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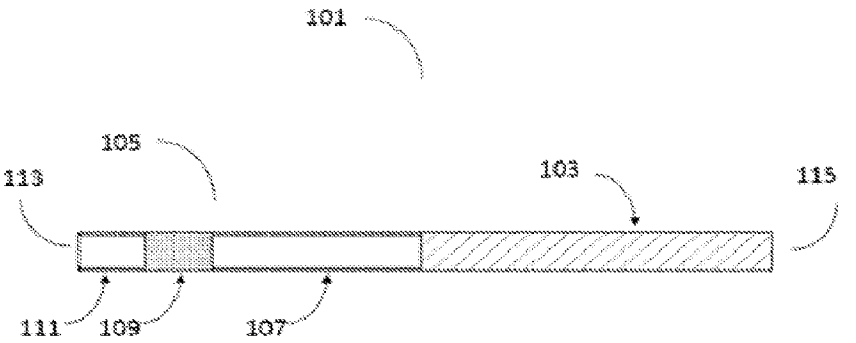

Figure 1

(57) **Abrégé/Abstract:**
The present invention relates to aerosol generation for delivery of constituents, derivatives or extracts of cannabis. An aerosol-generating composition is provided comprising a first aerosol-generating material comprising an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and a second aerosol-generating material comprising a different active substance and a gelling agent. Products including the compositions and methods of preparing the compositions are also provided.

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Abstract:

The present invention relates to aerosol generation for delivery of constituents, derivatives or extracts of cannabis. An aerosol-generating composition is provided comprising a first aerosol-generating material comprising an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and a second aerosol-generating material comprising a different active substance and a gelling agent. Products including the compositions and methods of preparing the compositions are also provided.

Aerosol generating compositions

Technical Field

The present invention relates to aerosol generation for delivery of constituents, derivatives or extracts of cannabis.

Background

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.

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.

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

According to a first aspect of the present invention, there is provided an aerosol-generating composition comprising a first aerosol-generating material comprising an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and a second aerosol-generating material comprising a different active substance and a gelling agent.

In some embodiments, the composition comprises a third or further aerosol-generating materials comprising an active substance and a gelling agent.

In some embodiments, the first, second and/or further aerosol-generating materials comprise:

from about 15 to about 70 wt% of an active substance;
from about 10 to about 50 wt% aerosol-former material;
from about 15 to about 60 wt% gelling agent; and
optionally filler;

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

In some embodiments, the composition comprises from about 5 to about 60 wt% of an active substance.

In some embodiments, the composition comprises from about 15 to about 45 wt% aerosol-former material.

In some embodiments, the composition comprises from about 25 to about 50 wt% gelling agent.

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.

In some embodiments, the polysaccharide gelling agent is selected from the group consisting of alginate and a cellulose derivative, and/or wherein the cellulose derivative 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 gelling agent is not crosslinked.

In some embodiments, the gelling agent is CMC.

In some embodiments, the aerosol-former material 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.

In some embodiments, the aerosol-former material comprises or is glycerol or a combination of glycerol and propylene glycol.

In some embodiments, the constituent, derivative or extract of cannabis is a cannabinoid.

In some embodiments, the cannabinoid is selected from cannabigerol (CBG), cannabichromene (CBC), cannabidiol (CBD), tetrahydrocannabinol (THC), cannabinol (CBN), cannabinodiol (CBDL), cannabicyclol (CBL), cannabivarin (CBV), tetrahydrocannabivarin (THCV), cannabidivarin (CBDV), cannabichromevarin (CBCV), cannabigerovarin (CBGV), cannabigerol monomethyl ether (CBGM), cannabinerolic acid, cannabidiolic acid (CBDA), cannabinol propyl variant (CBNV), cannabitriol (CBO), tetrahydrocannabmolic acid (THCA), and tetrahydrocannabivarinic acid (THCV A).

In some embodiments, the cannabinoid is cannabidiol.

In some embodiments, the second and any further aerosol-generating material comprises one or more active substance selected from the group consisting of: nutraceuticals; nootropics; psychoactives; and constituents, derivatives or extracts of tobacco or another botanical, such as nicotine, caffeine, taurine, theine, vitamins such as B6 or B12 or C, melatonin, and constituents or derivatives thereof.

In some embodiments, the first and second aerosol-generating materials have different compositions in addition to the different active substances.

In some embodiments, the first and second aerosol-generating materials are in the form of sheets.

In some embodiments, the first and second aerosol-generating materials are sheets having different thicknesses.

In some embodiments, the first and second aerosol-generating materials release their respective active substances at different temperatures.

In some embodiments, the composition comprises one or more of a shredded sheet of the first aerosol-generating material, a shredded sheet of the second aerosol-generating material and a shredded sheet of any further aerosol-generating material.

In some embodiments, the composition comprises from about 50-100 wt% (WWB) of the aerosol-generating materials.

According to a second aspect of the invention there is provided a consumable for use in a non-combustible aerosol provision device, the consumable comprising the aerosol-generating composition according to the first aspect.

According to a third aspect of the invention there is provided a non-combustible aerosol provision system comprising a consumable according to the second aspect and a non-combustible aerosol provision device.

According to a fourth aspect of the invention there is provided a method for preparing an aerosol-generating composition according to the first aspect, wherein the first or second aerosol-generating material is formed by casting a slurry into a sheet.

In some embodiments, the active substance is dissolved in a solvent in the slurry.

According to a fifth aspect of the invention there is provided a method for preparing an aerosol-generating composition according to the first aspect, wherein the first or second aerosol-generating material is formed by extrusion.

Brief Description of the Drawings

Embodiments of the invention will now be described, by way of example only, with reference to accompanying drawings, in which:

Figure 1 shows a section view of an example of a consumable.

Figure 2 shows a perspective view of the consumable of Figure 1.

Figure 3 shows a sectional elevation of an example of a consumable.

Figure 4 shows a perspective view of the consumable of Figure 3.

Figure 5 shows a perspective view of an example of a non-combustible aerosol provision system.

Figure 6 shows a section view of an example of a non-combustible aerosol provision system.

Figure 7 shows a perspective view of an example of a non-combustible aerosol provision system.

Figure 8 shows an exploded diagram of an example consumable.

Figure 9 shows an example of a consumable comprising a plurality of discrete portions of aerosol-generating material.

Detailed Description

An aerosol-generating composition is a composition that is capable of generating aerosol, for example when heated, irradiated or energized in any other way.

An aerosol-generating composition is provided comprising two or more different aerosol generating materials. The first aerosol-generating material comprises an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and the second aerosol-generating material comprises a different active substance and a gelling agent.

According to the disclosure, different actives or different combinations of actives are provided in separate aerosol-generating materials. These can then be combined, optionally with further aerosol-generating materials, to form an aerosol-generating composition.

This separate provision of the different actives within the aerosol-generating composition can have a number of important benefits.

The actives incorporated in different aerosol-generating materials are kept separated and this is beneficial where the actives are incompatible with one another, for example because they interact with one another.

The actives incorporated in different aerosol-generating materials is beneficial where one or more of the actives are incompatible with other components of the aerosol-generating material or where one active performs better in an aerosol-generating material including certain components whilst the other active performs better in an aerosol-generating material including different components. For example, the combination of an active with one or more other component of the aerosol-generating material, such as certain gelling agents, aerosol former materials, flavours, solvents or fillers, etc., may be undesirable or less desirable.

The actives may have different inherent chemical properties which affect their volatilisation and release from the aerosol-generating material into the aerosol formed on heating, etc. Provision of the actives in different aerosol-generating materials enables the aerosol-generating materials to be formulated to release the actives at the desired time, temperature or rate, to provide the aerosol-generating composition with the desired release profile and an aerosol with the desired properties.

For example, the release of an active from an aerosol-generating material may be influenced by a number of properties of the material, including the thickness (i.e., the surface area to volume ratio), the density of the material, the presence and amount of components within the aerosol-generating material that influence the heating and temperature distribution within the material, the type and amount of the aerosol-former, the type and amount of the gelling agent. These properties of the first and second aerosol-generating materials may be different to control the release of the respective actives.

Provision of the actives in different aerosol-generating materials enables the aerosol-generating materials to be arranged within the aerosol-generating composition and/or in a non-combustible aerosol provision system or consumable to release the actives at the desired time, temperature or rate, to provide the aerosol-generating composition with the desired release profile and an aerosol with the desired properties.

For example, different parts of the consumable or aerosol-generating composition may be heated to different temperatures and/or at different times, and the arrangement and/or heating of different aerosol-generating materials may allow the release of the different actives to be controlled to provide an aerosol with the desired properties and the desired user experience.

The different aerosol-generating materials may be heated at different times, for example by having the aerosol-generating composition or consumable comprising sections including different materials that are independently heated. For example, such sections may be arranged in different parts or areas of the consumable, with different heaters associated with the different sections, or heater(s) being moved to different sections. Alternatively, the heat may spread through the aerosol-generating composition and different sections of different aerosol-generating material may then be heated at different times and/or heated to different temperatures.

Thus, the provision of the actives in different aerosol-generating materials makes it possible to use the makeup of the materials, their form and arrangement to tailor the release of actives and other aerosol components to provide an aerosol with desired properties. The properties of the aerosol may be consistent throughout the use of the consumable or they may change from puff to puff or otherwise over the course of use of the consumable. The system may also allow the user to choose the properties of the aerosol from a given consumable or aerosol-generating composition. For example, operating the non-combustible aerosol-generating system at one temperature or at a particular setting may produce an aerosol with a first set of properties, whilst a different temperature or different setting produces an aerosol with different properties.

The aerosol-generating compositions may also make it possible to control the dose and delivery of the actives with greater accuracy. This may offer the consumer a more consistent, more predictable and/or safer experience.

In some embodiments, at least the first aerosol-generating material contains a high concentration of constituent, derivative or extract of cannabis meaning high delivery levels of CBD can be achieved. The high concentration of constituent, derivative or extract of cannabis also improves the ability to deliver a sufficient quantity of active to the user without increasing the volume of the substrate.

Without wishing to be bound by theory, it is believed that the high concentration of constituents, derivatives or extracts of cannabis (e.g. cannabinoids) relative to the gelling agent unexpectedly lowers the propensity for the constituents, derivatives or extracts of cannabis (e.g. cannabinoids) to change colour which may occur due to oxidation of the cannabinoid.

Aerosol-generating material

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, based on the weight of the aerosol-generating composition. 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 the aerosol-generating material.

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

In some embodiments, the first aerosol-generating material consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; and constituent, derivative or extract of cannabis.

In some embodiments, the first aerosol-generating material consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; cannabinoid; and optionally a flavour and/or optionally an additional active substance and/or optionally a filler.

In some cases, the first aerosol-generating material consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; and cannabinoid.

In some embodiments, the first aerosol-generating material consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; and constituent, derivative or extract of cannabis.

In some embodiments, the second or further aerosol-generating material consists essentially of, or consists of, gelling agent; solvent; aerosol-former material; an active substance; and optionally a flavour and/or optionally an additional active substance and/or optionally a filler.

In some embodiments, the aerosol-generating material is a hydrogel and comprises 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).

In some embodiments, the aerosol-generating material may contain less than about 20 wt%, such as less than about 15 wt%, 12 wt% or 10 wt% of water calculated on a wet weight basis (WWB). For example, the aerosol-generating material may contain about 1 to 15 wt% of water, such as 3 to 12 wt% of water (WWB). In some embodiments the aerosol-generating material may contain about 1 to 5 wt% of water (WWB).

In some embodiments, the aerosol-generating materials comprises:

from about 15 to about 50 wt% of an active substance;
from about 10 to about 50 wt% aerosol-former material;
from about 15 to about 60 wt% gelling agent; and
optionally filler;

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

Constituent, derivative or extract of cannabis

The first aerosol-generating material comprises an active substance which is a constituent, derivative or extract of cannabis.

In addition, the second aerosol-generating material comprising a different active substance may also comprise an active substance which is a constituent, derivative or extract of cannabis.

As used herein, any compound or mixture of compounds which may be obtained from cannabis may be a constituent, derivative or extract thereof, including synthetic versions of such compound(s) or such compound(s) derived from other natural sources.

In some embodiments the constituent, derivative or extract of cannabis comprises, or is, one or more compounds selected from: cannabinoids (such as phytocannabinoids that may optionally be THC and/or CBD); terpenes (such as triterpenes); alkaloids; and flavonoids.

In some embodiments the constituent, derivative or extract of cannabis comprises one or more compounds selected from: cannabinoids (such as phytocannabinoids) and terpenes (such as triterpenes).

In some embodiments the constituent, derivative or extract of cannabis comprises one or more cannabinoids, such as phytocannabinoids.

Cannabinoids are a class of natural or synthetic chemical compounds which act on cannabinoid receptors (i.e., CB1 and CB2) in cells that repress neurotransmitter release in the brain. Cannabinoids may be naturally occurring (phytocannabinoids) from plants such as cannabis, from animals (endocannabinoids), or artificially manufactured (synthetic cannabinoids). Cannabis species express at least 85 different phytocannabinoids, and are divided into subclasses, including cannabigerols, cannabichromenes, cannabidiols, tetrahydrocannabinols, cannabinols and cannabinodiols, and other cannabinoids. Cannabinoids found in cannabis include, without limitation: cannabigerol (CBG), cannabichromene (CBC), cannabidiol (CBD), tetrahydrocannabinol (THC), cannabinol (CBN), cannabinodiol (CBDL), cannabicyclol (CBL), cannabivarin (CBV), tetrahydrocannabivarin (THCV), cannabidivarin (CBDV), cannabichromevarin (CBCV), cannabigerovarin (CBGV), cannabigerol monomethyl ether (CBGM), cannabinerolic acid, cannabidiolic acid (CBDA), cannabinol propyl variant (CBNV), cannabitriol (CBO), tetrahydrocannabmolic acid (THCA), and tetrahydrocannabivarinic acid (THCV A).

In some embodiments, the cannabinoids are phytocannabinoids.

In some embodiments, the terpenes are triterpenes.

In particular embodiments, the constituent, derivative or extract of cannabis comprises, or is, tetrahydrocannabinol (THC) and/or cannabidiol (CBD).

In some embodiments, the constituent, derivative or extract of cannabis comprises, or is, THC.

In particular embodiments, the constituent, derivative or extract of cannabis comprises, or is, CBD.

In some embodiments, the total amount of the one or more constituent, derivative or extract of cannabis present is from about 0.1 to about 60% by weight, based on the total weight of the composition. In some embodiments, the total amount of the one or more constituent, derivative or extract of cannabis present is from about 5 to about 60% by weight, based on the total weight of the composition. In some embodiments, the total amount of the one or more constituent, derivative or extract of cannabis present in the composition is at least about 0.1%, at least about 0.2%, at least about 0.3%, at least about 0.4%, at least about 0.5%, at least about 0.6%, at least about 0.7%, at least about 0.8%, at least about 0.9%, at least about 1%, at least about 2%, at least about 3%, at least about 4%, at least about 5%, at least about 7%, at least about 10%, at least about 12% or at least about 15% by weight, based on the total weight of the composition. In some embodiments, the total amount of the one or more constituent, derivative or extract of cannabis present in the composition is about no more than about 60%, no more than about 55%, no more than about 50%, no more than about 45%, no more than about 40%, no more than about 35%, no more than about 30%, or no more than about 25% by weight, based on the total weight of the composition.

Other active substances

The aerosol-generating material may further comprise other active ingredients.

In some embodiments, the first aerosol-generating material comprises a different active substance in addition to the constituent, derivative or extract of cannabis. 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 60 wt%, 50 wt%, 45 wt%, 40 wt%, 35 wt%, or 30 wt% (calculated on a dry weight basis) of another active substance in addition to constituent(s), derivative(s) or extract(s) of cannabis.

Also, the second or further aerosol-generating material comprises a different active substance to the constituent, derivative or extract of cannabis.

In some embodiments, the different active substance is not a constituent, derivative or extract of cannabis.

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 nicotine, caffeine, taurine, theine, vitamins such as B6 or B12 or C, melatonin, or constituents, derivatives, or combinations thereof. The additional active substance may comprise one or more constituents, derivatives or extracts of tobacco or another botanical.

In some embodiments, the additional active substance comprises nicotine.

In some embodiments, the additional active substance comprises caffeine, melatonin or vitamin B12.

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.*

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.

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 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.

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.

For example, in some cases, the aerosol-generating material additionally comprises a tobacco material and/or nicotine. In some cases, the aerosol-generating material may comprise 5 to 60 wt% (calculated on a dry weight basis) of a tobacco material and/or nicotine.

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 60 wt%, 50 wt%, 45 wt%, 40 wt%, 35 wt%, or 30 wt% (calculated on a dry weight basis) of a tobacco material. For example, the aerosol-generating material may comprise up to about 50 wt% of a tobacco material. For example, the aerosol-generating material may comprise about 10 to 50 wt%, 15 to 40 wt% or 20 to 35 wt% of a tobacco material. In some cases, the aerosol-generating material may comprise from about 1 wt%, 2 wt%, 3 wt% or 4 wt% to about 20 wt%, 18

wt%, 15 wt% or 12 wt% (calculated on a dry weight basis) of nicotine. For example, the aerosol-generating material may comprise about 1 to 20 wt%, 2 to 18 wt% or 3 to 12 wt% of nicotine.

In some cases, the aerosol-generating material comprises an additional active substance such as tobacco extract. In some cases, the aerosol-generating material may comprise 5-60 wt% (calculated on a dry weight basis) of tobacco extract. In some cases, the aerosol-generating material may comprise from about 5 wt%, 10 wt%, 15 wt%, 20 wt% or 25 wt% to about 60 wt%, 50 wt%, 45 wt%, 40 wt%, 35 wt%, or 30 wt% (calculated on a dry weight basis) tobacco extract. For example, the aerosol-generating material may comprise about 10 to 50 wt%, 15 to 40 wt% or 20 to 35 wt% of tobacco extract. The tobacco extract may contain nicotine at a concentration such that the aerosol-generating material comprises about 1 wt%, 1.5 wt%, 2 wt% or 2.5wt% to about 6 wt%, 5 wt%, 4.5 wt% or 4 wt% (calculated on a dry weight basis) of nicotine. In some cases, there may be no nicotine in the aerosol-generating material other than that which results from any tobacco extract.

In some embodiments the aerosol-generating material in the aerosol-generating composition comprises no tobacco material but does comprise nicotine. In some such cases, the aerosol-generating material may comprise from about 1 wt%, 2 wt%, 3 wt% or 4 wt% to about 20 wt%, 18 wt%, 15 wt% or 12 wt% (calculated on a dry weight basis) of nicotine. For example, the aerosol-generating material may comprise about 1 to 20 wt%, 2 to 18 wt% or 3 to 12 wt% of nicotine.

In some embodiments, the aerosol-generating material and the aerosol-generating composition do not contain any tobacco material (including tobacco extract) or nicotine.

In some embodiments, the aerosol-generating material does not comprise tobacco fibres. In particular embodiments, the aerosol-generating material does not comprise fibrous material.

In some embodiments, the aerosol-generating composition does not contain any tobacco material (including tobacco extract) or nicotine. In some embodiments, the aerosol-generating composition does not comprise tobacco fibres. In particular embodiments, the aerosol-generating composition does not comprise fibrous material.

Gelling agent

Suitably, the amorphous solid may comprise from about 15 wt% to about 60 wt% gelling agent, for example from about 25 wt%, 30 wt%, or 35 wt% to about 40 wt%, 45 wt% or 50 wt% of a gelling agent (all calculated on a dry weight basis). For example, the aerosol-generating material may comprise about 25 to 50 wt%, 30 to 45 wt% or 35 to 40 wt% of the gelling agent. In some embodiments, the gelling agent comprises a hydrocolloid.

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.

In some embodiments the gelling agent comprises (or is) one or more polysaccharide gelling agents.

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

In some embodiments, the gelling agent is a polysaccharide gelling agent, optionally wherein the polysaccharide gelling agent is selected from alginate and a cellulose derivative.

In some embodiments, the alginate is sodium alginate.

In some embodiments, the polysaccharide gelling agent is a cellulose derivative. Without wishing to be bound by theory, the inventors believe that such gelling agents do not react with calcium ions to form crosslinks.

In some embodiments, the polysaccharide gelling agent is alginate.

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.

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.

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.

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.

In some cases, the gelling agent comprises (or is) alginate and/or pectin, and may be combined with a setting 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.

In some embodiments, the gelling agent comprises (or is) alginate, optionally wherein the alginate is present in the aerosol-generating material in an amount of from about 15 to 40 wt%, for example about 15 to 25 wt%, of the aerosol-generating material (calculated on a dry weight basis).

In some embodiments, the gelling agent comprises (or is) alginate, optionally wherein the alginate is present in the aerosol-generating material in an amount of from about 15 to 40 wt%, for example about 30 to 40 wt%, of the aerosol-generating material (calculated on a dry weight basis).

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

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

In particular embodiments, the gelling agent is carboxymethylcellulose, optionally wherein the carboxymethylcellulose (CMC) is present in an amount of about 15 to 50 wt%, for example about 20 to 40 wt% or about 30 wt%. In some embodiments, CMC is the only gelling agent present in the aerosol-generating material.

Cannabinoids have good stability in gels comprising cellulosic gelling agents such as CMC. Without wishing to be bound by theory, it is believed that the cellulosic gelling agents such as CMC do not promote oxidation of cannabinoids. It has therefore been found that undesirable colour change of the cannabinoid can be reduced or avoided when using cellulosic gelling agents such as CMC.

In some embodiments, the weight ratio of the total amount of gelling agent to the total amount of constituents, derivatives or extracts of cannabis is from about 2:1 to 1:2, such as about 1.5:1 to 1:1.5 or 1.2:1 to 1:1.2.

Aerosol-former material

The aerosol-former material may comprise one or more constituents capable of forming an aerosol.

Suitably, the amorphous solid may comprise from about 0.1 wt%, 0.5 wt%, 1 wt%, 3 wt%, 5 wt%, 7 wt% or 10 wt% to about 50 wt%, 45 wt%, 40 wt%, 35 wt%, 30 wt% or 25 wt% of an aerosol-former material (all calculated on a dry weight basis). For example, the amorphous solid may comprise 0.5 to 40 wt%, 3 to 35 wt% or 10 to 25 wt% of an aerosol-former material.

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.

In some embodiments, the aerosol-former material may comprise one or more of erythritol, propylene glycol, glycerol, and triacetin. In some cases, the aerosol-former material comprises, consists essentially of or consists of glycerol, or a mixture of glycerol and propylene glycol.

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.

The aerosol-former material may act as a plasticiser. If the content of the plasticiser is too high, the aerosol-generating material may absorb water resulting in a material that does not create an appropriate consumption experience in use. If the plasticiser content is too low, the aerosol-generating material may be brittle and easily broken. The plasticiser content specified herein provides an aerosol-generating material flexibility which allows a sheet of the aerosol-generating material or aerosol-generating composition to be wound onto a bobbin, which is useful in manufacture of aerosol generating articles (consumables).

Filler

The aerosol-generating composition 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.

In some embodiments, the aerosol-generating material may comprise less than about 50 wt% of a filler, such as from about 1 wt% to 50 wt%, or 5 wt% to 40 wt%, or 5 wt% to 30 wt%, or 10 wt% to 20 wt%.

In other embodiments, the aerosol-generating material comprises less than 20 wt%, suitably less than 10 wt% or less than 5 wt% of a filler. In some cases, the aerosol-

generating material comprises less than 1 wt% of a filler, and in some cases the aerosol-generating material comprises no filler.

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 may comprise one or more organic filler materials such as wood pulp; tobacco pulp; hemp fibre; starch and starch derivatives, such as maltodextrin; chitosan; and cellulose and cellulose derivatives, such as microcrystalline cellulose and nanocrystalline cellulose. In particular cases, the aerosol-generating material comprises no calcium carbonate such as chalk.

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, tobacco pulp, hemp fibre, cellulose or cellulose derivatives. In some embodiments, the fibrous organic filler material may be wood pulp, hemp fibre, cellulose or cellulose derivatives. In some embodiments, the fibrous filler is 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 aerosolisable material.

In some embodiments the gelling agent is CMC and is used together with wood pulp as a filler.

Flavour

The aerosol-generating material and/or the aerosol-generating composition may optionally comprise a flavour. For example, the or each aerosol-generating material may comprise up to about 60 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 to 60 wt%, 10 to 60 wt%, 20 to 50 wt%, or 30 to 40 wt% a flavour.

The different aerosol-generating materials in the aerosol-generating composition may include the same or different flavours, and/or flavours in different amounts.

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), flavour 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.

In some embodiments, the flavour comprises menthol, spearmint and/or peppermint.

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

In some embodiments, the flavour comprises eugenol.

In some embodiments, the flavour comprises flavour components extracted from tobacco.

In some embodiments, the flavour comprises flavour components extracted from cannabis.

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).

In some cases, the aerosol-generating material may additionally comprise an emulsifying agent, which emulsified 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.

Solvent

The amorphous solid may be made from a gel, and this gel may additionally comprise a solvent, included at 0.1-50 wt%. However, it has been established that the inclusion of a solvent in which the flavour is soluble may reduce the gel stability and the flavour may crystallise out of the gel. As such, in some cases, the gel does not include a solvent in which the flavour is soluble.

Other functional material

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

In some embodiments, the aerosol-generating material may further comprise one or more additional active substances and/or flavours, and optionally one or more other functional material. The one or more other functional materials may comprise one or more of pH regulators, colouring agents, preservatives, stabilizers, and/or antioxidants.

Sheets

In some embodiments, one or more of the aerosol-generating materials are each 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, or as a rolled sheet (i.e. in the form of a tube). 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, optionally mixed into an aerosolisable material such as cut rag tobacco or a non-tobacco plant material.

Where the aerosol-generating composition comprises two or more aerosol-generating materials in sheet form, the sheets may be incorporated into the non-combustible aerosol provision system or consumable in the same manner or in different manners.

The "thickness" of the aerosol-generating material describes the shortest distance between a first surface and a second surface. In embodiments where the aerosol-generating material is in the form of a sheet, the thickness of the aerosol-generating material is the shortest distance between a first planar surface of the sheet and a second planar surface of the sheet which opposes the first planar surface of the sheet. 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. Where the aerosol-generating composition comprises two or more aerosol-generating materials in sheet form, the sheets may have the same thickness or different thicknesses.

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.

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%.

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.

Where the aerosol-generating composition comprises two or more aerosol-generating materials in sheet form, the sheets may have the same tensile strength or different tensile strengths.

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 composition 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/m², 40 to 60 g/m², or 25 to 60 g/m² and may be used to wrap an aerosolisable material such as tobacco.

Where the aerosol-generating composition comprises two or more aerosol-generating materials in sheet form, the sheets may have the same area density or different area densities.

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.

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 a susceptor. 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.

Where the aerosol-generating composition comprises two or more aerosol-generating materials in sheet form, the sheets may be formed on the same support, may be formed on the same type of support, or may be formed on different supports.

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.

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.

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.

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.

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).

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

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.

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".)

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.

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.

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.

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.

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.

Where the aerosol-generating composition comprises two or more aerosol-generating materials in sheet form, the sheets may be formed on the same carrier, may be formed on the same type of carrier, or may be formed on different carrier.

The two or more aerosol-generating materials are included in the aerosol-generating composition. These aerosol-generating materials include different active substances. The aerosol-generating materials may, otherwise, be the same. Alternatively the materials may differ in one or more further ways.

For example, the aerosol-generating materials may have different thicknesses and/or that may be provided in otherwise different sizes, such as cut to different dimensions or average particle sizes.

The density of the aerosol-generating materials may be different.

In some embodiments, the aerosol-generating materials include different components or the same components in different amounts.

The two or more aerosol-generating materials may be included in the aerosol-generating material in different amounts.

In some embodiments, the different aerosol-generating materials may be mixed to form a largely homogenous blend. In other embodiments, the distribution of the different aerosol-generating materials is controlled to provide a desired distribution within the composition, optionally with the materials being unmixed or substantially unmixed. Where the aerosol-generating composition comprises a blend of two or more different aerosol-generating materials this may control the release of the active agents. For example, the blend may provide a consistent release throughout use of the consumable, and may be configured/formulated to provide either a rapid release or a slow release.

Consumable

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 comprising a first aerosol-generating material comprising an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and a second aerosol-generating material comprising a different active substance and a gelling agent, as described above.

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.

Articles of the present invention may be provided in any suitable shape or configuration. In some examples, the article is provided as a rod (e.g. substantially cylindrical). An article provided as a rod may include the aerosol-generating composition as shredded sheets of the two or more aerosol-generating materials. Optionally these shredded sheets are blended with another aerosol-generating material, such as cut tobacco or another botanical material.

Alternatively, or additionally, the article provided as a rod may include one or more sheets of aerosol-generating composition circumscribing a rod of aerosol-generating material (e.g. tobacco, an aerosol-generating material such as described herein or a combination thereof).

In some embodiments, the two or more different aerosol generating materials are arranged or located in different sections of the consumable.

For example, the aerosol-generating composition may be provided in the consumable in the form of a rod of material.

In some embodiments, the rod may be made up of cylindrical sections of different aerosol-generating material arranged along the longitudinal axis of the rod. In other embodiments, the sections of different aerosol-generating material may be arranged around the longitudinal axis of the rod. In yet other embodiments, the rod may comprise an inner section of one aerosol-generating material extending along the

longitudinal axis of the rod, and surrounded by one or more sections of other aerosol-generating material(s).

In some embodiments, the article comprises a layer portion of aerosol-generating material disposed on a carrier. In examples, the article may have at least one substantially planar (flat) surface. In such embodiments, the consumable may be provided in a shape or configuration other than a rod.

In some such embodiments, there is provided a consumable for use in a non-combustible aerosol-provision system comprising a planar support with complete coverage of the aerosol-generating material (e.g. a continuous aerosol-generating film comprising one or more of the aerosol-generating materials described herein). Figure 8 provides a schematic illustration of an exploded view of such a consumable, which includes a support layer 54 and an aerosol-generating material layer 52.

The aerosol-generating film may be discontinuous. For example, the aerosol-generating film may comprise one or more discrete portions or regions of aerosol-generating material, such as dots, stripes or lines, which may be supported on a support. In such embodiments, the support may be planar or non-planar. Each of the one or more discrete portions or regions of aerosol-generating material may comprise one of the aerosol-generating materials described herein, or may comprise a combination of two or more aerosol-generating materials. Discrete portions of different aerosol-generating materials may be heated separately.

In some cases, the discrete portions of aerosol-generating material are substantially round, cylindrical or hemispherical. In some cases, there is a grid-shaped distribution of the substantially round, cylindrical or hemispherical aerosol-generating material.

In some cases, there is provided a consumable for use in a non-combustible aerosol-provision system comprising a planar support with a discontinuous aerosol-generating film (which comprises a plurality of discrete portions of aerosol-generating material) deposited on it.

Figure 9 provides an example of a consumable (401) wherein a discontinuous aerosol-generating film (which comprises a discrete portion of aerosol-generating material (403)) are provided on the consumable.

In some embodiments, a planar consumable comprising an aerosol-generating composition comprising two aerosol-generating materials which can be heated by a heater. These may be arranged as two distinct portions or areas of the two aerosol-generating materials. The first aerosol-generating material comprises an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and the second aerosol-generating material comprises a different active substance and a gelling agent.

The portions or areas of the two aerosol-generating materials may be adjoining or abutting, or they may be separated by areas without aerosol-generating materials.

In a further exemplary embodiment, a planar consumable comprises an aerosol-generating composition comprising six (as shown in Figure 9) or nine aerosol-generating materials which can be heated by a planer heater. The first aerosol-generating material comprises an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and the second and further aerosol-generating materials comprise a different active substance and a gelling agent.

The portions or areas of the aerosol-generating materials may be adjoining or abutting, or they may be separated by areas without aerosol-generating materials (as shown in Figure 9). The portions may be arranged as portions arranged in a single row or in multiple rows, such as, for nine portions, three rows of three portions. Two or more portions may comprise the same aerosol-generating material. Alternatively, the portions may all be different.

The consumable may be used with any suitable non-combustible aerosol provision device.

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. 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.

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.

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.

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.

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 composition 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

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.

According to the present disclosure, a "non-combustible" aerosol provision system is one where a constituent aerosol-generating composition 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.

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

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.

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

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

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

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.

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.

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.

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.

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.

In some cases, the heater may be embedded in the aerosol-generating composition. 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 composition, which is heated by induction.

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.

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.

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.

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.

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.

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.

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%.

Referring to Figures 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 51 shown in Figures 5 to 7, described below. In use, the article 101 may be removably inserted into the device shown in Figure 5 at an insertion point 20 of the device 51.

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 composition comprises 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 composition described herein may be incorporated in sheet form and in shredded form.

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.

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.

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.

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 58 GSM standard tipping base paper. In one example the tipping paper has a length of between 42 mm and 50 mm, suitably of 46 mm.

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 51. In one example, the thickness of the wall of the cooling segment 107 is approximately 0.29 mm.

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°C 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 °C 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 51. 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 51, then the temperature sensitive filter segment may 109 become damaged in use, so it would not perform its required functions as effectively.

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.

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 51. 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.

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 51.

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.

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 composition.

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.

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.

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

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 51. 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.

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.

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.

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.

Referring to Figures 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 Figures 3 and 4 are equivalent to the reference signs shown in Figures 1 and 2, but with an increment of 200.

In the example of the article 301 shown in Figures 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.

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 11mm 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.

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 51, when the article 301 is fully inserted in the device 51, as can be seen in Figures 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 51 to aid with the cooling of the article 301.

The length of the cooling segment 307 is such that the cooling segment 307 will be partially inserted into the device 51, when the article 301 is fully inserted into the device 51. The length of the cooling segment 307 provides a first function of providing a physical gap between the heater arrangement of the device 51 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 51,

when the article 301 is fully inserted into the device 51. As can be seen from Figures 6 and 7, the majority of the cooling element 307 is located within the device 51. However, there is a portion of the cooling element 307 that extends out of the device 51. It is in this portion of the cooling element 307 that extends out of the device 51 in which the ventilation holes 317 are located.

Referring now to Figures 5 to 7 in more detail, there is shown an example of a device 51 arranged to heat aerosol-generating composition to volatilise at least one component of said aerosol-generating composition, typically to form an aerosol which can be inhaled. The device 51 is a heating device which releases compounds by heating, but not burning, the aerosol-generating composition.

A first end 53 is sometimes referred to herein as the mouth or proximal end 53 of the device 51 and a second end 55 is sometimes referred to herein as the distal end 55 of the device 51. The device 51 has an on/off button 57 to allow the device 51 as a whole to be switched on and off as desired by a user.

The device 51 comprises a housing 59 for locating and protecting various internal components of the device 51. In the example shown, the housing 59 comprises a uni-body sleeve 11 that encompasses the perimeter of the device 51, capped with a top panel 17 which defines generally the 'top' of the device 51 and a bottom panel 19 which defines generally the 'bottom' of the device 51. 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.

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 51, or may be "permanently" fixed to the uni-body sleeve 11, for example to deter a user from accessing the interior of the device 51. 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.

The top panel 17 of the device 51 has an opening 20 at the mouth end 53 of the device 51 through which, in use, the article 101, 301 including the aerosol-generating composition may be inserted into the device 51 and removed from the device 51 by a user.

The housing 59 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.

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

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 composition in the article (as discussed, to volatilise the aerosol-generating composition without causing the aerosol-generating composition to burn).

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 51 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 51 can be longer.

In one example, the heater arrangement 23 is generally in the form of a hollow cylindrical tube, having a hollow interior heating chamber 29 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.

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 material 103, 303 of the article 101, 301 is inserted into the heater arrangement 23 when the article 101, 301 is inserted into the device 51.

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

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 51. 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 51 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.

The housing 59 may further comprises various internal support structures 37 for supporting all internal components, as well as the heating arrangement 23.

The device 51 further comprises a collar 33 which extends around and projects from the opening 20 into the interior of the housing 59 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 35f, which in this example, comprises

a plurality of cooling fins 35f 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 51 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.

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 51. 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 51 and allow cooling air to flow into the device 51 around the article 101, 301 in the air gap 36.

In operation, the article 101, 301 is removably inserted into an insertion point 20 of the device 51, as shown in Figures 5 to 7. Referring particularly to Figure 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 51. The proximal end 113, 313 of the article 101, 301 extends from the device 51 and acts as a mouthpiece assembly for a user.

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 composition 103, 303.

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, 313 to the user. In one example, the temperature of the heated volatilised components that are generated from the body of aerosol-generating composition 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 Figures 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

In another aspect, there is provided a method of forming an aerosol-generating composition comprising a first aerosol-generating material comprising an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and a second aerosol-generating material comprising a different active substance and a gelling agent, as described above.

The method comprises forming each aerosol generating material by:

(a) providing a slurry comprising the active substance, gelling agent, aerosol-forming agent, a solvent and any optional further components of the aerosol-generating material;

(b) forming a layer of the slurry;

(c) optionally setting the layer of the slurry; and

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

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 materials and incorporating these aerosol-generating materials 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 the slurry, (d) drying to form an aerosol-generating material, and (e) incorporating the resulting aerosol-generating material into the consumable or system.

In step (a), the constituent, derivative or extract of cannabis and/or other active substance may first be dissolved in the aerosol-former material and the resulting solution then added to the other components of the slurry.

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.

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.

In some cases, a setting 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.

In other cases, the step (c) of optionally setting 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. Step (c) therefore involves cross-linking, for example cross-linking the gelling agent.

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).

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 or cross-linking agent results in a gel that is very tacky or very brittle and consequently has poor handleability.

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.

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.

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.

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.

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

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

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

In some examples, the slurry has a viscosity of from about 1 to about 20 Pa·s at 46.5°C, such as from about 10 to about 20 Pa·s at 46.5°C, such as from about 14 to about 16 Pa·s at 46.5°C.

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

Example

An exemplary first aerosol-generating material comprising an active substance which is a constituent, derivative or extract of cannabis was formulated as follows:

Ingredient	Inclusion level (% w/w)
Glycerol	30
Propylene glycol (PG)	20
Carboxymethyl cellulose (CMC)	40
Cannabidiol (CBD)	10

The resultant sheet or film of aerosol-generating material had a total mass of 400 g , of which 340 g (or 340 ml) was water, providing a total dry mass of 60 g.

A second aerosol-generating material comprising a different active substance may be made, for example, by replacing the CBD with 10% w/w of a different active agent.

Definitions

As used herein, the term "tobacco material" refers to any material comprising tobacco or derivatives therefore. The term "tobacco material" may include one or more of tobacco, tobacco derivatives, expanded tobacco, reconstituted tobacco or tobacco substitutes. The tobacco material may comprise one or more of ground tobacco, tobacco fibre, cut tobacco, extruded tobacco, tobacco stem, reconstituted tobacco and/or tobacco extract.

The tobacco used to produce tobacco material may be any suitable tobacco, such as single grades or blends, cut rag or whole leaf, including Virginia and/or Burley and/or Oriental. It may also be tobacco particle 'fines' or dust, expanded tobacco, stems, expanded stems, and other processed stem materials, such as cut rolled stems. The tobacco material may be a ground tobacco or a reconstituted tobacco material. The reconstituted tobacco material may comprise tobacco fibres, and may be formed by casting, a Fourdrinier-based paper making-type approach with back addition of tobacco extract, or by extrusion.

All percentages by weight described herein (denoted wt%) are calculated on a dry weight basis (DWB), unless explicitly stated otherwise. All weight ratios are also

calculated on a dry weight basis. A weight quoted on a dry weight basis refers to the whole of the extract or slurry or material, other than the water or other solvent, and may include components which by themselves are liquid at room temperature and pressure, such as glycerol. Conversely, a weight percentage quoted on a wet weight basis (WWB) refers to all components, including water or other solvent.

For the avoidance of doubt, where in this specification the term "comprises" is used in defining the invention or features of the invention, embodiments are also disclosed in which the invention or feature can be defined using the terms "consists essentially of" or "consists of" in place of "comprises". Reference to a material "comprising" certain features means that those features are included in, contained in, or held within the material.

The above embodiments are to be understood as illustrative examples of the invention. It is to be understood that any feature described in relation to any one embodiment may be used alone, or in combination with other features described, and may also be used in combination with one or more features of any other of the embodiments, or any combination of any other of the embodiments. Furthermore, equivalents and modifications not described above may also be employed without departing from the scope of the invention, which is defined in the accompanying claims.

The various embodiments described herein are presented only to assist in understanding and teaching the claimed features. These embodiments are provided as a representative sample of embodiments only, and are not exhaustive and/or exclusive. It is to be understood that advantages, embodiments, examples, functions, features, structures, and/or other aspects described herein are not to be considered limitations on the scope of the invention as defined by the claims or limitations on equivalents to the claims, and that other embodiments may be utilised and modifications may be made without departing from the scope of the claimed invention. Various embodiments of the invention may suitably comprise, consist of, or consist essentially of, appropriate combinations of the disclosed elements, components, features, parts, steps, means, etc., other than those specifically described herein. In addition, this disclosure may include other inventions not presently claimed, but which may be claimed in future.

Claims

1. An aerosol-generating composition comprising a first aerosol-generating material comprising an active substance which is a constituent, derivative or extract of cannabis and a gelling agent, and a second aerosol-generating material comprising a different active substance and a gelling agent.

2. An aerosol-generating composition as claimed in claim 1, comprising a third or further aerosol-generating materials comprising an active substance and a gelling agent.

3. An aerosol-generating composition as claimed in claim 1 or claim 2, wherein the first, second and/or further aerosol-generating materials comprise:

from about 15 to about 70 wt% of an active substance;
from about 10 to about 50 wt% aerosol-former material;
from about 15 to about 60 wt% gelling agent; and
optionally filler;

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

4. An aerosol-generating composition as claimed in one of claims 1 to 3, comprising from about 5 to about 60 wt% of an active substance.

5. An aerosol-generating composition as claimed in any one of claims 1 to 4, comprising from about 15 to about 45 wt% aerosol-former material.

6. An aerosol-generating composition as claimed in any one of claims 1 to 5, comprising from about 25 to about 50 wt% gelling agent.

7. An aerosol-generating composition as claimed in any one of claims 1 to 6, 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.

8. An aerosol-generating composition as claimed in claim 7, wherein the polysaccharide gelling agent is selected from the group consisting of alginate and a cellulose derivative, and/or wherein the cellulose derivative 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).

9. An aerosol-generating composition as claimed in any one of claims 1 to 8, wherein the gelling agent is not crosslinked.

10. An aerosol-generating composition as claimed in any one of claims 1 to 9, wherein the gelling agent is CMC.

11. An aerosol-generating composition as claimed in any one of claims 1 to 10, wherein the aerosol-former material 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.

12. An aerosol-generating composition as claimed in any one of claims 1 to 11, wherein the aerosol-former material comprises or is glycerol or a combination of glycerol and propylene glycol.

13. An aerosol-generating composition as claimed in any one of claims 1 to 12, wherein the constituent, derivative or extract of cannabis is a cannabinoid.

14. An aerosol-generating composition as claimed in claim 13, wherein the cannabinoid is selected from cannabigerol (CBG), cannabichromene (CBC), cannabidiol (CBD), tetrahydrocannabinol (THC), cannabinol (CBN), cannabinodiol (CBDL), cannabicyclol (CBL), cannabivarin (CBV), tetrahydrocannabivarin (THCV), cannabidivarin (CBDV), cannabichromevarin (CBCV), cannabigerovarin (CBGV), cannabigerol monomethyl ether (CBGM), cannabinerolic acid, cannabidiolic acid (CBDA), cannabinol propyl variant (CBNV), cannabitriol (CBO), tetrahydrocannabmolic acid (THCA), and tetrahydrocannabivarinic acid (THCV A).

15. An aerosol-generating composition as claimed in claim 13, wherein the cannabinoid is cannabidiol.

16. An aerosol-generating composition as claimed in any one of claims 1 to 15, wherein the second and any further aerosol-generating material comprises one or more active substance selected from the group consisting of: nutraceuticals; nootropics; psychoactives; and constituents, derivatives or extracts of tobacco or another botanical, such as nicotine, caffeine, taurine, theine, vitamins such as B6 or B12 or C, melatonin, and constituents or derivatives thereof.

17. An aerosol-generating composition as claimed in any one of claims 1 to 16, wherein the first and second aerosol-generating materials have different compositions in addition to the different active substances.

18. An aerosol-generating composition as claimed in any one of claims 1 to 17, wherein the first and second aerosol-generating materials are in the form of sheets.

19. An aerosol-generating composition as claimed in claim 18, wherein the first and second aerosol-generating materials are sheets having different thicknesses.

20. An aerosol-generating composition as claimed in any one of claims 1 to 19, wherein the first and second aerosol-generating materials release their respective active substances at different temperatures.

21. An aerosol-generating composition as claimed in any one of claims 1-20, comprising one or more of a shredded sheet of the first aerosol-generating material, a shredded sheet of the second aerosol-generating material and a shredded sheet of any further aerosol-generating material.

22. An aerosol-generating composition as claimed in claim 21, comprising from about 50-100 wt% (WWB) of the aerosol-generating materials.

23. A consumable for use in a non-combustible aerosol provision device, the consumable comprising the aerosol-generating composition as claimed in any one of claims 1 to 22.

24. A non-combustible aerosol provision system comprising a consumable of claim 23 and a non-combustible aerosol provision device.

25. A method for preparing an aerosol-generating composition as claimed in any one of claims 1 to 22, wherein the first or second aerosol-generating material is formed by casting a slurry into a sheet.

26. A method as claimed in claim 25, wherein the active substance is dissolved in a solvent in the slurry.

27. A method for preparing an aerosol-generating composition as claimed in any one of claims 1 to 22, wherein the first or second aerosol-generating material is formed by extrusion.

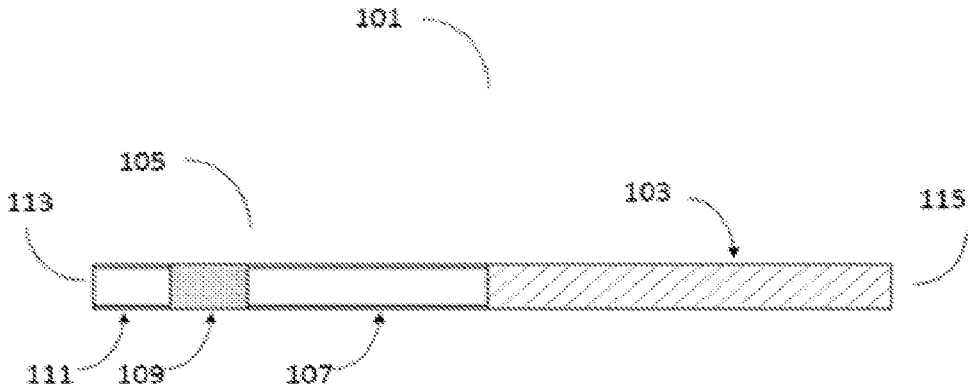


Figure 1

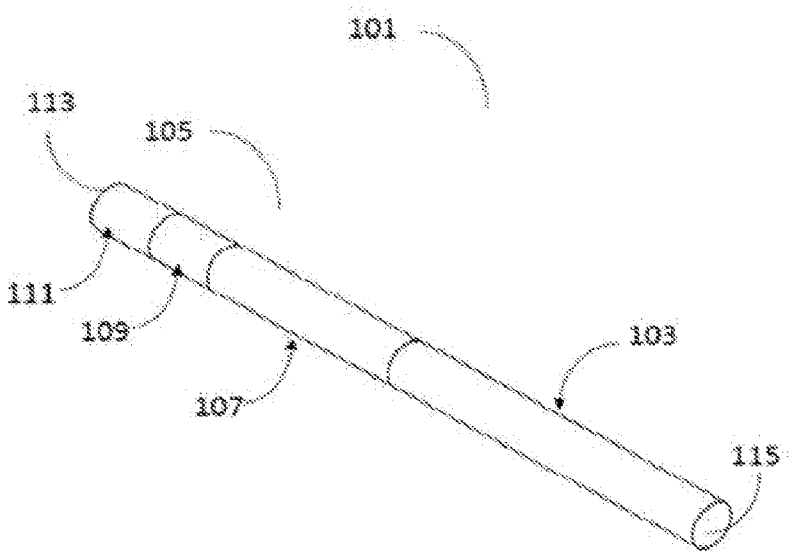
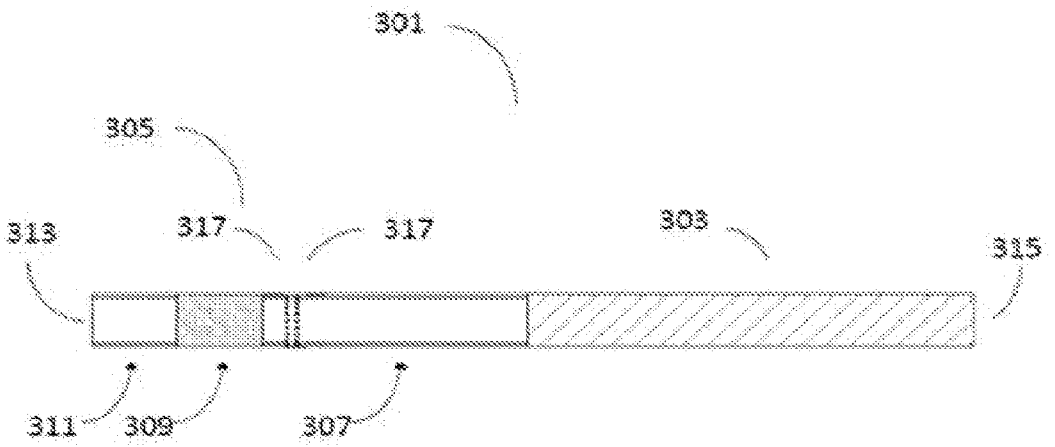


Figure 2



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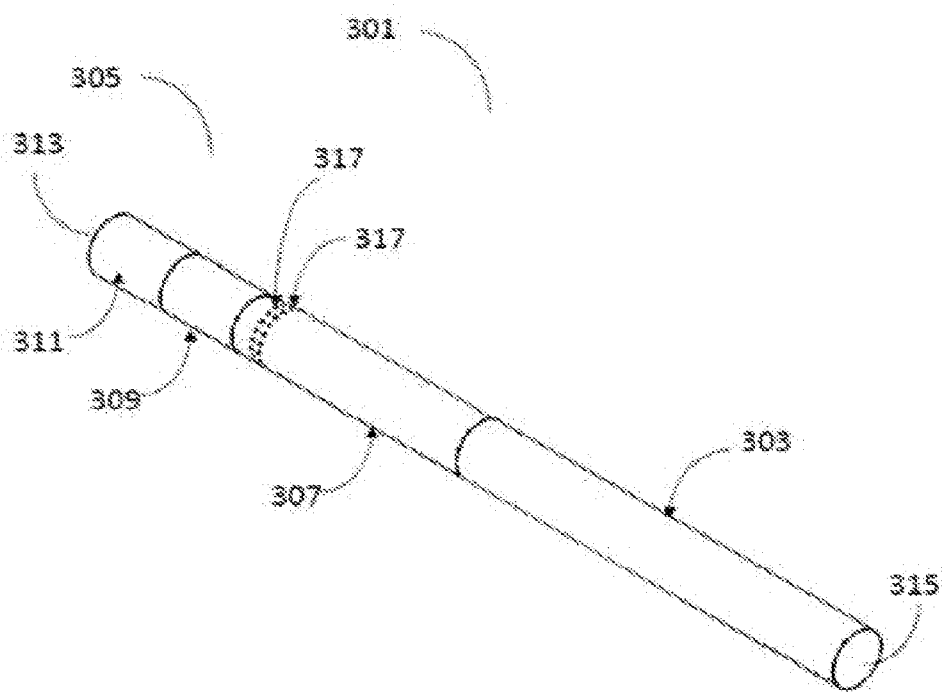
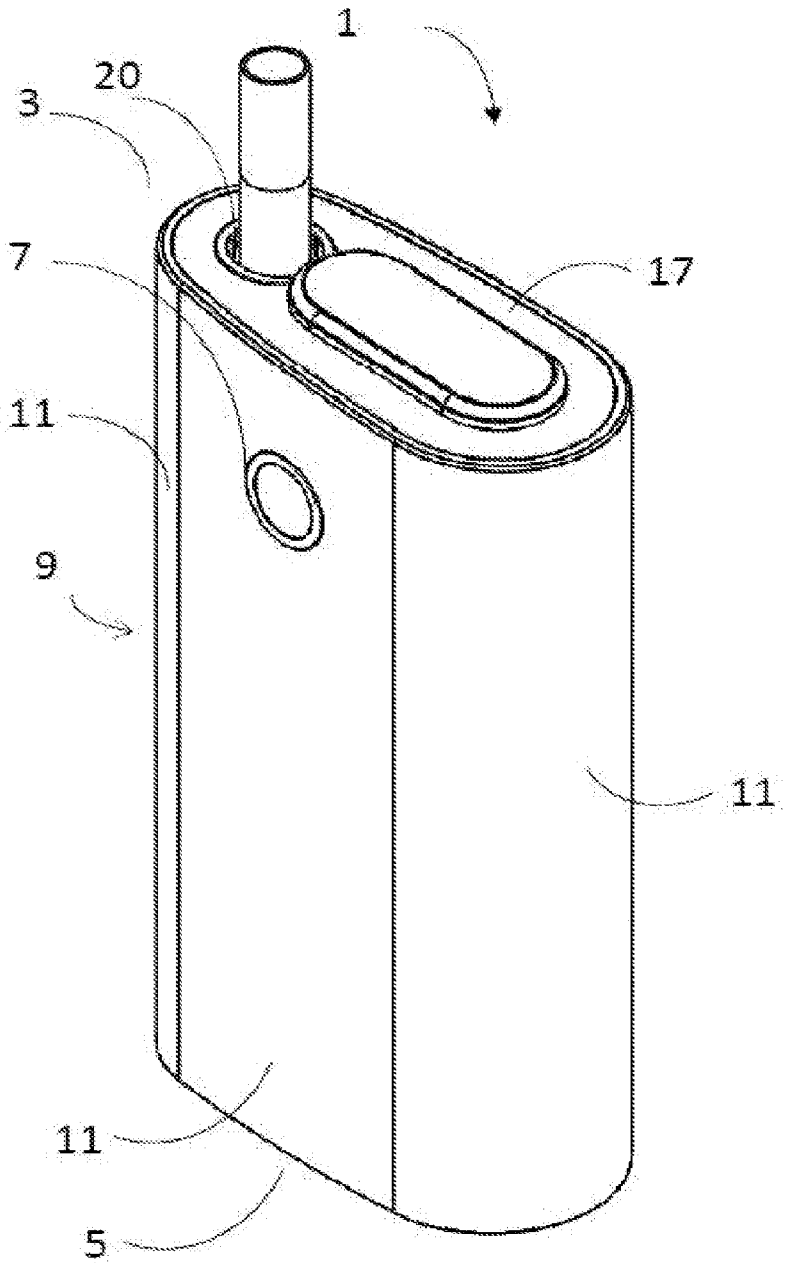


Figure 4



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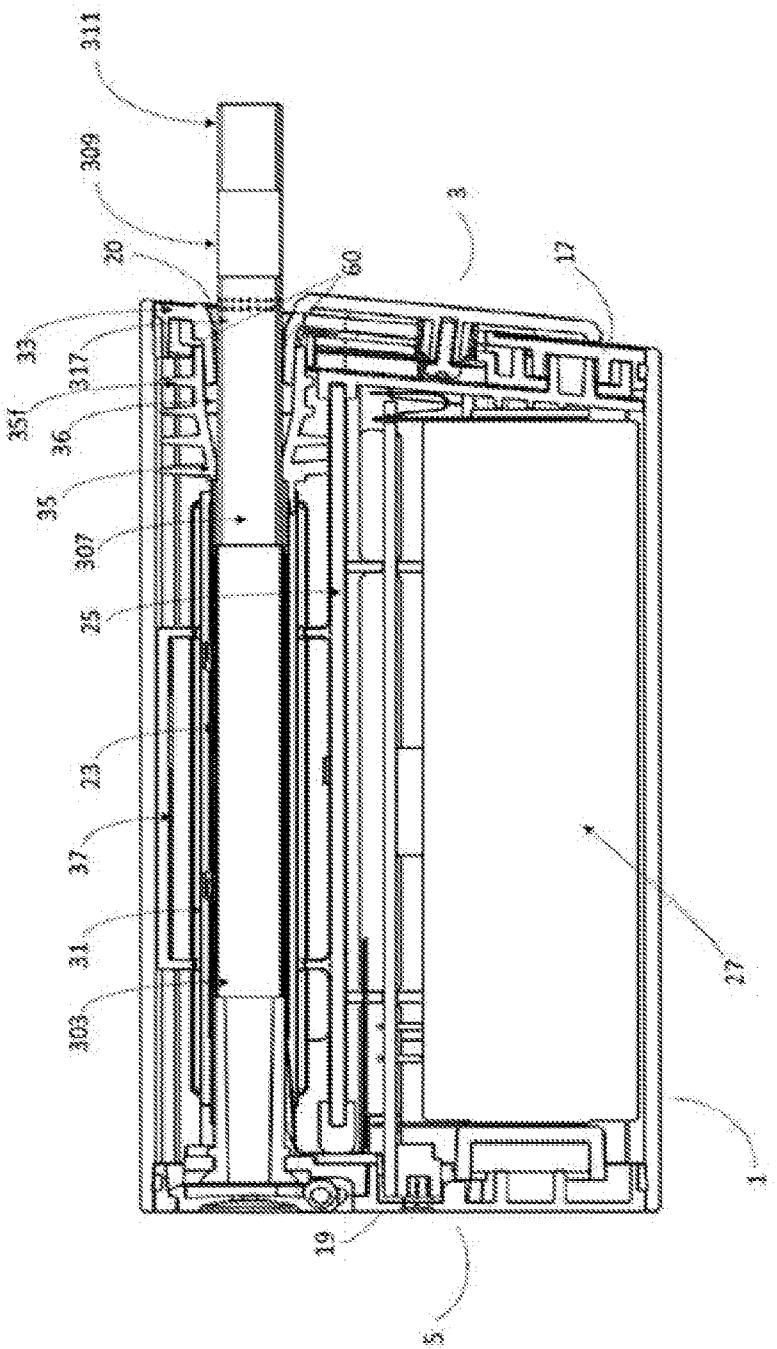

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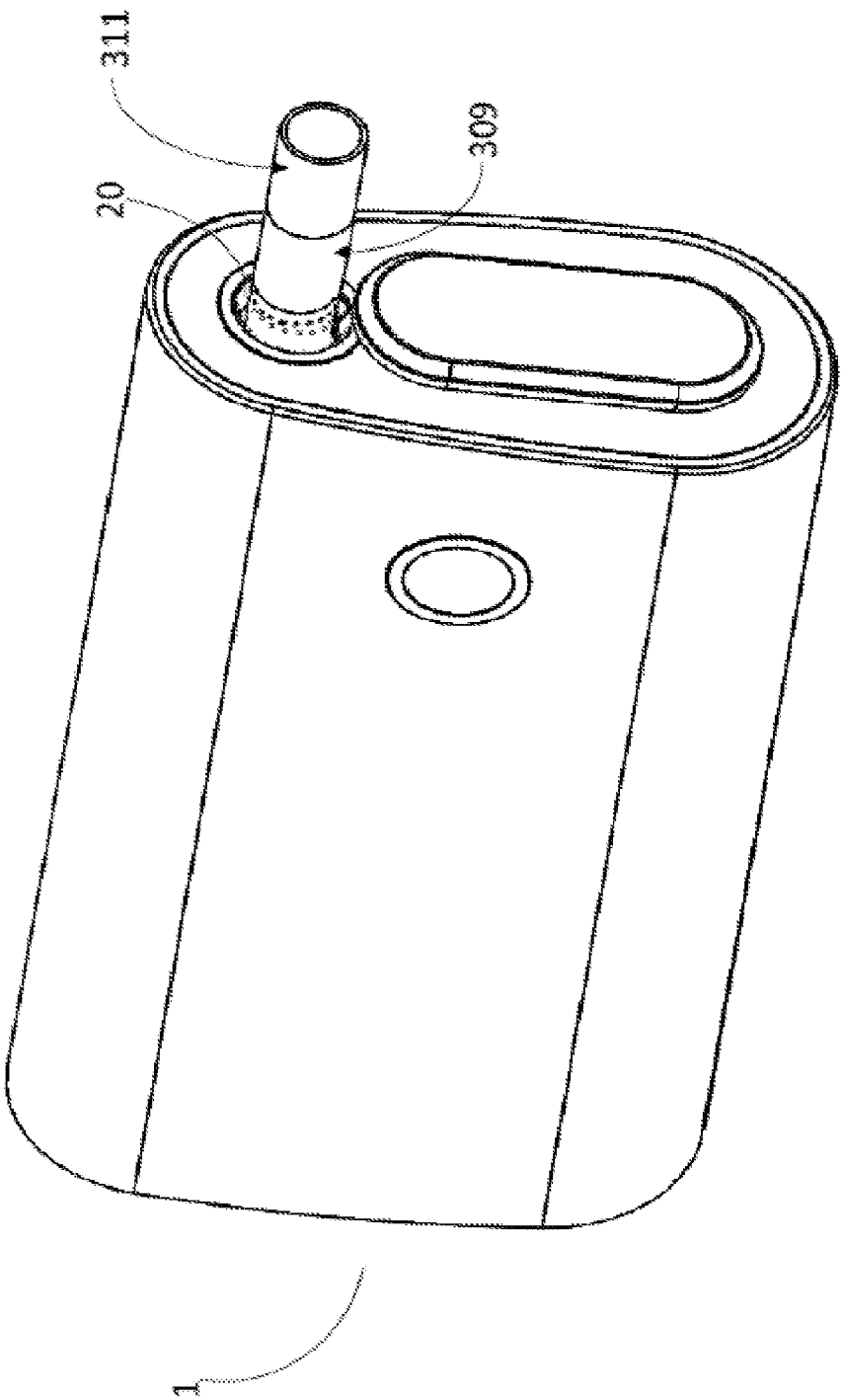

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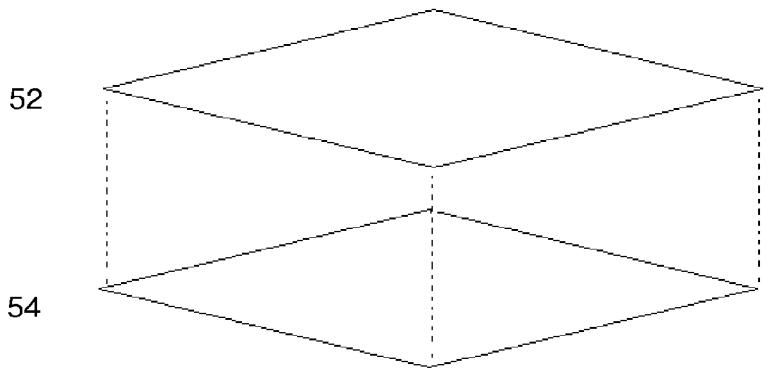

Figure 8

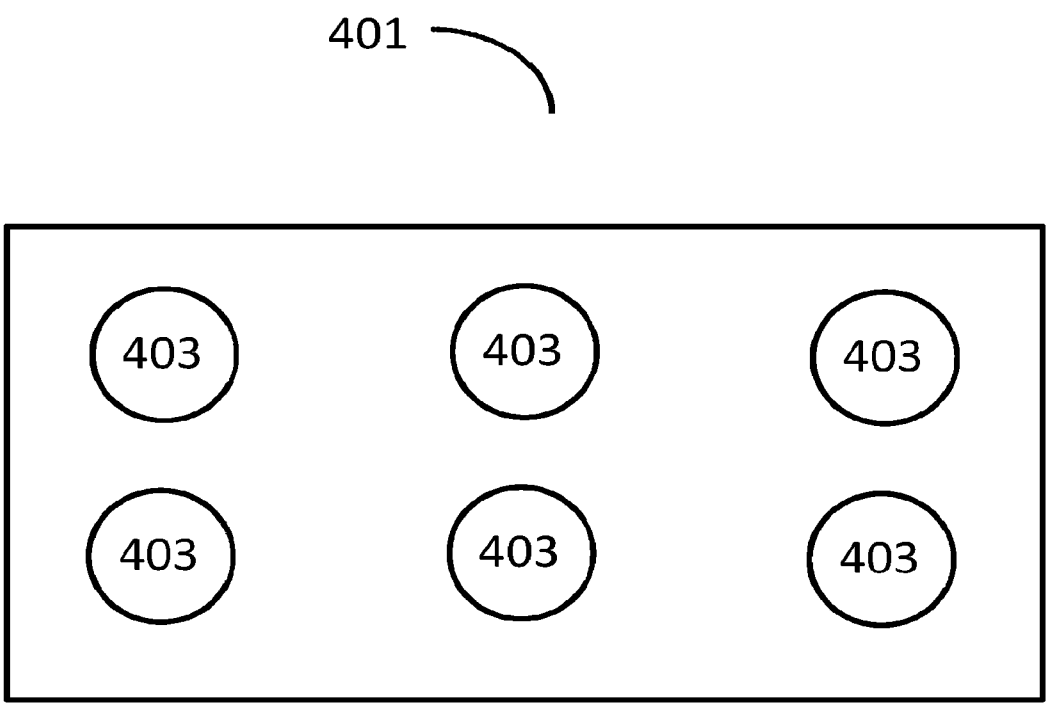

Figure 9

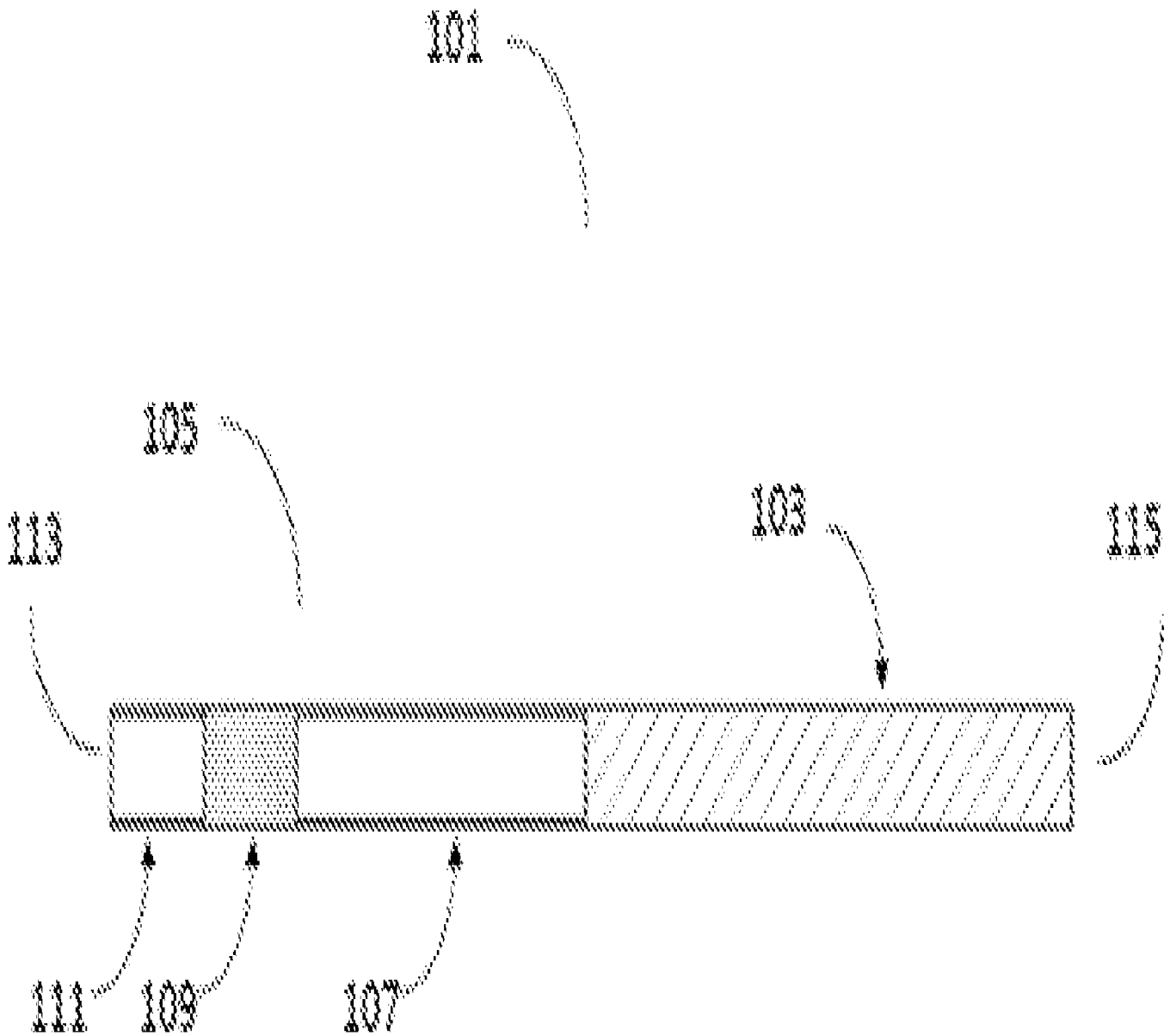

Figure 1