naturally occurring or synthetically obtained. The additional active substance may comprise for example caffeine, taurine, theine, vitamins such as B6 or B12 or C, melatonin, or constituents, derivatives or combinations thereof. The additional active sub-

stance may comprise one or more consistuents, derivatives or extracts of tobacco or another botanical.

**[0119]** In some embodiments, the additional active substance comprises caffeine, melatonin or vitamin B12.

**[0120]** In some embodiments, the additional active substance comprises constituents(s), derivative(s) or extract(s) of cannabis.

**[0121]** In some embodiments, the additional active substance comprises one or more cannabinoid compounds selected from the group consisting of: cannabidiol (CBD), tetrahydrocannabinol (THC), tetrahydrocannabinolic acid (THCA), cannabidiolic acid (CBDA), cannabinol (CBN), cannabigerol (CBG), cannabichromene (CBC), cannabicyclol (CBL), cannabivarin (CBV), tetrahydrocannabivarin (THCV), cannabidivarin (CBDV), cannabichromevarin (CBCV), cannabigerovarin (CBGV), cannabigerol monomethyl ether (CBGM) and cannabielsoin (CBE), cannabicitran (CBT).

**[0122]** The additional active substance may comprise one or more cannabinoid compounds selected from the group consisting of cannabidiol (CBD) and THC (tetrahydrocannabinol).

**[0123]** The additional active substance solid may comprise cannabidiol (CBD).

**[0124]** The active substances may comprise nicotine and cannabidiol (CBD).

**[0125]** The active substances may comprise nicotine, cannabidiol (CBD), and THC (tetrahydrocannabinol).

**[0126]** As noted herein, the additional active substance may comprise or be derived from one or more botanicals or constituents, derivatives or extracts thereof. As used herein, the term "botanical" includes any material derived from plants including, but not limited to, extracts, leaves, bark, fibres, stems, roots, seeds, flowers, fruits, pollen, husk, shells or the like. Alternatively, the material may comprise an active compound naturally existing in a botanical, obtained synthetically. The material may be in the form of liquid, gas, solid, powder, dust, crushed particles, granules, pellets, shreds, strips, sheets, or the like. Example botanicals are tobacco, eucalyptus, star anise, hemp, cocoa, coffee, fennel, lemongrass, peppermint, spearmint, rooibos, chamomile, flax, ginger, *Ginkgo biloba*, hazel, hibiscus, laurel, licorice (liquorice), matcha, mate, orange skin, papaya, rose, sage, tea such as green tea or black tea, thyme, clove, cinnamon, coffee, aniseed (anise), basil, bay leaves, cardamom, coriander, cumin, nutmeg, oregano, paprika, rosemary, saffron, lavender, lemon peel, mint, juniper, elderflower, vanilla, wintergreen, beefsteak plant, curcuma, turmeric, sandalwood, cilantro, bergamot, orange blossom, myrtle, cassis, valerian, pimento, mace, damien, marjoram, olive, lemon balm, lemon basil, chive, carvi, verbena, tarragon, geranium, mulberry, ginseng, theanine, theacrine, maca, ashwagandha, damiana, guarana, chlorophyll, baobab or any combination thereof. The mint may be chosen from the following mint varieties: *Mentha arventis, Mentha* c.v., *Mentha niliaca, Mentha piperita, Mentha piperita citrata* c.v., *Mentha piperita* c.v., *Mentha spicata crispa, Mentha cardifolia, Mentha longifolia, Mentha suaveolens variegata, Mentha pulegium, Mentha spicata* c.v. and *Mentha suaveolens*.

**[0127]** In some embodiments, the additional active substance comprises or is derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is tobacco.

**[0128]** In some embodiments, the aerosol-generating material is substantially free from tobacco. By "substantially free from" it is meant that the material comprises less than 1 wt %, such as less than 0.5 wt % tobacco. In some embodiments, the aerosol-generating material is free from tobacco. In some embodiments, the aerosol-generating material does not comprise tobacco fibres. In particular embodiments, the aerosol-generating material does not comprise fibrous material.

**[0129]** In some embodiments, the additional active substance comprises or derives from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is selected from eucalyptus, star anise, cocoa and hemp. In some embodiments the additional active substance comprises (or is) a botanical selected from eucalyptus, star anise, cocoa and hemp.

**[0130]** In some embodiments, the additional active substance comprises or derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is selected from rooibos and fennel. In some embodiments, the additional active substance comprises (or is) a botanical selected from rooibos and fennel.

Flavours

**[0131]** The aerosol-generating material and/or the aerosol-generating composition may optionally comprise a flavour. For example, the aerosol-generating material may comprise up to about 65 wt %, 55 wt %, 50 wt % or 45 wt % of a flavour. In some cases, the aerosol-generating material may comprise at least about 0.1 wt %, 1 wt %, 10 wt %, 20 wt %, 30 wt %, 35 wt % or 40 wt % of a flavour (all calculated on a dry weight basis). For example, the aerosol-generating material may comprise 1-65 wt %, 10-65 wt %, 20-50 wt %, or 30-40 wt % a flavour.

**[0132]** As used herein, the terms "flavour" and "flavourant" refer to materials which, where local regulations permit, may be used to create a desired taste, aroma or other somatosensorial sensation in a product for adult consumers. They may include naturally occurring flavour materials, botanicals, extracts of botanicals, synthetically obtained materials, or combinations thereof (e.g., tobacco, cannabis, licorice (liquorice), hydrangea, eugenol, Japanese white bark magnolia leaf, chamomile, fenugreek, clove, maple, matcha, menthol, Japanese mint, aniseed (anise), cinnamon, turmeric, Indian spices, Asian spices, herb, wintergreen, cherry, berry, red berry, cranberry, peach, apple, orange, mango, clementine, lemon, lime, tropical fruit, papaya, rhubarb, grape, durian, dragon fruit, cucumber, blueberry, mulberry, citrus fruits, Drambuie, bourbon, scotch, whiskey, gin, tequila, rum, spearmint, peppermint, lavender, aloe vera, cardamom, celery, cascarilla, nutmeg, sandalwood, bergamot, geranium, khat, naswar, betel, shisha, pine, honey essence, rose oil, vanilla, lemon oil, orange oil, orange blossom, cherry blossom, cassia, caraway, cognac, jasmine, ylang-ylang, sage, fennel, wasabi, piment, ginger, coriander, coffee, hemp, a mint oil from any species of the genus *Mentha*, eucalyptus, star anise, cocoa, lemongrass, rooibos, flax, *Ginkgo biloba*, hazel, hibiscus, laurel, mate, orange skin, rose, tea such as green tea or black tea, thyme, juniper, elderflower, basil, bay leaves, cumin, oregano, paprika, rosemary, saffron, lemon peel, mint, beefsteak plant, curcuma, cilantro, myrtle, cassis, valerian, pimento, mace, damien, marjoram, olive, lemon balm, lemon basil, chive, carvi, verbena, tarragon, limonene, thymol, camphene), fla-

vour enhancers, bitterness receptor site blockers, sensorial receptor site activators or stimulators, sugars and/or sugar substitutes (e.g., sucralose, acesulfame potassium, aspartame, saccharine, cyclamates, lactose, sucrose, glucose, fructose, sorbitol, or mannitol), and other additives such as charcoal, chlorophyll, minerals, botanicals, or breath freshening agents. They may be imitation, synthetic or natural ingredients or blends thereof. They may be in any suitable form, for example, liquid such as an oil, solid such as a powder, or gas.

**[0133]** In some embodiments, the flavour comprises menthol, spearmint and/or peppermint.

**[0134]** In some embodiments, the flavour comprises flavour components of cucumber, blueberry, citrus fruits and/or redberry.

**[0135]** In some embodiments, the flavour comprises eugenol.

**[0136]** In some embodiments, the flavour comprises flavour components extracted from tobacco.

**[0137]** In some embodiments, the flavour comprises flavour components extracted from cannabis.

**[0138]** In some embodiments, the flavour may comprise a sensate, which is intended to achieve a somatosensorial sensation which are usually chemically induced and perceived by the stimulation of the fifth cranial nerve (trigeminal nerve), in addition to or in place of aroma or taste nerves, and these may include agents providing heating, cooling, tingling, numbing effect. A suitable heat effect agent may be, but is not limited to, vanillyl ethyl ether and a suitable cooling agent may be, but not limited to eucolyptol or WS-3 (N-ethyl-2-isopropyl-5-methylcyclohexanecarboxamide).

**[0139]** In some cases, the aerosol-generating material may additionally comprise an emulsifying agent, which emulsifies molten flavour during manufacture. For example, the aerosol-generating material may comprise from about 5 wt % to about 15 wt % of an emulsifying agent (calculated on a dry weight basis), suitably about 10 wt %. The emulsifying agent may comprise acacia gum.

**[0140]** In some cases, the total content of additional active substance and/or flavour may be at least about 0.1 wt %, 1 wt %, 5 wt %, 10 wt %, 20 wt %, 25 wt % or 30 wt %. In some cases, the total content of additional active substance and/or flavour may be less than about 60 wt %, 50 wt % or 40 wt % (all calculated on a dry weight basis).

Colourant

**[0141]** The aerosol-generating material may comprise a colourant. The addition of a colourant may alter the visual appearance of the aerosol-generating material. The presence of colourant in the aerosol-generating material may enhance the visual appearance of the aerosol-generating material and the aerosol-generating composition. By adding a colourant to the aerosol-generating material, the aerosol-generating material may be colour-matched to other components of the aerosol-generating composition or to other components of an article comprising the aerosol-generating material.

**[0142]** A variety of colourants may be used depending on the desired colour of the aerosol-generating material. The colour of aerosol-generating material may be, for example, white, green, red, purple, blue, brown or black. Other colours are also envisaged. Natural or synthetic colourants, such as natural or synthetic dyes, food-grade colourants and pharmaceutical-grade colourants may be used. In certain embodiments, the colourant is caramel, which may confer the aerosol-generating material with a brown appearance. In such embodiments, the colour of the aerosol-generating material may be similar to the colour of other components (such as tobacco material) in an aerosol-generating composition comprising the aerosol-generating material. In some embodiments, the addition of a colourant to the aerosol-generating material renders it visually indistinguishable from other components in the aerosol-generating composition.

**[0143]** The colourant may be incorporated during the formation of the aerosol-generating material (e.g. when forming a slurry comprising the materials that form the aerosol-generating material) or it may be applied to the aerosol-generating material after its formation (e.g. by spraying it onto the aerosol-generating material).

Other Functional Material

**[0144]** The one or more other functional materials may comprise one or more of pH regulators, preservatives, stabilisers, and/or antioxidants.

**[0145]** In some embodiments, the aerosol-generating material is formed as a sheet. In some cases, the aerosol-generating material sheet may be incorporated into the non-combustible aerosol provision system or consumable in sheet form. The aerosol-generating material sheet may be incorporated as a planar sheet, as a gathered or bunched sheet, as a crimped sheet, as a rolled sheet (i.e. in the form of a tube), or as strips (e.g. formed by cutting the sheet into longitudinal strips). In some such cases, the aerosol-generating material of these embodiments may be included in the system/consumable as a sheet, such as a sheet circumscribing a rod of aerosolisable material (e.g. tobacco). For example, the aerosol-generating material sheet may be formed on a wrapping paper which circumscribes an aerosolisable material such as tobacco. In other cases, the sheet may be shredded and then incorporated into the assembly, suitably mixed into an aerosolisable material such as cut rag tobacco.

**[0146]** In some cases, the aerosol-generating material may be in the form of a sheet or layer having a thickness of about 0.015 mm to about 1.0 mm. Suitably, the thickness may be in the range of about 0.05 mm, 0.1 mm or 0.15 mm to about 0.5 mm or 0.3 mm, for example 0.1-3 mm or 0.15-3 mm. A material having a thickness of 0.2 mm may be particularly suitable. The aerosol-generating material may comprise more than one layer, and the thickness described herein refers to the aggregate thickness of those layers.

**[0147]** If the aerosol-generating material is too thick, then heating efficiency may be compromised. This adversely affects the power consumption in use. Conversely, if the aerosol-generating material is too thin, it may be difficult to manufacture and handle; a very thin material is harder to cast and may be fragile, compromising aerosol formation in use.

**[0148]** The thickness stipulated herein is a mean thickness for the material. In some cases, the aerosol-generating material thickness may vary by no more than 25%, 20%, 15%, 10%, 5% or 1%.

**[0149]** In some examples, the aerosol-generating material in sheet form may have a tensile strength of from around 200 N/m to around 2000 N/m. In some examples, the aerosol-generating material in sheet form may have a tensile strength of from around 200 N/m to around 900 N/m. In some examples, such as where the aerosol-generating material does not comprise a filler, the aerosol-generating material in

sheet form may have a tensile strength of from around 200 N/m to around 400 N/m, or around 200 N/m to around 300 N/m, or about 250 N/m. Such tensile strengths may be particularly suitable for embodiments wherein the aerosol-generating material and/or the aerosol-generating composition is formed as a sheet and then shredded and incorporated into a consumable. In some examples, such as where the aerosol-generating material comprises a filler, the aerosol-generating material may have a tensile strength of from around 600 N/m to around 900 N/m, or from around 700 N/m to around 900 N/m, or around 800 N/m. Such tensile strengths may be particularly suitable for embodiments wherein the aerosol-generating material and/or the aerosol-generating composition is included in a consumable/non-combustible aerosol provision system as a rolled sheet, suitably in the form of a tube.

**[0150]** The aerosol-generating composition comprising the aerosol-generating material may have any suitable area density, such as from 30 $g/m^2$ to 120 $g/m^2$. In some cases, the aerosol-generating material may have a mass per unit area of 80-120 $g/m^2$, or from about 70 to 110 $g/m^2$, or particularly from about 90 to 110 $g/m^2$, or suitably about 100 $g/m^2$ (so that it has a similar density to cut rag tobacco and a mixture of these substances will not readily separate). Such area densities may be particularly suitable where the aerosol-generating composition is included in assembly consumable/system in sheet form, or as a shredded sheet (described further hereinbelow). In some cases, the aerosol-generating composition may have a mass per unit area of about 30 to 70 $g/m^2$, 40 to 60 $g/m^2$, or 25-60 $g/m^2$ and may be used to wrap an aerosolisable material such as tobacco.

**[0151]** In some embodiments, the aerosol-generating material is formed as a film on a support. The aerosol-generating film may be a continuous film or a discontinuous film, such as an arrangement of discrete portions of film on a support. In some cases, the aerosol-generating film does not comprise a filler.

**[0152]** The aerosol-generating material for use in aerosol generation may be present on or in a support, to form a substrate. The support may, for example, be or comprise paper, card, paperboard, cardboard, reconstituted material, a plastics material, a ceramic material, a composite material, glass, a metal, or a metal alloy. In some embodiments, the support comprises (or is) a susceptor. In some embodiments, the susceptor is an aluminium sheet. In some embodiments, the susceptor is embedded within the material. In some alternative embodiments, the susceptor is on one or either side of the material.

**[0153]** The aerosol-generating composition may comprise a carrier on which the aerosol-generating material is provided. The carrier functions as a support on which the aerosol-generating material layer forms, easing manufacture. The carrier may provide tensile strength to the aerosol-generating material layer, easing handling.

**[0154]** In some cases, the carrier may be formed from materials selected from metal foil, paper, carbon paper, greaseproof paper, ceramic, carbon allotropes such as graphite and graphene, plastic, cardboard, wood or combinations thereof. In some cases, the carrier may comprise or consist of a tobacco material, such as a sheet of reconstituted tobacco. In some cases, the carrier may be formed from materials selected from metal foil, paper, cardboard, wood or combinations thereof. In some cases, the carrier itself be a laminate structure comprising layers of materials selected from the preceding lists. In some cases, the carrier may also function as a flavour carrier. For example, the carrier may be impregnated with a flavour or with tobacco extract.

**[0155]** In some cases, the carrier may be magnetic. This functionality may be used to fasten the carrier to the non-combustible aerosol provision device in use, or may be used to generate particular aerosol-generating material shapes. In some cases, the aerosol-generating composition may comprise one or more magnets which can be used to fasten the material to an induction heater in use.

**[0156]** In some cases, the carrier may be substantially or wholly impermeable to gas and/or aerosol. This prevents aerosol or gas passage through the carrier layer, thereby controlling the flow and ensuring it is delivered to the user. This can also be used to prevent condensation or other deposition of the gas/aerosol in use on, for example, the surface of a heater provided in an aerosol generating assembly. Thus, consumption efficiency and hygiene can be improved in some cases.

**[0157]** In some cases, the surface of the carrier that abuts the aerosol-generating material may be porous. For example, in one case, the carrier comprises paper. A porous carrier such as paper has been found to be particularly suitable; the porous (e.g. paper) layer abuts the aerosol-generating material layer and forms a strong bond. The aerosol-generating material may be formed by drying a gel and, without being limited by theory, it is thought that the slurry from which the gel is formed partially impregnates the porous carrier (e.g. paper) so that when the gel sets, the carrier is partially bound into the gel. This provides a strong binding between the gel and the carrier (and between the dried gel and the carrier).

**[0158]** In some embodiments, the aerosol-generating material may be laminated to a carrier, such as a paper sheet.

**[0159]** In some embodiments, when the aerosol-generating material is formed from a slurry as described herein, the layer of slurry may be formed on a carrier, such as a paper sheet.

**[0160]** Additionally, surface roughness may contribute to the strength of bond between the aerosol-generating material and the carrier. The paper roughness (for the surface abutting the carrier) may suitably be in the range of 50-1000 Bekk seconds, suitably 50-150 Bekk seconds, suitably 100 Bekk seconds (measured over an air pressure interval of 50.66-48.00 kPa). (A Bekk smoothness tester is an instrument used to determine the smoothness of a paper surface, in which air at a specified pressure is leaked between a smooth glass surface and a paper sample, and the time (in seconds) for a fixed volume of air to seep between these surfaces is the "Bekk smoothness".)

**[0161]** Conversely, the surface of the carrier facing away from the aerosol-generating material may be arranged in contact with the heater, and a smoother surface may provide more efficient heat transfer. Thus, in some cases, the carrier is disposed so as to have a rougher side abutting the aerosol-generating material and a smoother side facing away from the aerosol-generating material.

**[0162]** In one particular case, the carrier may be a paper-backed foil; the paper layer abuts the aerosol-generating material layer and the properties discussed in the previous paragraphs are afforded by this abutment. The foil backing is substantially impermeable, providing control of the aerosol flow path. A metal foil backing may also serve to conduct heat to the aerosol-generating material.

**[0163]** In another case, the foil layer of the paper-backed foil abuts the aerosol-generating material. The foil is substantially impermeable, thereby preventing water provided in the aerosol-generating material from being absorbed into the paper which could weaken its structural integrity.

**[0164]** In some cases, the carrier is formed from or comprises metal foil, such as aluminium foil. A metallic carrier may allow for better conduction of thermal energy to the aerosol-generating material. Additionally, or alternatively, a metal foil may function as a susceptor in an induction heating system. In particular embodiments, the carrier comprises a metal foil layer and a support layer, such as cardboard. In these embodiments, the metal foil layer may have a thickness of less than 20 μm, such as from about 1 μm to about 10 μm, suitably about 5 μm.

**[0165]** In some cases, the carrier may have a thickness of between about 0.010 mm and about 2.0 mm, suitably from about 0.015 mm, 0.02 mm, 0.05 mm or 0.1 mm to about 1.5 mm, 1.0 mm, or 0.5 mm.

Consumable

**[0166]** In another aspect of the disclosure, there is provided a consumable for use in a non-combustible aerosol provision device, the consumable comprising an aerosol-generating composition, wherein the aerosol-generating composition comprises (or consists of) an aerosol-generating material, the aerosol-generating material comprising:

**[0167]** about 1 to about 30 wt % nicotine;

**[0168]** optionally filler,

**[0169]** about 15 to about 80 wt % gelling agent;

**[0170]** about 10 to about 60 wt % aerosol-former material;

**[0171]** about 1 to about 30 wt % acid; and

**[0172]** wherein the wt % values are calculated on a dry weight basis; and

**[0173]** wherein the molar ratio of nicotine to acid is 2.2:1 or less.

**[0174]** In another aspect of the disclosure, there is provided a consumable for use in a non-combustible aerosol provision device, the consumable comprising an aerosol-generating composition, wherein the aerosol-generating composition comprises (or consists of) an aerosol-generating material, the aerosol-generating material comprising:

**[0175]** about 10 to about 60 wt % aerosol-former material; and

**[0176]** about 5 to about 30 wt % nicotine salt;

**[0177]** about 15 to about 80 wt % gelling agent;

**[0178]** optionally filler,

**[0179]** wherein the wt % values are calculated on a dry weight basis.

**[0180]** In another aspect of the disclosure, there is provided a consumable for use in a non-combustible aerosol provision device, the consumable comprising an aerosol-generating composition, wherein the aerosol-generating composition comprises (or consists of) an aerosol-generating material, the aerosol-generating material comprising:

**[0181]** about 1 to about 30 wt % nicotine salt;

**[0182]** about 45 to about 80 wt % gelling agent;

**[0183]** about 10 to about 54 wt % aerosol-former material; and

**[0184]** optionally filler,

**[0185]** wherein the wt % values are calculated on a dry weight basis.

**[0186]** In some embodiments, the disclosure relates to consumables comprising aerosol-generating composition and configured to be used with non-combustible aerosol provision devices. These consumables are sometimes referred to as articles throughout the disclosure.

**[0187]** The consumable may be used with any suitable non-combustible aerosol provision device.

**[0188]** A consumable is an article comprising or consisting of aerosol-generating composition, part or all of which is intended to be consumed during use by a user.

**[0189]** A consumable may comprise one or more other components, such as an aerosol-generating composition storage area, an aerosol-generating composition transfer component, an aerosol generation area, a housing, a wrapper, a mouthpiece, a filter and/or an aerosol-modifying agent. A consumable may also comprise an aerosol generator, such as a heater, that emits heat to cause the aerosol-generating composition to generate aerosol in use. The heater may, for example, comprise combustible material, a material heatable by electrical conduction, or a susceptor.

**[0190]** In some embodiments, the consumable comprises a single aerosol-generating composition. That is, the consumable comprises an aerosol-generating composition as defined herein, and no other aerosol-generating component (s), active(s), agent(s) or composition(s).

**[0191]** In some embodiments, the consumable is substantially free from tobacco. By "substantially free from" it is meant that the material comprises less than 1 wt %, such as less than 0.5 wt % tobacco. In some embodiments, the consumable is free from tobacco. In some embodiments, the consumable does not comprise tobacco fibres.

**[0192]** A susceptor is a material that is heatable by penetration with a varying magnetic field, such as an alternating magnetic field. The susceptor may be an electrically-conductive material, so that penetration thereof with a varying magnetic field causes induction heating of the heating material. The heating material may be magnetic material, so that penetration thereof with a varying magnetic field causes magnetic hysteresis heating of the heating material. The susceptor may be both electrically-conductive and magnetic, so that the susceptor is heatable by both heating mechanisms. The device that is configured to generate the varying magnetic field is referred to as a magnetic field generator, herein.

**[0193]** An aerosol-modifying agent is a substance, typically located downstream of the aerosol generation area, that is configured to modify the aerosol generated, for example by changing the taste, flavour, acidity or another characteristic of the aerosol. The aerosol-modifying agent may be provided in an aerosol-modifying agent release component that is operable to selectively release the aerosol-modifying agent.

**[0194]** The aerosol-modifying agent may, for example, be an additive or a sorbent. The aerosol-modifying agent may, for example, comprise one or more of a flavourant, a colourant, water, and a carbon adsorbent. The aerosol-modifying agent may, for example, be a solid, a liquid, or a gel. The aerosol-modifying agent may be in powder, thread or granule form. The aerosol-modifying agent may be free from filtration material.

**[0195]** An aerosol generator is an apparatus configured to cause aerosol to be generated from the aerosol-generating material. In some embodiments, the aerosol generator is a heater configured to subject the aerosol-generating material

to heat energy, so as to release one or more volatiles from the aerosol-generating composition to form an aerosol. In some embodiments, the aerosol generator is configured to cause an aerosol to be generated from the aerosol-generating composition without heating. For example, the aerosol generator may be configured to subject the aerosol-generating composition to one or more of vibration, increased pressure, or electrostatic energy.

Non-Combustible Aerosol Provision System

**[0196]** In another aspect of the disclosure, there is provided a non-combustible aerosol provision system comprising the consumable described herein and a non-combustible aerosol provision device.

**[0197]** According to the present disclosure, a "non-combustible" aerosol provision system is one where a constituent aerosol-generating material of the aerosol provision system (or component thereof) is not combusted or burned in order to facilitate delivery of at least one substance to a user.

**[0198]** In some embodiments, the delivery system is a non-combustible aerosol provision system, such as a powered non-combustible aerosol provision system.

**[0199]** In some embodiments, the non-combustible aerosol provision system is an aerosol-generating material heating system, also known as a heat-not-burn system. An example of such a system is a tobacco heating system.

**[0200]** In some embodiments, the non-combustible aerosol provision device is a heat-not-burn device.

**[0201]** In some embodiments, the non-combustible aerosol provision system is a hybrid system to generate aerosol using a combination of aerosol-generating materials, one or a plurality of which may be heated. In some embodiments, the hybrid system comprises the aerosol-generating material described herein comprising or consisting of the aerosol-generating material and an additional liquid or gel aerosol-generating material.

**[0202]** In some embodiments, the non-combustible aerosol provision device is an electronic tobacco hybrid device.

**[0203]** Typically, the non-combustible aerosol provision system may comprise a non-combustible aerosol provision device and a consumable for use with the non-combustible aerosol provision device.

**[0204]** In some embodiments, the non-combustible aerosol provision system, such as a non-combustible aerosol provision device thereof, may comprise a power source and a controller. The power source may, for example, be an electric power source or an exothermic power source. In some embodiments, the exothermic power source comprises a carbon substrate which may be energised so as to distribute power in the form of heat to an aerosol-generating material or to a heat transfer material in proximity to the exothermic power source.

**[0205]** In some embodiments, the non-combustible aerosol provision system, such as a non-combustible aerosol provision device thereof, may comprise an area for receiving the consumable, an aerosol generator, an aerosol generation area, a housing, a mouthpiece, a filter and/or an aerosol-modifying agent.

**[0206]** The non-combustible aerosol provision system or device may comprise a heater configured to heat but not burn the aerosol generating substrate. The heater may be, in some cases, a thin film, electrically resistive heater. In other cases, the heater may comprise an induction heater or the like. In yet further cases, the heater may be a combustible heat source or a chemical heat source which undergoes an exothermic reaction to produce heat in use.

**[0207]** In some cases, the heater may heat but not burn the aerosolisable material(s) to between 120° C. and 350° C. in use. In some cases, the heater may heat but not burn the aerosolisable material(s) to between 140° C. and 250° C. in use. In some cases in use, substantially all of the aerosol-generating material is less than about 4 mm, 3 mm, 2 mm or 1 mm from the heater. In some cases, the solid is disposed between about 0.017 mm and 2.0 mm from the heater, suitably between about 0.1 mm and 1.0 mm. These minimum distances may, in some cases, reflect the thickness of a carrier that supports the aerosol-generating material. In some cases, a surface of the aerosol-generating material may directly abut the heater.

**[0208]** In some cases, the heater may be embedded in the aerosol-generating material. In some such cases, the heater may be an electrically resistive heater (with exposed contacts for connection to an electrical circuit). In other such cases, the heater may be a susceptor embedded in the aerosol-generating material, which is heated by induction.

**[0209]** The non-combustible aerosol provision system may additionally comprise a cooling element and/or a filter. The cooling element, if present, may act or function to cool gaseous or aerosol components. In some cases, it may act to cool gaseous components such that they condense to form an aerosol. It may also act to space the very hot parts of the apparatus from the user. The filter, if present, may comprise any suitable filter known in the art such as a cellulose acetate plug.

**[0210]** In some cases, the non-combustible aerosol provision system may be a heat-not-burn system. That is, it may contain a solid material (and no liquid aerosolisable material). A heat-not-burn device is disclosed in WO 2015/062983 A2, which is incorporated by reference in its entirety.

**[0211]** In some cases, the non-combustible aerosol provision system may comprise an electronic tobacco hybrid device. That is, it may contain a solid aerosolisable material and a liquid aerosolisable material. The separate aerosolisable materials may be heated by separate heaters, the same heater or, in one case, a downstream aerosolisable material may be heated by a hot aerosol which is generated from the upstream aerosolisable material. An electronic tobacco hybrid device is disclosed in WO 2016/135331 A1, which is incorporated by reference in its entirety.

**[0212]** The consumable may alternatively be referred to herein as a cartridge. The consumable may be adapted for use in a THP, an electronic tobacco hybrid device or another aerosol generating device. In some cases, the consumable may additionally comprise a filter and/or cooling element, as described previously. In some cases, the consumable may be circumscribed by a wrapping material such as paper.

**[0213]** The consumable may additionally comprise ventilation apertures. These may be provided in the sidewall of the article. In some cases, the ventilation apertures may be provided in the filter and/or cooling element. These apertures may allow cool air to be drawn into the article during use, which can mix with the heated volatilised components thereby cooling the aerosol.

**[0214]** The ventilation enhances the generation of visible heated volatilised components from the article when it is heated in use. The heated volatilised components are made

visible by the process of cooling the heated volatilised components such that supersaturation of the heated volatilised components occurs. The heated volatilised components then undergo droplet formation, otherwise known as nucleation, and eventually the size of the aerosol particles of the heated volatilised components increases by further condensation of the heated volatilised components and by coagulation of newly formed droplets from the heated volatilised components.

**[0215]** In some cases, the ratio of the cool air to the sum of the heated volatilised components and the cool air, known as the ventilation ratio, is at least 15%. A ventilation ratio of 15% enables the heated volatilised components to be made visible by the method described above. The visibility of the heated volatilised components enables the user to identify that the volatilised components have been generated and adds to the sensory experience of the smoking experience. In another example, the ventilation ratio is between 50% and 85% to provide additional cooling to the heated volatilised components. In some cases, the ventilation ratio may be at least 60% or 65%.

**[0216]** Referring to FIGS. **1** and **2**, there are shown a partially cut-away section view and a perspective view of an example of article consumable **101** ("article"). The article **101** is adapted for use with a device having a power source and a heater. The article **101** of this embodiment is particularly suitable for use with the device **1** shown in FIGS. **5** to **7**, described below. In use, the article **101** may be removably inserted into the device shown in FIG. **5** at an insertion point **20** of the device **1**. The article **101** of one example is in the form of a substantially cylindrical rod that includes a body of aerosol-generating composition **103** and a filter assembly **105** in the form of a rod. The aerosol-generating material comprises the aerosol-generating material described herein. In some embodiments, it may be included in sheet form. In some embodiments it may be included in the form of a shredded sheet. In some embodiments, the aerosol-generating material described herein may be incorporated in sheet form and in shredded form.

**[0217]** The filter assembly **105** includes three segments, a cooling segment **107**, a filter segment **109** and a mouth end segment **111**. The article **101** has a first end **113**, also known as a mouth end or a proximal end and a second end **115**, also known as a distal end. The body of aerosol-generating composition **103** is located towards the distal end **115** of the article **101**. In one example, the cooling segment **107** is located adjacent the body of aerosol-generating composition **103** between the body of aerosol-generating composition **103** and the filter segment **109**, such that the cooling segment **107** is in an abutting relationship with the aerosol generating-composition **103** and the filter segment **103**. In other examples, there may be a separation between the body of aerosol-generating composition **103** and the cooling segment **107** and between the body of aerosol-generating composition **103** and the filter segment **109**. The filter segment **109** is located in between the cooling segment **107** and the mouth end segment **111**. The mouth end segment **111** is located towards the proximal end **113** of the article **101**, adjacent the filter segment **109**. In one example, the filter segment **109** is in an abutting relationship with the mouth end segment **111**. In one embodiment, the total length of the filter assembly **105** is between 37 mm and 45 mm, more preferably, the total length of the filter assembly **105** is 41 mm. In one example, the rod of aerosol-generating composition **103** is between 34 mm and 50 mm in length, suitably between 38 mm and 46 mm in length, suitably 42 mm in length.

**[0218]** In one example, the total length of the article **101** is between 71 mm and 95 mm, suitably between 79 mm and 87 mm, suitably 83 mm.

**[0219]** An axial end of the body of aerosol-generating composition **103** is visible at the distal end **115** of the article **101**. However, in other embodiments, the distal end **115** of the article **101** may comprise an end member (not shown) covering the axial end of the body of aerosol-generating composition **103**.

**[0220]** The body of aerosol-generating composition **103** is joined to the filter assembly **105** by annular tipping paper (not shown), which is located substantially around the circumference of the filter assembly **105** to surround the filter assembly **105** and extends partially along the length of the body of aerosol-generating composition **103**. In one example, the tipping paper is made of 58GSM standard tipping base paper. In one example the tipping paper has a length of between 42 mm and 50 mm, suitably of 46 mm.

**[0221]** In one example, the cooling segment **107** is an annular tube and is located around and defines an air gap within the cooling segment. The air gap provides a chamber for heated volatilised components generated from the body of aerosol-generating composition **103** to flow. The cooling segment **107** is hollow to provide a chamber for aerosol accumulation yet rigid enough to withstand axial compressive forces and bending moments that might arise during manufacture and whilst the article **101** is in use during insertion into the device **1**. In one example, the thickness of the wall of the cooling segment **107** is approximately 0.29 mm.

**[0222]** The cooling segment **107** provides a physical displacement between the aerosol-generating composition **103** and the filter segment **109**. The physical displacement provided by the cooling segment **107** will provide a thermal gradient across the length of the cooling segment **107**. In one example the cooling segment **107** is configured to provide a temperature differential of at least 40 degrees Celsius between a heated volatilised component entering a first end of the cooling segment **107** and a heated volatilised component exiting a second end of the cooling segment **107**. In one example the cooling segment **107** is configured to provide a temperature differential of at least 60 degrees Celsius between a heated volatilised component entering a first end of the cooling segment **107** and a heated volatilised component exiting a second end of the cooling segment **107**. This temperature differential across the length of the cooling element **107** protects the temperature sensitive filter segment **109** from the high temperatures of the aerosol-generating composition **103** when it is heated by the device **1**. If the physical displacement was not provided between the filter segment **109** and the body of aerosol-generating composition **103** and the heating elements of the device **1**, then the temperature sensitive filter segment may **109** become damaged in use, so it would not perform its required functions as effectively.

**[0223]** In one example the length of the cooling segment **107** is at least 15 mm. In one example, the length of the cooling segment **107** is between 20 mm and 30 mm, more particularly 23 mm to 27 mm, more particularly 25 mm to 27 mm, suitably 25 mm.

**[0224]** The cooling segment **107** is made of paper, which means that it is comprised of a material that does not generate compounds of concern, for example, toxic compounds when in use adjacent to the heater of the device **1**. In one example, the cooling segment **107** is manufactured from a spirally wound paper tube which provides a hollow internal chamber yet maintains mechanical rigidity. Spirally wound paper tubes are able to meet the tight dimensional accuracy requirements of high-speed manufacturing processes with respect to tube length, outer diameter, roundness and straightness.

**[0225]** In another example, the cooling segment **107** is a recess created from stiff plug wrap or tipping paper. The stiff plug wrap or tipping paper is manufactured to have a rigidity that is sufficient to withstand the axial compressive forces and bending moments that might arise during manufacture and whilst the article **101** is in use during insertion into the device **1**.

**[0226]** The filter segment **109** may be formed of any filter material sufficient to remove one or more volatilised compounds from heated volatilised components from the aerosol-generating material. In one example the filter segment **109** is made of a mono-acetate material, such as cellulose acetate. The filter segment **109** provides cooling and irritation-reduction from the heated volatilised components without depleting the quantity of the heated volatilised components to an unsatisfactory level for a user.

**[0227]** In some embodiments, a capsule (not illustrated) may be provided in filter segment **109**. It may be disposed substantially centrally in the filter segment **109**, both across the filter segment **109** diameter and along the filter segment **109** length. In other cases, it may be offset in one or more dimension. The capsule may in some cases, where present, contain a volatile component such as a flavour or aerosol-former material.

**[0228]** The density of the cellulose acetate tow material of the filter segment **109** controls the pressure drop across the filter segment **109**, which in turn controls the draw resistance of the article **101**. Therefore the selection of the material of the filter segment **109** is important in controlling the resistance to draw of the article **101**. In addition, the filter segment performs a filtration function in the article **101**. In one example, the filter segment **109** is made of a 8Y15 grade of filter tow material, which provides a filtration effect on the heated volatilised material, whilst also reducing the size of condensed aerosol droplets which result from the heated volatilised material.

**[0229]** The presence of the filter segment **109** provides an insulating effect by providing further cooling to the heated volatilised components that exit the cooling segment **107**. This further cooling effect reduces the contact temperature of the user's lips on the surface of the filter segment **109**.

**[0230]** In one example, the filter segment **109** is between 6 mm to 10 mm in length, suitably 8 mm.

**[0231]** The mouth end segment **111** is an annular tube and is located around and defines an air gap within the mouth end segment **111**. The air gap provides a chamber for heated volatilised components that flow from the filter segment **109**. The mouth end segment **111** is hollow to provide a chamber for aerosol accumulation yet rigid enough to withstand axial compressive forces and bending moments that might arise during manufacture and whilst the article is in use during insertion into the device **1**. In one example, the thickness of the wall of the mouth end segment **111** is approximately 0.29 mm. In one example, the length of the mouth end segment **111** is between 6 mm to 10 mm, suitably 8 mm.

**[0232]** The mouth end segment **111** may be manufactured from a spirally wound paper tube which provides a hollow internal chamber yet maintains critical mechanical rigidity. Spirally wound paper tubes are able to meet the tight dimensional accuracy requirements of high-speed manufacturing processes with respect to tube length, outer diameter, roundness and straightness.

**[0233]** The mouth end segment **111** provides the function of preventing any liquid condensate that accumulates at the exit of the filter segment **109** from coming into direct contact with a user.

**[0234]** It should be appreciated that, in one example, the mouth end segment **111** and the cooling segment **107** may be formed of a single tube and the filter segment **109** is located within that tube separating the mouth end segment **111** and the cooling segment **107**.

**[0235]** Referring to FIGS. **3** and **4**, there are shown a partially cut-away section and perspective views of an example of an article **301**. The reference signs shown in FIGS. **3** and **4** are equivalent to the reference signs shown in FIGS. **1** and **2**, but with an increment of 200.

**[0236]** In the example of the article **301** shown in FIGS. **3** and **4**, a ventilation region **317** is provided in the article **301** to enable air to flow into the interior of the article **301** from the exterior of the article **301**. In one example the ventilation region **317** takes the form of one or more ventilation holes **317** formed through the outer layer of the article **301**. The ventilation holes may be located in the cooling segment **307** to aid with the cooling of the article **301**. In one example, the ventilation region **317** comprises one or more rows of holes, and preferably, each row of holes is arranged circumferentially around the article **301** in a cross-section that is substantially perpendicular to a longitudinal axis of the article **301**.

**[0237]** In one example, there are between one to four rows of ventilation holes to provide ventilation for the article **301**. Each row of ventilation holes may have between 12 to 36 ventilation holes **317**. The ventilation holes **317** may, for example, be between 100 to 500 μm in diameter. In one example, an axial separation between rows of ventilation holes **317** is between 0.25 mm and 0.75 mm, suitably 0.5 mm. In one example, the ventilation holes **317** are of uniform size. In another example, the ventilation holes **317** vary in size. The ventilation holes can be made using any suitable technique, for example, one or more of the following techniques: laser technology, mechanical perforation of the cooling segment **307** or pre-perforation of the cooling segment **307** before it is formed into the article **301**. The ventilation holes **317** are positioned so as to provide effective cooling to the article **301**. In one example, the rows of ventilation holes **317** are located at least 11 mm from the proximal end **313** of the article, suitably between 17 mm and 20 mm from the proximal end **313** of the article **301**. The location of the ventilation holes **317** is positioned such that user does not block the ventilation holes **317** when the article **301** is in use.

**[0238]** Providing the rows of ventilation holes between 17 mm and 20 mm from the proximal end **313** of the article **301** enables the ventilation holes **317** to be located outside of the device **1**, when the article **301** is fully inserted in the device **1**, as can be seen in FIGS. **6** and **7**. By locating the

ventilation holes outside of the device, non-heated air is able to enter the article **301** through the ventilation holes from outside the device **1** to aid with the cooling of the article **301**.

**[0239]** The length of the cooling segment **307** is such that the cooling segment **307** will be partially inserted into the device **1**, when the article **301** is fully inserted into the device **1**. The length of the cooling segment **307** provides a first function of providing a physical gap between the heater arrangement of the device **1** and the heat sensitive filter arrangement **309**, and a second function of enabling the ventilation holes **317** to be located in the cooling segment, whilst also being located outside of the device **1**, when the article **301** is fully inserted into the device **1**. As can be seen from FIGS. **6** and **7**, the majority of the cooling element **307** is located within the device **1**. However, there is a portion of the cooling element **307** that extends out of the device **1**. It is in this portion of the cooling element **307** that extends out of the device **1** in which the ventilation holes **317** are located. Referring now to FIGS. **5** to **7** in more detail, there is shown an example of a device **1** arranged to heat aerosol-generating composition to volatilise at least one component of said aerosol-generating material, typically to form an aerosol which can be inhaled. The device **1** is a heating device which releases compounds by heating, but not burning, the aerosol-generating material.

**[0240]** A first end **3** is sometimes referred to herein as the mouth or proximal end **3** of the device **1** and a second end **5** is sometimes referred to herein as the distal end **5** of the device **1**. The device **1** has an on/off button **7** to allow the device **1** as a whole to be switched on and off as desired by a user.

**[0241]** The device **1** comprises a housing **9** for locating and protecting various internal components of the device **1**. In the example shown, the housing **9** comprises a uni-body sleeve **11** that encompasses the perimeter of the device **1**, capped with a top panel **17** which defines generally the 'top' of the device **1** and a bottom panel **19** which defines generally the 'bottom' of the device **1**. In another example the housing comprises a front panel, a rear panel and a pair of opposite side panels in addition to the top panel **17** and the bottom panel **19**.

**[0242]** The top panel **17** and/or the bottom panel **19** may be removably fixed to the uni-body sleeve **11**, to permit easy access to the interior of the device **1**, or may be "permanently" fixed to the uni-body sleeve **11**, for example to deter a user from accessing the interior of the device **1**. In an example, the panels **17** and **19** are made of a plastics material, including for example glass-filled nylon formed by injection moulding, and the uni-body sleeve **11** is made of aluminium, though other materials and other manufacturing processes may be used.

**[0243]** The top panel **17** of the device **1** has an opening **20** at the mouth end **3** of the device **1** through which, in use, the article **101**, **301** including the aerosol-generating material may be inserted into the device **1** and removed from the device **1** by a user.

**[0244]** The housing **9** has located or fixed therein a heater arrangement **23**, control circuitry **25** and a power source **27**. In this example, the heater arrangement **23**, the control circuitry **25** and the power source **27** are laterally adjacent (that is, adjacent when viewed from an end), with the control circuitry **25** being located generally between the heater arrangement **23** and the power source **27**, though other locations are possible.

**[0245]** The control circuitry **25** may include a controller, such as a microprocessor arrangement, configured and arranged to control the heating of the aerosol-generating material in the article **101**, **301** as discussed further below.

**[0246]** The power source **27** may be for example a battery, which may be a rechargeable battery or a non-rechargeable battery. Examples of suitable batteries include for example a lithium-ion battery, a nickel battery (such as a nickel-cadmium battery), an alkaline battery and/or the like. The battery **27** is electrically coupled to the heater arrangement **23** to supply electrical power when required and under control of the control circuitry **25** to heat the aerosol-generating material in the article (as discussed, to volatilise the aerosol-generating material without causing the aerosol-generating material to burn).

**[0247]** An advantage of locating the power source **27** laterally adjacent to the heater arrangement **23** is that a physically large power source **25** may be used without causing the device **1** as a whole to be unduly lengthy. As will be understood, in general a physically large power source **25** has a higher capacity (that is, the total electrical energy that can be supplied, often measured in Amp-hours or the like) and thus the battery life for the device **1** can be longer.

**[0248]** In one example, the heater arrangement **23** is generally in the form of a hollow cylindrical tube, having a hollow interior heating chamber into which the article **101**, **301** comprising the aerosol-generating composition is inserted for heating in use. Different arrangements for the heater arrangement **23** are possible. For example, the heater arrangement **23** may comprise a single heating element or may be formed of plural heating elements aligned along the longitudinal axis of the heater arrangement **23**. The or each heating element may be annular or tubular, or at least part-annular or part-tubular around its circumference. In an example, the or each heating element may be a thin film heater. In another example, the or each heating element may be made of a ceramics material. Examples of suitable ceramics materials include alumina and aluminium nitride and silicon nitride ceramics, which may be laminated and sintered. Other heating arrangements are possible, including for example inductive heating, infrared heater elements, which heat by emitting infrared radiation, or resistive heating elements formed by for example a resistive electrical winding.

**[0249]** In one particular example, the heater arrangement **23** is supported by a stainless steel support tube and comprises a polyimide heating element. The heater arrangement **23** is dimensioned so that substantially the whole of the body of aerosol-generating composition **103**, **303** of the article **101**, **301** is inserted into the heater arrangement **23** when the article **101**, **301** is inserted into the device **1**.

**[0250]** The or each heating element may be arranged so that selected zones of the aerosol-generating material can be independently heated, for example in turn (over time, as discussed above) or together (simultaneously) as desired.

**[0251]** The heater arrangement **23** in this example is surrounded along at least part of its length by a thermal insulator **31**. The insulator **31** helps to reduce heat passing from the heater arrangement **23** to the exterior of the device **1**. This helps to keep down the power requirements for the heater arrangement **23** as it reduces heat losses generally. The insulator **31** also helps to keep the exterior of the device **1** cool during operation of the heater arrangement **23**. In one example, the insulator **31** may be a double-walled sleeve

which provides a low pressure region between the two walls of the sleeve. That is, the insulator **31** may be for example a "vacuum" tube, i.e. a tube that has been at least partially evacuated so as to minimise heat transfer by conduction and/or convection. Other arrangements for the insulator **31** are possible, including using heat insulating materials, including for example a suitable foam-type material, in addition to or instead of a double-walled sleeve.

**[0252]** The housing **9** may further comprises various internal support structures **37** for supporting all internal components, as well as the heating arrangement **23**.

**[0253]** The device **1** further comprises a collar **33** which extends around and projects from the opening **20** into the interior of the housing **9** and a generally tubular chamber **35** which is located between the collar **33** and one end of the vacuum sleeve **31**. The chamber **35** further comprises a cooling structure **35***f*, which in this example, comprises a plurality of cooling fins **35***f* spaced apart along the outer surface of the chamber **35**, and each arranged circumferentially around outer surface of the chamber **35**. There is an air gap **36** between the hollow chamber **35** and the article **101**, **301** when it is inserted in the device **1** over at least part of the length of the hollow chamber **35**. The air gap **36** is around all of the circumference of the article **101**, **301** over at least part of the cooling segment **307**.

**[0254]** The collar **33** comprises a plurality of ridges **60** arranged circumferentially around the periphery of the opening **20** and which project into the opening **20**. The ridges **60** take up space within the opening **20** such that the open span of the opening **20** at the locations of the ridges **60** is less than the open span of the opening **20** at the locations without the ridges **60**. The ridges **60** are configured to engage with an article **101**, **301** inserted into the device to assist in securing it within the device **1**. Open spaces (not shown in the Figures) defined by adjacent pairs of ridges **60** and the article **101**, **301** form ventilation paths around the exterior of the article **101**, **301**. These ventilation paths allow hot vapours that have escaped from the article **101**, **301** to exit the device **1** and allow cooling air to flow into the device **1** around the article **101**, **301** in the air gap **36**.

**[0255]** In operation, the article **101**, **301** is removably inserted into an insertion point **20** of the device **1**, as shown in FIGS. **5** to **7**. Referring particularly to FIG. **6**, in one example, the body of aerosol-generating composition **103**, **303**, which is located towards the distal end **115**, **315** of the article **101**, **301**, is entirely received within the heater arrangement **23** of the device **1**. The proximal end **113**, **313** of the article **101**, **301** extends from the device **1** and acts as a mouthpiece assembly for a user.

**[0256]** In operation, the heater arrangement **23** will heat the article **101**, **301** to volatilise at least one component of the aerosol-generating composition from the body of aerosol-generating material **103**, **303**.

**[0257]** The primary flow path for the heated volatilised components from the body of aerosol-generating composition **103**, **303** is axially through the article **101**, **301**, through the chamber inside the cooling segment **107**, **307**, through the filter segment **109**, **309**, through the mouth end segment **111**, **311** to the user. In one example, the temperature of the heated volatilised components that are generated from the body of aerosol-generating material is between 60° C. and 250° C., which may be above the acceptable inhalation temperature for a user. As the heated volatilised component travels through the cooling segment **107**, **307**, it will cool and some volatilised components will condense on the inner surface of the cooling segment **107**, **307**. In the examples of the article **301** shown in FIGS. **3** and **4**, cool air will be able to enter the cooling segment **307** via the ventilation holes **317** formed in the cooling segment **307**. This cool air will mix with the heated volatilised components to provide additional cooling to the heated volatilised components.

Method of Manufacture

**[0258]** In another aspect, there is provided a method of forming an aerosol-generating material comprising:

**[0259]** about 1 to about 30 wt % nicotine;

**[0260]** about 15 to about 80 wt % gelling agent;

**[0261]** about 10 to about 60 wt % aerosol-former material;

**[0262]** about 1 to about 30 wt % acid; and

**[0263]** optionally filler,

**[0264]** wherein the wt % values are calculated on a dry weight basis; and

**[0265]** wherein the molar ratio of nicotine to acid is 2.2:1 or less;

**[0266]** the method comprising:

**[0267]** (a) providing a slurry comprising nicotine, gelling agent, aerosol-former material, acid, a solvent and any optional further components of the aerosol-generating material;

**[0268]** (b) forming a layer of the slurry;

**[0269]** (c) optionally setting or cross-linking the layer of the slurry; and

**[0270]** (d) drying the slurry to form the aerosol-generating material.

**[0271]** In another aspect, there is provided a method of forming an aerosol-generating material comprising:

**[0272]** about 5 to about 30 wt % nicotine salt;

**[0273]** about 15 to about 80 wt % gelling agent;

**[0274]** about 10 to about 60 wt % aerosol-former material; and

**[0275]** optionally filler,

**[0276]** wherein the wt % values are calculated on a dry weight basis;

**[0277]** the method comprising:

**[0278]** (a) providing a slurry comprising nicotine salt, gelling agent, aerosol-former material, acid, a solvent and any optional further components of the aerosol-generating material;

**[0279]** (b) forming a layer of the slurry;

**[0280]** (c) optionally setting or cross-linking the layer of the slurry; and

**[0281]** (d) drying the slurry to form the aerosol-generating material.

**[0282]** In another aspect, there is provided a method of forming an aerosol-generating material comprising:

**[0283]** about 1 to about 30 wt % nicotine salt;

**[0284]** about 45 to about 80 wt % gelling agent;

**[0285]** about 10 to about 54 wt % aerosol-former material; and

**[0286]** optionally filler,

**[0287]** wherein the wt % values are calculated on a dry weight basis;

**[0288]** the method comprising:

**[0289]** (a) providing a slurry comprising nicotine salt, gelling agent, aerosol-former material, acid, a solvent and any optional further components of the aerosol-generating material;

[0290] (b) forming a layer of the slurry;

[0291] (c) optionally setting or cross-linking the layer of the slurry; and

[0292] (d) drying the slurry to form the aerosol-generating material.

[0293] Another aspect of the invention provides a method of making the consumable or system as previously described. This method comprises a method of making the aerosol-generating material and incorporating the aerosol-generating material into the consumable or system. The method may comprise (a) forming a slurry comprising components of the aerosol-generating material or precursors thereof, (b) forming a layer of the slurry, and (c) optionally setting or cross-linking the slurry, (d) drying to form an aerosol-generating material, and (e) incorporating the resulting aerosol-generating material into the consumable or system.

[0294] In step (a), the nicotine or nicotine salt may first be dissolved in the aerosol-former material and the resulting solution then added to the other components of the slurry.

[0295] The step (b) in the above methods of forming a layer of the slurry may comprise spraying, casting or extruding the slurry, for example. In some cases, the layer is formed by electrospraying the slurry. In some cases, the layer is formed by casting the slurry.

[0296] In some cases, the steps (b) and/or (c) and/or (d) may, at least partially, occur simultaneously (for example, during electrospraying). In some cases, these steps may occur sequentially.

[0297] In some cases, a setting or cross-linking agent (such as a calcium source) may be added to the slurry before or during step (b). This is appropriate in instances where gelation occurs relatively slowly (e.g. with alginate gelling agent), and thus the slurry may be, e.g. cast, after the setting agent is added.

[0298] In other cases, step (c) of setting or cross-linking the slurry may comprise the addition of a setting or cross-linking agent to the slurry layer. The setting or cross-linking agent may be sprayed onto the slurry, for example, or may be preloaded onto the surface on which the slurry is layered.

[0299] For example, a setting or cross-linking agent comprising a calcium source (such as calcium chloride or calcium citrate), may be added to a slurry containing alginate and/or pectin to form a calcium-crosslinked alginate/pectin gel. In some cases where gelation occurs rapidly (such as those in which a pectin gelling agent is used), the calcium should be added after casting (because the slurry is too viscous to cast).

[0300] The total amount of the setting or cross-linking agent, such as a calcium source, may be 0.5-5 wt % (calculated on a dry weight basis). It has been found that the addition of too little setting or cross-linking agent may result in a gel which does not stabilise any optional flavour and results in the flavour dropping out of the gel. It has also been found that the addition of too much setting agent or cross-linking results in a gel that is very tacky or very brittle and consequently has poor handleability.

[0301] Alginate salts are derivatives of alginic acid and are typically high molecular weight polymers (10-600 kDa). Alginic acid is a copolymer of β-D-mannuronic (M) and α-L-guluronic acid (G) units (blocks) linked together with (1,4)-glycosidic bonds to form a polysaccharide. On addition of calcium cations, the alginate crosslinks to form a gel. Alginate salts with a high G monomer content may more readily form a gel on addition of the calcium source. In some cases therefore, the gel-precursor may comprise an alginate salt in which at least about 40%, 45%, 50%, 55%, 60% or 70% of the monomer units in the alginate copolymer are α-L-guluronic acid (G) units.

[0302] In some cases, the slurry may be warmed prior to and during casting. This can slow gelation, improving handleability and easing the casting process. Further, warming the slurry may melt optional flavour components (e.g. menthol) easing handleability.

[0303] In some cases, menthol or other optional flavours may be distributed through the slurry in powder form. In some cases, menthol or other flavours may be molten in the slurry (where it is warmed). In such cases, an emulsifying agent such as acacia gum may be added to disperse molten menthol in the slurry.

[0304] In some cases, the slurry may be cast onto a bandcast sheet. The sheet may be loaded with a releasing agent, such as lecithin, which can aid separation of the bandcast and the aerosol-generating material.

[0305] In another aspect, there is provided a slurry comprising:

[0306] about 1 to about 30 wt % nicotine;

[0307] about 15 to about 80 wt % gelling agent;

[0308] about 10 to about 60 wt % aerosol-former material;

[0309] about 1 to about 30 wt % acid; and

[0310] optionally filler,

[0311] wherein the wt % values are calculated on a dry weight basis; and

[0312] wherein the molar ratio of nicotine to acid is 2.2:1 or less; and

[0313] a solvent.

[0314] In another aspect, there is provided a slurry comprising:

[0315] about 5 to about 30 wt % nicotine salt;

[0316] about 15 to about 80 wt % gelling agent;

[0317] about 10 to about 60 wt % aerosol-former material; and

[0318] optionally filler,

[0319] wherein the wt % values are calculated on a dry weight basis; and

[0320] a solvent.

[0321] In another aspect, there is provided a slurry comprising:

[0322] about 1 to about 30 wt % nicotine salt;

[0323] about 45 to about 80 wt % gelling agent;

[0324] about 10 to about 54 wt % aerosol-former material; and

[0325] optionally filler,

[0326] wherein the wt % values are calculated on a dry weight basis; and

[0327] a solvent.

[0328] In some embodiments the slurry solvent comprises, or is, one or more of water, ethanol, methanol, dimethyl sulfoxide, acetone, hexane, and toluene.

[0329] In particular embodiments, the slurry solvent may comprise water. In some cases, the slurry solvent may consist essentially of or consist of water.

[0330] In some cases, the slurry may comprise from about 50 wt %, 60 wt %, 70 wt %, 80 wt % or 90 wt % of solvent (WWB).

**[0331]** In some examples, the slurry has a viscosity of from about 1 to about 20 Pas at 46.5° C., such as from about 10 to about 20 Pas at 46.5° C., such as from about 14 to about 16 Pas at 46.5° C.

**[0332]** The discussion herein relating to the aerosol-generating material is explicitly disclosed in combination with any slurry aspect of the invention.

Example Embodiments

**[0333]** 1. An aerosol-generating material comprising:

**[0334]** about 1 to about 30 wt % nicotine;

**[0335]** about 15 to about 80 wt % gelling agent;

**[0336]** about 10 to about 60 wt % aerosol-former material;

**[0337]** about 1 to about 30 wt % acid; and

**[0338]** optionally filler

**[0339]** wherein the wt % values are calculated on a dry weight basis; and

**[0340]** wherein the molar ratio of nicotine to acid is 2.2:1 or less.

**[0341]** 1A. A slurry comprising:

**[0342]** about 1 to about 30 wt % nicotine;

**[0343]** about 15 to about 80 wt % gelling agent;

**[0344]** · about 10 to about 60 wt % aerosol-former material;

**[0345]** about 1 to about 30 wt % of an acid; and

**[0346]** optionally filler

**[0347]** wherein the wt % values are calculated on a dry weight basis; and

**[0348]** wherein the molar ratio of nicotine to acid is 2.2:1 or less, and

**[0349]** a solvent.

**[0350]** 2. The aerosol-generating material of Embodiment 1 or the slurry of Embodiment 1A, comprising about 1-15 wt % nicotine.

**[0351]** 3. The aerosol-generating material or slurry of Embodiment 2, comprising about 1-10 wt % nicotine.

**[0352]** 4. The aerosol-generating material of Embodiment 1 or the slurry of Embodiment 1A, comprising about 3-15 wt % nicotine.

**[0353]** 5. The aerosol-generating material or slurry of Embodiment 4, comprising about 3-10 wt % nicotine.

**[0354]** 6. The aerosol-generating material of Embodiment 1 or the slurry of Embodiment 1A, comprising about 5-15 wt % nicotine.

**[0355]** 7. The aerosol-generating material or slurry of Embodiment 6, comprising about 5-10 wt % nicotine.

**[0356]** 8. The aerosol-generating material or slurry of any preceding Embodiment comprising about 1-15 wt % acid.

**[0357]** 9. The aerosol-generating material or slurry of Embodiment 8, comprising about 1-10 wt % acid.

**[0358]** 10. The aerosol-generating material or slurry of Embodiment 8, comprising about 3-15 wt % acid.

**[0359]** 11. The aerosol-generating material or slurry of Embodiment 10, comprising about 3-10 wt % acid.

**[0360]** 12. The aerosol-generating material or slurry of Embodiment 10, comprising about 5-15 wt % acid.

**[0361]** 13. The aerosol-generating material or slurry of Embodiment 9, comprising about 5-10 wt % acid.

**[0362]** 14. The aerosol-generating material or slurry of any preceding Embodiment, wherein the molar ratio of nicotine to acid is 2:1 or less.

**[0363]** 15. The aerosol-generating material or slurry of Embodiment 14, wherein the molar ratio of nicotine to acid is 1.5:1 or less.

**[0364]** 16. The aerosol-generating material or slurry of Embodiment 15, wherein the molar ratio of nicotine to acid is 1 or less.

**[0365]** 17. The aerosol-generating material or slurry of any preceding Embodiment, wherein the molar ratio of nicotine to acid is 0.5:1 or more.

**[0366]** 18. The aerosol-generating material or slurry of Embodiment 17, wherein the molar ratio of nicotine to acid is 0.7:1 or more.

**[0367]** 19. The aerosol-generating material or slurry of Embodiment 18, wherein the molar ratio of nicotine to acid is 0.8:1 or more.

**[0368]** 20. The aerosol-generating material or slurry of any of Embodiments 1-12, wherein the molar ratio of nicotine to acid is 0.5:1 to 2.2:1.

**[0369]** 21. The aerosol-generating material or slurry of Embodiment 20, wherein the molar ratio of nicotine to acid is 0.7:1 to 2:1.

**[0370]** 22. The aerosol-generating material or slurry of Embodiment 21, wherein the molar ratio of nicotine to acid is 0.7:1 to 1.5:1.

**[0371]** 23. The aerosol-generating material or slurry of any of Embodiments 1 to 22, wherein the acid comprises at least one of succinic acid, lactic acid, benzoic acid, citric acid, tartartic acid, fumaric acid, levulinic acid, acetic acid, malic acid, formic acid, sorbic acid, benzoic acid, propanoic acid and pyruvic acid.

**[0372]** 23A. The aerosol-generating material or slurry of any of Embodiments 1 to 22, wherein the acid comprises at least one of lactic acid, benzoic acid, levulinic acid and pyruvic acid.

**[0373]** 24. The aerosol-generating material or slurry of any of Embodiments 1 to 22, wherein the acid comprises (or consists of) benzoic acid.

**[0374]** 25. The aerosol-generating material or slurry of any of Embodiments 1 to 22, wherein the acid comprises (or consists of) lactic acid.

**[0375]** 26. An aerosol-generating material comprising:

**[0376]** about 5 to about 30 wt % nicotine salt;

**[0377]** about 15 to about 80 wt % gelling agent;

**[0378]** about 10 to about 60 wt % aerosol-former material; and

**[0379]** optionally filler

**[0380]** wherein the wt % values are calculated on a dry weight basis.

**[0381]** 26A. An slurry comprising:

**[0382]** about 5 to about 30 wt % nicotine salt;

**[0383]** about 15 to about 80 wt % gelling agent;

**[0384]** about 10 to about 60 wt % aerosol-former material;

**[0385]** optionally filler

**[0386]** wherein the wt % values are calculated on a dry weight basis; and

**[0387]** a solvent.

**[0388]** 27. The aerosol-generating material of Embodiment 26 or the slurry of Embodiment 26A, comprising about 5-15 wt % nicotine salt.

**[0389]** 28. The aerosol-generating material or slurry of Embodiment 27, comprising about 5-10 wt % nicotine salt.

**[0390]** 29. The aerosol-generating material or slurry of any of Embodiments 26 to 28, wherein the nicotine salt comprises nicotine benzoate.

**[0391]** 30. The aerosol-generating material or slurry of any of Embodiments 26 to 28, wherein the nicotine salt comprises nicotine lactate.

**[0392]** 31. The aerosol-generating material or slurry of any preceding Embodiment, comprising about 20-70 wt % gelling agent.

**[0393]** 32. The aerosol-generating material or slurry of Embodiment 31, comprising about 20-65 wt % gelling agent.

**[0394]** 33. The aerosol-generating material or slurry of Embodiment 31, comprising about 25-70 wt % gelling agent.

**[0395]** 34. The aerosol-generating material or slurry of Embodiment 33, comprising about 25-65 wt % gelling agent.

**[0396]** 35. The aerosol-generating material or slurry of Embodiment 33, comprising about 30-70 wt % gelling agent.

**[0397]** 36. The aerosol-generating material or slurry of Embodiment 35, comprising about 30-65 wt % gelling agent.

**[0398]** 37. The aerosol-generating material or slurry of Embodiment 35, comprising about 35-70 wt % gelling agent.

**[0399]** 38. The aerosol-generating material or slurry of Embodiment 37, comprising about 35-65 wt % gelling agent.

**[0400]** 39. The aerosol-generating material or slurry of Embodiment 37, comprising about 40-70 wt % gelling agent.

**[0401]** 40. The aerosol-generating material or slurry of Embodiment 39, comprising about 40-65 wt % gelling agent.

**[0402]** 41. The aerosol-generating material or slurry of Embodiment 39, comprising about 45-70 wt % gelling agent.

**[0403]** 42. The aerosol-generating material or slurry of Embodiment 41, comprising about 40-65 wt % gelling agent.

**[0404]** 43. The aerosol-generating material or slurry of any preceding Embodiment, comprising about 15-60 wt % aerosol-former material.

**[0405]** 43A. The aerosol-generating material or slurry of any preceding Embodiment, comprising about 15-55 wt % aerosol-former material.

**[0406]** 44. The aerosol-generating material or slurry of Embodiment 43 or 43A, comprising about 15-50 wt % aerosol-former material.

**[0407]** 45. The aerosol-generating material or slurry of Embodiment 43, comprising about 20-55 wt % aerosol-former material.

**[0408]** 46. The aerosol-generating material or slurry of Embodiment 45, comprising about 20-50 wt % aerosol-former material.

**[0409]** 47. The aerosol-generating material or slurry of Embodiment 45, comprising about 25-55 wt % aerosol-former material.

**[0410]** 48. The aerosol-generating material or slurry of Embodiment 47, comprising about 25-50 wt % aerosol-former material.

**[0411]** 49. The aerosol-generating material or slurry of Embodiment 47, comprising about 30-55 wt % aerosol-former material.

**[0412]** 50. The aerosol-generating material or slurry of Embodiment 49, comprising about 30-50 wt % aerosol-former material.

**[0413]** 51. An aerosol-generating material comprising:

- **[0414]** about 1 to about 30 wt % nicotine salt;
- **[0415]** about 45 to about 80 wt % gelling agent;
- **[0416]** about 10 to about 54 wt % aerosol-former material; and
- **[0417]** optionally filler
- **[0418]** wherein the wt % values are calculated on a dry weight basis.

**[0419]** 51A. A slurry comprising:

- **[0420]** about 1 to about 30 wt % nicotine salt;
- **[0421]** about 45 to about 80 wt % gelling agent;
- **[0422]** about 10 to about 54 wt % aerosol-former material;
- **[0423]** optionally filler
- **[0424]** wherein the wt % values are calculated on a dry weight basis; and
- **[0425]** a solvent.

**[0426]** 52. The aerosol-generating material of Embodiment 51 or the slurry of Embodiment 51A, comprising about 1-15 wt % nicotine salt.

**[0427]** 53. The aerosol-generating material or slurry of Embodiment 52, comprising about 1-10 wt % nicotine salt.

**[0428]** 54. The aerosol-generating material or slurry of Embodiment 52, comprising about 3-15 wt % nicotine salt.

**[0429]** 55. The aerosol-generating material or slurry of Embodiment 54, comprising about 3-10 wt % nicotine salt.

**[0430]** 56. The aerosol-generating material or slurry of Embodiment 54, comprising about 5-15 wt % nicotine salt.

**[0431]** 57. The aerosol-generating material or slurry of Embodiment 56, comprising about 5-10 wt % nicotine salt.

**[0432]** 58. The aerosol-generating material or slurry of any of Embodiments 51 to 57, wherein the nicotine salt comprises nicotine benzoate.

**[0433]** 59. The aerosol-generating material or slurry of any of Embodiments 51 to 57, wherein the nicotine salt comprises nicotine lactate.

**[0434]** 60. The aerosol-generating material or slurry of any of Embodiments 51 to 59, comprising about 45-70 wt % gelling agent.

**[0435]** 61. The aerosol-generating material or slurry of Embodiment 60, comprising about 45-65 wt % gelling agent.

**[0436]** 62. The aerosol-generating material or slurry of Embodiment 60, comprising about 50-70 wt % gelling agent.

**[0437]** 63. The aerosol-generating material or slurry of any Embodiment 62, comprising about 50-65 wt % gelling agent.

**[0438]** 64. The aerosol-generating material or slurry of any of Embodiments 51 to 59, comprising about 15-60 wt % aerosol-former material.

**[0439]** 64A. The aerosol-generating material or slurry of any of Embodiments 51 to 59, comprising about 15-50 wt % aerosol-former material.

**[0440]** 65. The aerosol-generating material or slurry of Embodiment 64, comprising about 20-50 wt % aerosol-former material.

**[0441]** 66. The aerosol-generating material or slurry of Embodiment 65, comprising about 25-50 wt % aerosol-former material.

**[0442]** 67. The aerosol-generating material or slurry of Embodiment 66, comprising about 30-50 wt % aerosol-former material.

**[0443]** 68. The aerosol-generating material or slurry of any preceding Embodiment, wherein the gelling agent comprises a hydrocolloid.

**[0444]** 68. The aerosol-generating agent or slurry of any preceding Embodiment, wherein the gelling agent comprises (or is) one or more compounds selected from polysaccharide gelling agents, such as alginate, pectin, starch or a derivative thereof, cellulose or a derivative thereof, pullulan, carrageenan, agar and agarose; gelatin; gums, such as xanthan gum, guar gum and acacia gum; silica or silicone compounds, such as PDMS and sodium silicate; clays, such as kaolin; and polyvinyl alcohol.

**[0445]** 69. The aerosol-generating material or slurry of any preceding Embodiment, wherein the gelling agent comprises one or more polysaccharide gelling agents.

**[0446]** 70. The aerosol-generating material or slurry of any preceding Embodiment, wherein the gelling agent is one or more polysaccharide gelling agents.

**[0447]** 71. The aerosol-generating material or slurry of any of Embodiments 68 to 70, wherein the polysaccharide gelling agent is selected from: alginate, pectin, starch or a derivative thereof, cellulose or a derivative thereof.

**[0448]** 72. The aerosol-generating material or slurry of Embodiment 71, wherein the polysaccharide gelling agent is a cellulose derivative.

**[0449]** 73. The aerosol-generating material or slurry of any of Embodiments 69 to 72, wherein the cellulose or the derivative thereof, is selected from hydroxymethyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, carboxymethylcellulose (CMC), hydroxypropyl methylcellulose (HPMC), methyl cellulose, ethyl cellulose, cellulose acetate (CA), cellulose acetate butyrate (CAB), and cellulose acetate propionate (CAP).

**[0450]** 74. The aerosol-generating material or slurry of Embodiment 73, wherein the cellulose or the derivative thereof, is CMC.

**[0451]** 75. The aerosol-generating material or slurry of Embodiment 74, wherein CMC is the only gelling agent present in the aerosol-generating material or slurry.

**[0452]** 76. The aerosol-generating material or slurry of Embodiment 71, wherein the polysaccharide gelling agent is alginate.

**[0453]** 77. The aerosol-generating material or slurry of Embodiment 76, wherein alginate is the only gelling agent present in the aerosol-generating material or slurry.

**[0454]** 78. The aerosol-generating material or slurry of Embodiment 68, wherein the gelling agent comprises (or is) one or more of alginate, pectin, hydroxyethyl cellulose, hydroxypropyl cellulose, carboxymethylcellulose, pullulan, xanthan gum guar gum, carrageenan, agarose, acacia gum, fumed silica, PDMS, sodium silicate, kaolin and polyvinyl alcohol.

**[0455]** 79. The aerosol-generating material or slurry of Embodiment 68, wherein the gelling agent comprises (or is) one or more of hydroxyethyl cellulose, hydroxypropyl cellulose, carboxymethylcellulose, guar gum, acacia gum, alginate and/or pectin.

**[0456]** 80. The aerosol-generating material or slurry of any of Embodiments 68-72, 73, 74 or 76-79, wherein the alginate is sodium alginate.

**[0457]** 81. The aerosol-generating material or slurry of any preceding Embodiment, wherein the gelling agent is not crosslinked.

**[0458]** 82 The aerosol-generating material or slurry of any preceding Embodiment, wherein the aerosol-generating agent comprises (or is) one or more of glycerol, propylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, 1,3-butylene glycol, erythritol, meso-Erythritol, ethyl vanillate, ethyl laurate, a diethyl suberate, triethyl citrate, triacetin, a diacetin mixture, benzyl benzoate, benzyl phenyl acetate, tributyrin, lauryl acetate, lauric acid, myristic acid, and propylene carbonate.

**[0459]** 83. The aerosol-generating material or slurry of Embodiment 82, wherein the aerosol-generating agent comprises (or is) one or more of erythritol, propylene glycol, glycerol, and triacetin.

**[0460]** 84. The aerosol-generating material or slurry of Embodiment 82 or 83, wherein the aerosol-generating agent comprises (or is) glycerol optionally in combination with propylene glycol.

**[0461]** 85. The aerosol-generating material or slurry of any preceding Embodiment, comprising less than about 10 wt % filler.

**[0462]** 86. The aerosol-generating material or slurry of Embodiment 85, comprising less than about 5 wt % filler.

**[0463]** 87. The aerosol-generating material or slurry of Embodiment 86, comprising less than about 1 wt % filler.

**[0464]** 88. The aerosol-generating material or slurry of any of Embodiments 1 to 84, comprising 1 to 10 wt % filler.

**[0465]** 89. The aerosol-generating material or slurry of Embodiment 88, comprising 1 to 5 wt % filler.

**[0466]** 90. The aerosol-generating material or slurry of Embodiment 88, comprising 2 to 7 wt % filler.

**[0467]** 91. The aerosol-generating material or slurry of any of Embodiments 1 to 84, comprising 3 to 10 wt % filler.

**[0468]** 92. The aerosol-generating material or slurry of Embodiment 91, comprising 3 to 5 wt % filler.

**[0469]** 93. The aerosol-generating material or slurry of any of Embodiments 85 to 92, wherein the fillers are selected from inorganic filler materials, wood pulp, hemp fibre, cellulose and cellulose derivatives.

**[0470]** 94. The aerosol-generating material or slurry of Embodiment 93, wherein the aerosol-generating material or slurry comprises no calcium carbonate such as chalk.

**[0471]** 95. The aerosol-generating material or slurry of any of Embodiments 1 to 84, wherein aerosol-generating material or slurry does not comprise filler.

**[0472]** 96. The aerosol-generating material or slurry of any preceding Embodiment, comprising additional active substances

**[0473]** 97. The aerosol-generating material or slurry of any preceding Embodiment further comprising one or more other functional materials.

**[0474]** 98. The aerosol-generating material or slurry of any preceding Embodiment, wherein the aerosol-generating material or slurry does not comprise fibrous material.

**[0475]** 99. The aerosol-generating material or slurry of any preceding Embodiment, wherein the aerosol-generating material or slurry does not comprise tobacco fibres.

**[0476]** 99A. The aerosol-generating material or slurry of any of Embodiments 1-98, wherein the aerosol-generating material or slurry comprises less than 1 wt % tobacco.

**[0477]** 99B. The aerosol-generating material or slurry of any of Embodiments 1-98, wherein the aerosol-generating material or slurry comprises less than 0.5 wt % tobacco.

**[0478]** 99C. The aerosol-generating material or slurry of any of Embodiments 1-98, wherein the aerosol-generating material or slurry does not comprise tobacco.

**[0479]** 100. The aerosol-generating material or slurry of any preceding Embodiment, further comprising water.

**[0480]** 101. An aerosol-generating composition comprising an aerosol-generating material according to any preceding Embodiment.

**[0481]** 102. The aerosol-generating composition of Embodiment 101, further comprising one or more additional active substances and/or flavours, and optionally one or more other functional materials.

**[0482]** 103. The aerosol-generating composition of Embodiment 101 or 102 further comprising one or more other functional materials.

**[0483]** 104. The aerosol-generating composition of Embodiment 102 or 103, wherein the other functional materials comprise one or more pH regulators, colouring agents, preservatives, binders, stabilisers, and/or antioxidants.

**[0484]** 105. The aerosol-generating composition of any of Embodiments 101 to 104, comprising from about 50-100 wt % (WWB) of the aerosol-generating material.

**[0485]** 106. The aerosol-generating composition of Embodiment 105, comprising from about 50-90 wt % (WWB) of the aerosol-generating material.

**[0486]** 107. The aerosol-generating composition of Embodiment 105, comprising from about 60-100 wt % (WWB) of the aerosol-generating material.

**[0487]** 108. The aerosol-generating composition of Embodiment 107, comprising from about 60-95 wt % (WWB) of the aerosol-generating material.

**[0488]** 109. The aerosol-generating composition of Embodiment 107, comprising from about 70-100 wt % (WWB) of the aerosol-generating material.

**[0489]** 110. The aerosol-generating composition of Embodiment 109, comprising from about 70-95 wt % (WWB) of the aerosol-generating material.

**[0490]** 111. The aerosol-generating composition of Embodiment 110, comprising from about 70-90 wt % (WWB) of the aerosol-generating material.

**[0491]** 112. The aerosol-generating composition of any of Embodiments 101 to 104, consisting of, or consisting essentially of the aerosol-generating material.

**[0492]** 112A. The aerosol-generating composition of any of Embodiments 101 to 112, wherein the composition comprises a carrier on which the aerosol-generating material is provided.

**[0493]** 112B. The aerosol-generating composition of Embodiment 112A, wherein the carrier comprises a metal foil.

**[0494]** 112C. The aerosol-generating composition of Embodiment 112B, wherein the carrier comprises an aluminium foil.

**[0495]** 113. A consumable for use in a non-combustible aerosol provision device, the consumable comprising the aerosol-generating composition of any of Embodiments 101-112.

**[0496]** 113A. The consumable of Embodiment 113, wherein the consumable does not comprise tobacco.

**[0497]** 113B. The consumable of Embodiment 113 to 113A, wherein the aerosol-generating composition consists of the aerosol-generating material of any of Embodiments 1 to 100.

**[0498]** 113C. The consumable of Embodiment 113 to 113B, wherein the consumable comprises a single aerosol-generating composition.

**[0499]** 114. A non-combustible aerosol provision system comprising the consumable of Embodiment 113 and a non-combustible aerosol provision device.

**[0500]** 115. The consumable for use in a non-combustible aerosol provision device of Embodiment 113, or the non-combustible aerosol provision system of Embodiment 114, wherein the non-combustible aerosol provision device is a heat-not-burn device.

**[0501]** 116. The consumable for use in a non-combustible aerosol provision device of Embodiment 113, or the non-combustible aerosol provision system of Embodiment 114, wherein the non-combustible aerosol provision device is an electronic tobacco hybrid device.

**[0502]** 117. A method of forming an aerosol-generating material as defined in any of Embodiments 1 to 25, 31 to 50 and 68 to 100, the method comprising

**[0503]** (a) providing a slurry comprising the gelling agent, aerosol-former material, nicotine, acid, a solvent and any optional further components of the aerosol-generating material;

**[0504]** (b) forming a layer of the slurry;

**[0505]** (c) optionally setting the layer of the slurry; and

**[0506]** (d) drying the slurry to form the aerosol-generating material.

**[0507]** 118. A method of forming an aerosol-generating material as defined in any of Embodiments 26 to 100, the method comprising

**[0508]** (a) providing a slurry comprising the gelling agent, aerosol-former material, nicotine salt, a solvent and any optional further components of the aerosol-generating material;

**[0509]** (b) forming a layer of the slurry;

**[0510]** (c) optionally setting the layer of the slurry; and

**[0511]** (d) drying the slurry to form the aerosol-generating material.

**[0512]** 119. The method of Embodiment 117 or 118, wherein the solvent comprises water.

**[0513]** 120. The method of Embodiment 117 or 118, wherein the solvent consists essentially of, or consists of water.

**[0514]** 121. The method of Embodiments 117 to 120 or the slurry of any of Embodiments 1 to 100, wherein the slurry comprises from about 50 wt %, 60 wt %, 70 wt %, 80 wt % or 90 wt % of solvent (WWB).

## Examples

**[0515]** Exemplary and non-limiting formulation for aerosol-generating material (AM) are provided in the table below.

| | Alginate | CMC | Glycerol | Nicotine salt | Cross-linking agent |
|---|---|---|---|---|---|
| AM1 | — | 54.55% | 36.36% | 9.09% Nicotine lactate | — |
| AM2 | — | 54.55% | 36.36% | 9.09% Nicotine benzoate | — |
| AM3 | 58.82% | — | 39.22% | 1.96% Nicotine lactate | — |
| AM4 | 58.82% | — | 39.22% | 1.96% Nicotine lactate | Calcium formate |
| AM5 | — | 65.36% | 32.68% | 1.96% Nicotine lactate | — |
| AM6 | — | 65.36% | 32.68% | 1.96% Nicotine benzoate | — |
| AM7 | — | 62.60% | 31.30% | 6.10% Nicotine lactate | — |
| AM8 | — | 62.60% | 31.30% | 6.10% Nicotine benzoate | — |
| AM9 | 54.05% | — | 36.04% | 9.91% Nicotine lactate | — |
| AM10 | 54.05% | — | 36.04% | 9.91% Nicotine lactate | Calcium formate |
| AM11 | — | 47.00% | 47.00% | 5.99% Nicotine lactate | — |
| AM12 | — | 47.00% | 47.00% | 5.99% Nicotine benzoate | — |
| AM13 | 54.05% | — | 36.04% | 9.91% Nicotine benzoate | — |
| AM14 | 54.05% | — | 36.04% | 9.91% Nicotine benzoate | Calcium formate |
| AM15 | — | 48.96% | 48.96% | 2.08% Nicotine lactate | — |
| AM16 | — | 48.96% | 48.96% | 2.08% Nicotine benzoate | — |

**1**. An aerosol-generating composition comprising an aerosol-generating material, wherein the aerosol-generating material comprises:

about 1 to about 30 wt % nicotine;

about 15 to about 80 wt % gelling agent;

about 10 to about 60 wt % aerosol-former material;

about 1 to about 30 wt % acid; and

optionally filler

wherein the wt % values are calculated on a dry weight basis; and

wherein the molar ratio of nicotine to acid is 2.2:1 or less.

**2**. The aerosol-generating composition according to claim **1**, wherein the molar ratio of nicotine to acid is 1.5:1 or less.

**3**. The aerosol-generating composition according to claim **1**, wherein the molar ratio of nicotine to acid is 1:1 or less.

**4**. The aerosol-generating composition according to any of claims **1** to **3**, wherein the molar ratio of nicotine to acid is 0.5:1 or more.

**5**. The aerosol-generating composition according to any of claims **1** to **4**, wherein the acid comprises one or more of lactic acid, benzoic acid, levulinic acid and pyruvic acid.

**6**. The aerosol-generating composition according to any of claims **1** to **5**, wherein the acid comprises benzoic acid.

**7**. The aerosol-generating composition according to any of claims **1** to **6**, wherein the nicotine is present in an amount of from about 6 to about 30 wt %.

**8**. An aerosol-generating composition comprising an aerosol-generating material, wherein the aerosol-generating material comprises:

about 5 to about 30 wt % nicotine salt;

about 15 to about 80 wt % gelling agent;

about 10 to about 60 wt % aerosol-former material; and

optionally filler

wherein the wt % values are calculated on a dry weight basis.

**9**. An aerosol-generating composition comprising an aerosol-generating material, wherein the aerosol-generating material comprises:

about 1 to about 30 wt % nicotine salt;

about 45 to about 80 wt % gelling agent;

about 10 to about 54 wt % aerosol-former material; and

optionally filler

wherein the wt % values are calculated on a dry weight basis.

**10**. The aerosol-generating composition according to any of claims **1** to **9**, wherein the aerosol-generating material comprises less than about 10 wt % filler.

**11**. The aerosol-generating composition according to any of claims **1** to **10**, wherein the aerosol-generating material comprises less than about 5 wt % filler.

**12**. The aerosol-generating composition according to any of claims **1** to **11**, wherein the aerosol-generating material comprises wood pulp.

**13**. The aerosol-generating composition according to any of claims **1** to **11**, wherein the aerosol-generating material does not comprise filler.

**14**. The aerosol-generating composition according to any of claims **1** to **13**, wherein the gelling agent comprises one or more compounds selected from the group comprising alginates, cellulose derivatives, gums, silica or silicon compounds, clays and combinations thereof.

**15**. The aerosol-generating composition according to any of claims **1** to **14**, wherein the gelling agent comprises alginate and/or carboxymethyl cellulose.

**16**. The aerosol-generating composition according to any of claims **1** to **15**, wherein the aerosol-generating material further comprises a crosslinking agent.

**17**. The aerosol-generating composition according to claim **16**, wherein the crosslinking agent comprises calcium ions.

**18**. The aerosol-generating composition according to any of claims **1** to **15**, wherein the aerosol-generating material does not comprise a crosslinking agent.

**19**. The aerosol-generating composition according to any of claims **1** to **18**, wherein the gelling agent is present in an amount from about 45 to about 70 wt %.

**20**. The aerosol-generating composition according to any of claims **1** to **19**, wherein the aerosol-former material comprises one or more glycerol, propylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, 1,3-butylene glycol, erythritol, meso-Erythritol, ethyl vanillate, ethyl laurate, a diethyl suberate, triethyl citrate, triacetin, a diacetin mixture, benzyl benzoate, benzyl phenyl acetate, tributyrin, lauryl acetate, lauric acid, myristic acid, and propylene carbonate.

**21**. The aerosol-generating composition according to any of claims **1** to **20**, wherein the aerosol-former material comprises glycerol.

**22**. The aerosol-generating composition according to any of claims **1** to **21**, wherein the aerosol-former agent is present in an amount from about 15 to about 50 wt %.

**23**. The aerosol-generating composition according to any of claims **1** to **22**, wherein the aerosol-generating material is substantially free from tobacco.

**24**. The aerosol-generating composition according to any of claims **1** to **23**, wherein the aerosol-generating material is in the form of a film.

**25**. The aerosol-generating composition according to any of claims **1** to **23**, wherein the aerosol-generating material is the form of strips, a crimped sheet, a gathered sheet or a shredded sheet.

**26**. The aerosol-generating composition according to any of claims **1** to **25**, wherein the aerosol-generating material comprises a flavour.

**27**. The aerosol-generating composition according to claim **26**, wherein the aerosol-generating material comprises from about 1 to about 65 wt % flavour.

**28**. The aerosol-generating composition according to any of claims **1** to **27**, wherein the aerosol-generating composition consists of the aerosol-generating material.

**29**. A consumable for use with a non-combustible aerosol provision system, the consumable comprising the aerosol-generating composition as defined in any of claims **1** to **28**.

**30**. The consumable of claim **29**, wherein the consumable does not comprise tobacco.

**31**. The consumable of claim **29** or **30**, wherein the aerosol-generating composition consists of nicotine, gelling agent, aerosol-former material, acid and optionally a flavour and/or optionally filler.

**32**. The consumable of any of claims **29** to **31**, wherein the consumable comprises a single aerosol-generating composition, with said aerosol-generating composition being as defined in any of claims **1** to **28**.

**33**. The consumable of any of claims **29** to **32**, wherein the aerosol-generating composition is in the form of a film.

**34**. A non-combustible aerosol provision system comprising the consumable as defined in any of claims **29** to **33** and a non-combustible aerosol provision device, the non-combustible aerosol provision device comprising an aerosol-generation device arranged to generate aerosol from the consumable when the consumable is used with the non-combustible aerosol provision device.

**35**. Use of an aerosol-generating composition as defined in any of claims **1** to **28** in a consumable for use with a non-combustible aerosol provision device, the non-combustible aerosol provision device comprising an aerosol-generation device arranged to generate aerosol from the consumable when the consumable is used with the non-combustible aerosol provision device.

**36**. A slurry comprising:
about 1 to about 30 wt % nicotine;
about 15 to about 80 wt % gelling agent;
about 10 to about 60 wt % aerosol-former material;
about 1 to about 30 wt % of an acid; and
optionally filler
wherein the wt % values are calculated on a dry weight basis; and
wherein the molar ratio of nicotine to acid is 2.2:1 or less, and
a solvent

**37**. A slurry comprising:
about 5 to about 30 wt % nicotine salt;
about 15 to about 80 wt % gelling agent;
about 10 to about 60 wt % aerosol-former material; and
optionally filler
wherein the wt % values are calculated on a dry weight basis, and
a solvent.

**38**. A slurry comprising:
about 1 to about 30 wt % nicotine salt;
about 45 to about 80 wt % gelling agent;
about 10 to about 54 wt % aerosol-former material; and
optionally filler
wherein the wt % values are calculated on a dry weight basis, and
a solvent.

**39**. A slurry according to claim **36**, **37** or **38**, wherein the solvent is water.

**40**. A method of making an aerosol-generating composition according to any one of claims **1** to **28**, the aerosol-generating composition comprising an aerosol-generating material, the method comprising:
(i) combining
about 1 to about 30 wt % nicotine;
about 15 to about 80 wt % gelling agent;
about 10 to about 60 wt % aerosol-former material;
about 1 to about 20 wt % of an acid; and
optionally filler;
wherein these weights are calculated on a dry weight basis; and
wherein the molar ratio of nicotine to acid is less than 2.2:1, and
a solvent;
or combining
about 5 to about 30 wt % nicotine salt;
about 15 to about 80 wt % gelling agent;
about 10 to about 60 wt % aerosol-former material; and
optionally filler
wherein these weights are calculated on a dry weight basis, and
a solvent;
or combining
about 1 to about 30 wt % nicotine salt;
about 45 to about 80 wt % gelling agent;
about 10 to about 54 wt % aerosol-former material; and
optionally filler
wherein the wt % values are calculated on a dry weight basis, and
a solvent.
(ii) forming a layer of the slurry; and
(iii) drying to form the aerosol-generating material.

**41**. An aerosol-generating composition formed by the method of claim **40**.

**42**. A method of generating an aerosol comprising a nicotine salt using a non-combustible aerosol provision system according to claim **34**, the method comprising heating the aerosol-generating composition, optionally to a temperature of less than 350° C.

* * * * *