

(19)



(11)

EP 4 563 021 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

04.06.2025 Bulletin 2025/23

(51) International Patent Classification (IPC):

A24F 40/42 ^(2020.01)

(21) Application number: **25171120.6**

(52) Cooperative Patent Classification (CPC):

A24B 15/16; A24B 15/285; A24B 15/42;

A24F 40/42

(22) Date of filing: **18.12.2020**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

• **DAVIES, Ashley**

London, WC2R 3LA (GB)

• **KABIRAT, Junior**

London, WC2R 3LA (GB)

(30) Priority: **20.12.2019 GB 201918973**

(74) Representative: **Gill, Siân Victoria et al**

Venner Shipley LLP

200 Aldersgate

London EC1A 4HD (GB)

(62) Document number(s) of the earlier application(s) in
accordance with Art. 76 EPC:

20838197.0 / 4 076 020

Remarks:

This application was filed on 16-04-2025 as a
divisional application to the application mentioned
under INID code 62.

(71) Applicant: **Nicoventures Trading Limited**
London WC2R 3LA (GB)

(72) Inventors:

• **BAILEY, Chelsea**

London, WC2R 3LA (GB)

(54) **PARTICLE**

(57) The invention relates to a population of particles for use in a non-combustible aerosol provision system, wherein each particle comprises (i) a binder, (ii) an absorbent comprising one or more components selected from: silica, silicates, diatomaceous earth and zeolites, and (iii) an aerosol-generating material, wherein the median particle size, D50, is between 1 mm and 2 mm. The invention also relates to a cartridge for use in a non-combustible aerosol provision system, to a non-combustible aerosol provision system and to a method of manufacturing the particles.



Figure 1

EP 4 563 021 A2

Description

Technical Field

[0001] The present invention relates to a population of particles for use in a non-combustible aerosol provision system, a cartridge for use in a non-combustible aerosol provision system and a non-combustible aerosol provision system.

Background

[0002] Smoking articles such as cigarettes, cigars and the like burn tobacco during use to create tobacco smoke. Non-combustible aerosol provision systems are provided as alternatives to these combustible products, and generate an inhalable aerosol or vapour by releasing compounds from an aerosol-generating material, typically by heating without burning.

[0003] An example class of non-combustible aerosol provision system is the electronic vapour provision system, also known as electronic cigarettes or e-cigarettes. These generally contain a reservoir of liquid which is vaporised to generate an inhalable aerosol. The liquid typically contains nicotine. When a user inhales on the device, a heater is activated to vaporise a small amount of liquid, which is then inhaled by the user.

[0004] Current vaping products use liquids which are wicked to a heater that generates an aerosol, and this aerosol delivers, for example, nicotine and/or flavour. Current e-cigarette formulations typically utilise glycerol and/or propylene glycol as the aerosol-former in the liquid. In these systems, liquid can leak both in the device and in the bottles during storage and handling.

Summary

[0005] According to a first aspect, the present invention provides a population of particles for use in a non-combustible aerosol provision system, wherein each particle comprises (i) a binder, (ii) an absorbent, wherein the absorbent comprises silica or a silicate, and (iii) an aerosol-generating material; wherein the population of particles has a bulk density of between about 0.5 and about 1.1 g.cm⁻³.

[0006] A second aspect of the invention provides a population of particles for use in a non-combustible aerosol provision system, wherein each of the particles comprises (i) a binder, (ii) an absorbent, wherein the absorbent comprises silica or a silicate, and (iii) an aerosol-generating material, wherein the median particle size D₅₀ is between about 1 mm and about 2 mm.

[0007] A third aspect of the invention provides a cartridge for use in a non-combustible aerosol provision system, wherein the cartridge contains a population of particles according to the first or second aspects.

[0008] A fourth aspect of the invention provides a non-combustible aerosol provision system comprising a po-

pulation of particles according to the first or second aspect, and an aerosol generator, wherein the aerosol generator is configured to aerosolise one or more components of the aerosol generating material in use. In some cases, the system may comprise a cartridge of the third aspect containing the population of particles.

[0009] A fifth aspect of the invention provides a method of manufacturing a population of particles of the first aspect, comprising: combining (i) a binder, (ii) an absorbent comprising silica or a silicate, and (iii) an aerosol-generating material to form a slurry; extruding the slurry to form an extrudate; and spherionising the extrudate to form the population of particles

Features described herein in relation to one aspect are hereby explicitly disclosed in combination with each and every other aspect, to the extent that they are compatible. In particular, features of a particle or particles discussed in the context of the first or second aspects are explicitly disclosed herein in combination with the other of the first and second aspects, to the extent that they are combinable.

[0010] Further features and advantages of the invention will become apparent from the following description of preferred embodiments of the invention, given by way of example only, which is made with reference to the accompanying drawings.

Brief Description of the Drawing

[0011] Figure 1 shows an SEM image of a particle according to the present invention.

Detailed Description

[0012] As noted above, in some instances, the invention provides a population of particles for use in a non-combustible aerosol provision system, wherein each particle comprises (i) a binder, (ii) an absorbent, wherein the absorbent comprises silica or a silicate, and (iii) an aerosol-generating material, wherein the particle has a bulk density of between about 0.5 and about 1.1 g.cm⁻³.

[0013] The particles trap the aerosol-generating material and minimise leakage of that material in storage (prior to use) and/or in the non-combustible aerosol provision system.

[0014] The bulk density is the density of the population when allowed to flow freely and settle (i.e. it is not the density of any given particle but rather the population as a whole).

[0015] The bulk density and materials specified ensure a good balance of various properties, including but not limited to one or more of the following: particle rigidity; flowability; absorptive capacity (particularly for hydrophilic substances); surface area and aerosol release profile; resistance to temperature to which the particle may be exposed in use; and toxicity. The preferred examples of these features, discussed below, further optimise the balance of these properties.

[0016] In some cases, the bulk density may be between about 0.6 and 0.9 g.cm⁻³, suitably between about 0.7 and 0.8 g.cm⁻³

[0017] In some cases, the mean particle weight may be between about 0.2 mg and 6 mg, suitably from about 1 mg to about 4 mg, most suitably between about 1.5 mg to about 3 mg. In some cases, the mean particle weight may be between about 2 mg to about 2.5 mg.

[0018] In some cases, the binder comprises a cellulose or cellulose derivative, suitably carboxymethyl cellulose and/or microcrystalline cellulose. In some cases, the binder comprises or consists of microcrystalline cellulose.

[0019] In some cases, the absorbent comprises one or more components selected from: silica, diatomaceous earth and zeolites. In some cases, the absorbent comprises or consists of silica. In some cases, the specific surface area of the absorbent component of the particle is at least about 400 m²/g, suitably at least about 450 m²/g or 500 m²/g.

[0020] In some cases, the weight ratio of absorbent to binder is between about 1:1 to 2:1. In some cases, the weight ratio of absorbent to binder is from about 1.3:1, 1.4:1 or about 1.5:1 to about 1.9:1 or 1.8:1. In some cases, the weight ratio of absorbent to binder is about 1.7:1.

[0021] In some cases, the particles may have maximum dimension of between about 1 mm and 2 mm. In some cases, the particle may be substantially spherical. (The term "maximum dimension" refers to the longest straight-line distance from any point on the particle surface to any other surface point on the same particle.)

[0022] In some cases, the particles may comprise less than about 10 wt% of water, based on the total particle weight, suitably less than about 6 wt%, 5 wt% or 4 wt%.

[0023] The aerosol-generating material is a material that is capable of generating aerosol, for example when heated, irradiated or energized in any other way. The aerosol-generating material may, for example, be in the form of a solid, liquid or gel which may or may not contain an active substance and/or flavourants. In preferred cases, the aerosol-generating material is a liquid, which is absorbed into the absorbent material.

[0024] The aerosol-generating material may comprise one or more active substances and/or flavours, one or more aerosol-former materials, and optionally one or more other functional material. The one or more other functional materials may comprise, by way of example, one or more of pH regulators, colouring agents, preservatives, binders, fillers, stabilizers, and/or antioxidants.

[0025] In some cases, the aerosol-generating material comprises an aerosol-former material. In some cases, the aerosol-former material comprises or consists of glycerol, propylene glycol, water and mixtures thereof.

[0026] In some cases, the aerosol-generating material comprises an active substance and/or a flavour. In some cases, the aerosol-generating material comprises an active substance, wherein the active substance comprises or consists of nicotine.

[0027] In some cases, the aerosol-generating material is present in an amount of between about 50 wt% and 90 wt%, suitably from about 50 wt%, 60 wt% or 65 wt% to about 90 wt%, 80 wt% or 75 wt%, based on the total weight of the particles. In some cases, the aerosol-generating material is present in an amount of about 70 wt%, based on the total weight of the particles.

[0028] In some cases, the median particle size (D50) is between about 1 mm and about 2 mm. The D50 value may be determined by sieving, thus relates to the maximum dimension of each particle. This size provides good handleability, and particles of this size will not be readily carried by the formed aerosol. Moreover, even if carried in the aerosol, they will not be typically transit the user's mouth and so will not enter the lungs. In some cases, the particles may be substantially spherical.

[0029] In some cases, the particle population has a tap density of at least about 0.7 g.cm⁻³. In some cases, the particles have a Hausner ratio value of less than about 1.25, suitably less than about 1.2, 1.15, 1.10 or 1.05. The population of particles thus has good flowability and are easy to handle. (The tap density and bulk density measurements can be performed using a TD 1 tap density tester (SOTAX). The USP 2 method can be used for all measurements.) In one particular case, the population of particles has a bulk density of 0.78 g.cm⁻³ and a tap density of 0.8 g.cm⁻³, giving a Hausner ratio of 1.026.

[0030] In some instances, the invention provides a population of particles for use in a non-combustible aerosol provision system, wherein the particles comprises (i) a binder, (ii) an absorbent, wherein the absorbent comprises silica or a silicate, and (iii) an aerosol-generating material, wherein the median particle size D50 is between about 1 mm and about 2 mm.

[0031] The particles can be manufactured by any suitable method known in the art. By way of example;

i) The components of the particles, such as propylene glycol and/or glycerol, silica, and microcrystalline cellulose, optionally alongside water and/or an active substance and/or a flavour, are mixed under low shear to form a slurry.

ii) The slurry is extruded using a low pressure extruder system, with a 1 mm die.

iii) The extrudate is spheronised (100-120 RPM) in order to form beads with an approximate diameter of around 1-2 mm.

Consumable or cartridge

[0032] In some cases, the invention provides a cartridge for use in a non-combustible aerosol provision system, wherein the cartridge contains such a population of particles. This may alternatively be referred to herein as a consumable.

[0033] In some cases, the cartridge may be a disposable item which is thrown away once the aerosol-generating material contained therein has been consumed.

In other cases, the cartridge may be refillable with a fresh population of particles after consumption and before subsequent use.

[0034] In some cases, the cartridge contains between about 80 and 120 particles. Suitably, the cartridge contains between about 90 and 110 particles, most suitably about 100 particles.

[0035] In some cases, particles in the cartridge may have a total mass of between about 20 mg and 600 mg, suitably from about 100 mg to about 400 mg, most suitably from about 150 mg to about 300 mg. In some cases, the particles may have a total weight of from about 200 mg to about 250 mg.

[0036] In some embodiments, the cartridge for use with a non-combustible aerosol provision device may comprise one or more of: aerosol-generating material, an aerosol-generating material storage area, an aerosol-generating material transfer component, an aerosol generator, an aerosol generation area, a housing, a filter, a mouthpiece, and/or an aerosol-modifying agent.

[0037] The cartridge may be formed from any suitable material which will retain the population of particles in a chamber defined therein. The cartridge is configured to allow airflow through the cartridge. In some cases, the cartridge may be formed from metals, ceramics, plastics or even paper. In some cases, the cartridge may comprise end walls with apertures therein to allow airflow through the cartridge, with substantially impermeable side walls connecting the end walls. In some cases, the cartridge may be formed from a porous material which allows air to flow through and into the cartridge. In some such cases, there may be an aperture in one wall to allow aerosol to pass out of the cartridge without passing through the pores of the porous material (thereby avoiding any filtration by the porous material). In other cases, the cartridge may be formed from a mesh or the like. Such materials may be advantageous since they are lighter, and it may be easier to volatilise the particles if there is only a partial physical barrier between an aerosol generator and the particles.

Non-combustible aerosol provision system

[0038] In some instances, the invention provides a non-combustible aerosol provision system. According to the present disclosure, a "non-combustible aerosol provision system" is one where a constituent aerosol-generating material of the aerosol provision system (or component thereof) is not combusted or burned in order to facilitate delivery of at least one substance to a user.

[0039] The non-combustible aerosol provision system of the invention comprises a population of particles and an aerosol generator, wherein the aerosol generator is configured to aerosolise one or more components of the aerosol generating material in use. In some cases, the population of particles may be provided in a cartridge as described herein.

[0040] An aerosol generator is an apparatus config-

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

[0041] In some cases, the aerosol generator comprises a heater, wherein the heater is configured to heat the particles to a maximum temperature of less than about 250°C, suitably less than about 230°C or 220°C in use. Suitably, the heater may be configured to heat the particles in use to at least about 180°C, 190°C, or 200°C. The particles do not decompose, combust, melt or otherwise degrade at such operating temperatures.

[0042] In some embodiments, the non-combustible aerosol provision system is an electronic cigarette, also known as a vaping device or electronic nicotine delivery system (END), although it is noted that the presence of nicotine in the aerosol-generating material is not a requirement.

[0043] 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. The particles are provided in the consumable.

[0044] 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.

[0045] In some embodiments, the non-combustible aerosol provision system may comprise one or more of: 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.

Examples

[0046] In one example, 5.0 grams of silica (having a specific surface area of 500 m²/g), 3.0 grams of micro-crystalline cellulose and 12.0 grams of an e-liquid formulation may be combined and mixed in a low shear mixer. The e-liquid formulation may comprise propylene glycol, glycerol nicotine, flavours (such as menthol) and an organic acid. The conditions at mixing may be approximately 20-24°C and 20-40% relative humidity.

[0047] The resulting slurry may be extruded through a 1 mm die at low pressure.

[0048] The extrudate may then be spheronised at 100-120 RPM in order to form beads with an approximate diameter of around 1mm.

[0049] The beads may have a Hausner ratio of approximately 1.03. The particles may have a bulk density of 0.80 g.cm⁻³. The particle population may have a D50 value of approximately 1.1 mm, a D10 value of approximately 0.85 mm and a D90 value of approximately 1.35 mm.

[0050] The beads may be heated to approximately 180-220°C to generate an aerosol. Approximately 100 beads may be heated so as to generate sufficient aerosol for approximately 10-12 puffs by the user.

[0051] The beads may be evaluated after undergoing heating. The beads will not substantially deform in shape, and the compressibility will be essentially unchanged from prior to heating. The mass loss measured will indicate good transfer of the aerosol-generating material into the aerosol.

[0052] Comparative beads which did not contain aerosol-generating material may also be subject to the same heating protocol and no drop in mass of the beads will be observed.

Definitions

[0053] As used herein, the term "aerosol-former material" refers to a material capable of forming an aerosol. In some embodiments, the aerosol former comprises one or more polyhydric alcohols, such as propylene glycol, triethylene glycol, 1,3-butanediol and glycerin; esters of polyhydric alcohols, such as glycerol mono-, di- or triacetate; and/or aliphatic esters of mono-, di- or polycarboxylic acids, such as dimethyl dodecanedioate and dimethyl tetradecanedioate. 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.

[0054] As used herein, the term "active substance" refers to a physiologically active material, which is a material intended to achieve or enhance a physiological response. The active substance may for example be selected from nutraceuticals, nootropics, psychoactives. The active substance may be naturally occurring or synthetically obtained. The active substance may comprise for example nicotine, caffeine, taurine, theine, vitamins such as B6 or B12 or C, melatonin, cannabinoids, or constituents, derivatives, or combinations thereof. The active substance may comprise one or more constituents, derivatives or extracts of tobacco, cannabis or another botanical.

[0055] In some embodiments, the active substance comprises nicotine. In some embodiments, the active substance comprises caffeine, melatonin or vitamin B12.

[0056] As noted herein, the active substance may comprise one or more constituents, derivatives or extracts of cannabis, such as one or more cannabinoids or terpenes.

[0057] In some embodiments, the active substance comprises one or more cannabinoid compounds selected from the group consisting of: cannabidiol (CBD), tetrahydrocannabinol (THC), tetrahydrocannabinolic acid (THCA), cannabidiolic acid (CBDA), cannabinol (CBN), cannabigerol (CBG), cannabichromene (CBC), cannabicyclol (CBL), cannabivarin (CBV), tetrahydrocannabivarin (THCV), cannabidivarin (CBDV), cannabichromevarin (CBCV), cannabigerovarin (CBGV), cannabigerol monomethyl ether (CBGM) and cannabielsoin (CBE), cannabicitran (CBT).

[0058] The active substance may comprise one or more cannabinoid compounds selected from the group consisting of cannabidiol (CBD) and THC (tetrahydrocannabinol).

[0059] The active substance may comprise cannabidiol (CBD).

[0060] The active substance may comprise nicotine and cannabidiol (CBD).

[0061] The active substance may comprise nicotine, cannabidiol (CBD), and THC (tetrahydrocannabinol).

[0062] As noted herein, the 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, cannabis, 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, cassia, 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 Arvensis*, *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*

[0063] In some embodiments, the active substance comprises or is derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is tobacco.

[0064] In some embodiments, the 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.

[0065] In some embodiments, the 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.

[0066] 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, fennel, 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, cascarrilla, 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.

[0067] 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.

[0068] 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 eucalyptol, WS-3.

[0069] As used herein, the term "aerosol-modifying agent" refers to a substance, typically located downstream of an 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.

[0070] 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..

[0071] The invention may include one or more features in accordance with any of the following numbered clauses, which, for the avoidance of doubt, do not con-

stitute part of the claims of this application.

Clause 1. A population of particles for use in a non-combustible aerosol provision system, wherein each particle comprises (i) a binder, (ii) an absorbent, wherein the absorbent comprises silica or a silicate, and (iii) an aerosol-generating material, wherein the population of particles has a bulk density of between about 0.5 and about 1.1 g.cm⁻³.

Clause 2. A population of particles according to clause 1, wherein the aerosol generating material comprises an aerosol-former material.

Clause 3. A population of particles according to clause 1 or clause 2, wherein the aerosol generating material comprises an active substance and/or a flavour.

Clause 4. A population of particles according to any one of clauses 1 to 3, wherein the binder comprises a cellulose or cellulose derivative, suitably microcrystalline cellulose.

Clause 5. A population of particles according to any one of clauses 1 to 4, wherein the absorbent comprises silica.

Clause 6. A population of particles according to any one of clauses 1 to 5, wherein the weight ratio of absorbent to binder is between about 1:1 to 2:1.

Clause 7. A population of particles according to any one of clauses 1 to 6, wherein the aerosol-generating material is present in an amount of between about 50 wt% and 90 wt%, of the total weight of the particles.

Clause 8. A population of particles according to any one of clauses 1 to 7, wherein the median particle size D50 is between about 1 mm and about 2 mm.

Clause 9. A population of particles according to any one of clauses 1 to 8, wherein the population of particles has a Hausner ratio value of less than about 1.25.

Clause 10. A population of particles for use in a non-combustible aerosol provision system, wherein each of the particles comprises (i) a binder, (ii) an absorbent, wherein the absorbent comprises silica or a silicate, and (iii) an aerosol-generating material, wherein the median particle size, D50, is between about 1 mm and about 2 mm.

Clause 11. A cartridge for use in a non-combustible aerosol provision system, wherein the cartridge contains a population of particles according to any one of clauses 1 to 10.

Clause 12. A cartridge according to clause 11, wherein the cartridge contains between about 80 and 120 particles.

Clause 13. A non-combustible aerosol provision system comprising a population of particles according to any one of clauses 1 to 10, and an aerosol generator, wherein the aerosol generator is configured to aerosolise one or more components of the aerosol generating material in use.

Clause 14. A non-combustible aerosol provision system according to clause 13, wherein the aerosol generator comprises a heater, wherein the heater is configured to heat the particles to a maximum temperature of less than about 250°C in use.

Clause 15. A method of manufacturing a population of particles as claimed in any one of clauses 1 to 10, comprising:

combining (i) a binder, (ii) an absorbent comprising silica or a silicate, and (iii) an aerosol-generating material to form a slurry;
extruding the slurry to form an extrudate; and
spheronising the extrudate to form the population of particles.

Claims

1. A population of particles for use in a non-combustible aerosol provision system, wherein each particle comprises (i) a binder, (ii) an absorbent comprising one or more components selected from: silica, silicates, diatomaceous earth and zeolites, and (iii) an aerosol-generating material, wherein the median particle size, D50, is between 1 mm and 2 mm.

2. A population of particles according to claim 1, wherein the aerosol generating material comprises an aerosol-former material.

3. A population of particles according to claim 1 or claim 2, wherein the aerosol generating material comprises an active substance and/or a flavour.

4. A population of particles according to any one of claims 1 to 3, wherein the binder comprises a cellulose or cellulose derivative, suitably microcrystalline cellulose.

5. A population of particles according to any one of claims 1 to 4, wherein the absorbent comprises silica.

6. A population of particles according to any one of

claims 1 to 5, wherein the weight ratio of absorbent to binder is between 1:1 to 2:1.

7. A population of particles according to any one of claims 1 to 6, wherein the aerosol-generating material is present in an amount of between 50 wt% and 90 wt%, of the total weight of the particles. 5

9. A population of particles according to any one of claims 1 to 8, wherein the population of particles has a Hausner ratio value of less than 1.25. 10

10. A cartridge for use in a non-combustible aerosol provision system, wherein the cartridge contains a population of particles according to any one of claims 1 to 9. 15

11. A cartridge according to claim 10, wherein the cartridge contains between 80 and 120 particles. 20

12. A non-combustible aerosol provision system comprising a population of particles according to any one of claims 1 to 9, and an aerosol generator, wherein the aerosol generator is configured to aerosolise one or more components of the aerosol generating material in use. 25

13. A non-combustible aerosol provision system according to claim 12, wherein the aerosol generator comprises a heater, wherein the heater is configured to heat the particles to a maximum temperature of less than 250°C in use. 30

14. A method of manufacturing a population of particles as claimed in any one of claims 1 to 9, comprising: 35

combining (i) a binder, (ii) an absorbent comprising one or more components selected from: silica, silicates, diatomaceous earth and zeolites, and (iii) an aerosol-generating material to form a slurry; 40
extruding the slurry to form an extrudate; and
spheronising the extrudate to form the population of particles having a median particle size, D50, of between 1 mm and 2 mm. 45

50

55



Figure 1