A container for separately containing pre-vapor formulation ingredients prior to filling a reservoir of an electronic wiping device includes a container body having a first opening, a first compartment in the container body, a second compartment in the container body, a first seal between the first compartment and the second compartment, and a lid configured to cover the opening. The first compartment contains at least a first ingredient. The second compartment contains at least a second ingredient. The first seal is a frangible seal and is substantially impermeable. The lid is connected to the first seal.
REFILL CONTAINER FOR REFILLABLE ELECTRONIC VAPOURING DEVICES

BACKGROUND

[0001] Field

[0002] The present disclosure relates to a refillable electronic vaping or e-vaping device.

[0003] Description of Related Art

[0004] Some electronic vaping devices include reservoirs that may be refilled with pre-vapor formulations. The pre-vapor formulations may be contained in bottles.

SUMMARY

[0005] At least one example embodiment relates to a container for separately containing pre-vapor formulation ingredients prior to filling a reservoir of an electronic vaping device.

[0006] In at least one example embodiment, a container for separately containing pre-vapor formulation ingredients prior to filling a reservoir of an electronic vaping device includes a container body having a first opening, a first compartment in the container body, a second compartment in the container body, a first seal between the first compartment and the second compartment, and a lid configured to cover the opening. The first compartment contains at least a first ingredient. The second compartment contains at least a second ingredient. The first seal is a frangible seal and is substantially impermeable. The lid is connected to the first seal.

[0007] In at least one example embodiment, the first seal is formed of at least one of a plastic or a metal foil coated with an inert substance. In at least one example embodiment, the container and the first seal are formed of the same material. The first seal is about 50 microns to about 1000 microns thick.

[0008] In at least one example embodiment, the container may also include a third compartment in the container body. The third compartment contains at least a third ingredient. A second seal separates the third compartment from at least one of the first compartment and the second compartment. The second seal is frangible and substantially impermeable.

[0009] In at least one example embodiment, the second seal is formed of the same material as the first seal. The second seal may be connected to the first seal. The second seal may be coated with an inert substance.

[0010] In at least one example embodiment, at least one of the container body, the lid, and the first seal is coated with an inert substance.

[0011] In at least one example embodiment, the lid is a screw-top lid.

[0012] In at least one example embodiment, the first compartment contains at least one of an aerosol former, nicotine and a first flavorant and the second compartment contains at least one of an aerosol former, an acid, a second flavorant, and water. The first flavorant may be the same or different than the second flavorant.

[0013] In at least one example embodiment, the first seal extends substantially horizontally between the first compartment and the second compartment.

[0014] In at least one example embodiment, a seal connector is attached to the first seal and attached to the lid, such that when the lid is removed from the container, the seal connector pulls the first seal to break the first seal.

[0015] In at least one example embodiment, the first seal extends substantially vertically between the first compartment and the second compartment.

[0016] At least one example embodiment relates to a container for separately containing pre-vapor formulation ingredients prior to filling a reservoir of an electronic vaping device.

[0017] In at least one example embodiment, the container includes a container body having an opening therein, a first compartment in the container body, a lid covering the opening, and a dropper extending from the lid into the first compartment. The first compartment contains at least a first ingredient. The dropper contains at least a second ingredient. The dropper including a dropper opening. The dropper opening is covered with a covering. The covering is removable and substantially impermeable.

[0018] In at least one example embodiment, the dropper includes measurement markings on a side thereof. The measurement markings include indicia indicating amounts of the second ingredient.

[0019] In at least one example embodiment, the covering is formed of at least one of a plastic or a metal foil coated with an inert substance.

[0020] In at least one example embodiment, the container may also include a second compartment in the container body. The second compartment contains at least a third ingredient. The container may also include a first seal between the first compartment and the second compartment. The first seal is frangible and substantially impermeable. The first seal is connected to at least one of the lid and the dropper, such that the first seal is broken when the lid is removed from the container.

[0021] At least one example embodiment relates to a method of increasing a shelf-life of a pre-vapor formulation.

[0022] In at least one example embodiment, a method of increasing shelf-life of a pre-vapor formulation includes storing at least a first ingredient in a first compartment of a container, and storing at least a second ingredient in a second compartment of the container. The first compartment is separated from the second compartment by a first seal. The first seal is frangible and substantially impermeable. The first seal is attached to a container lid. The first seal is configured to be removed upon opening of the container.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The various features and advantages of the non-limiting embodiments herein may become more apparent upon review of the detailed description in conjunction with the accompanying drawings. The accompanying drawings are merely provided for illustrative purposes and should not be interpreted to limit the scope of the claims. The accompanying drawings are not to be considered as drawn to scale unless explicitly noted. For purposes of clarity, various dimensions of the drawings may have been exaggerated.

[0024] FIG. 1 is a side, cross-sectional view of a refill vial including a first compartment and a second compartment according to at least one example embodiment.

[0025] FIG. 2 is a side, cross-sectional view of a refill vial including a first compartment, a second compartment, and a third compartment according to at least one example embodiment.

[0026] FIG. 3 is a side, cross-sectional view of a refill vial including a substantially horizontally extending seal separ-
rating a first compartment and a second compartment according to at least one example embodiment.

[0027] FIG. 4 is a side, cross-sectional view of a refill vial including a first compartment and a dropper according to at least one example embodiment.

[0028] FIG. 5 is a side, cross-sectional view of a refill vial including a first compartment, a second compartment, and a dropper according to at least one example embodiment.

[0029] FIG. 6 is an illustration of a seal between a first compartment and a second compartment being broken according to at least one example embodiment.

[0030] FIG. 7 is a side, cross-sectional view of a refill vial including a first compartment and a second compartment according to at least one example embodiment.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

[0031] Some detailed example embodiments are disclosed herein. However, specific structural and functional details disclosed herein are merely representative for purposes of describing example embodiments. Example embodiments may, however, be embodied in many alternate forms and should not be construed as limited to only the example embodiments set forth herein.

[0032] Accordingly, while example embodiments are capable of various modifications and alternative forms, example embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that there is no intent to limit example embodiments to the particular forms disclosed, but to the contrary, example embodiments are to cover all modifications, equivalents, and alternatives falling within the scope of example embodiments. Like numbers refer to like elements throughout the description of the figures.

[0033] It should be understood that when an element or layer is referred to as being “on,” “connected to,” “coupled to,” or “covering” another element or layer, it may be directly on, connected to, coupled to, or covering the other element or layer or intervening elements or layers may be present. In contrast, when an element is referred to as being “directly on,” “directly connected to,” or “directly coupled to” another element or layer, there are no intervening elements or layers present. Like numbers refer to like elements throughout the specification. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

[0034] It should be understood that, although the terms first, second, third, etc. may be used herein to describe various elements, components, regions, layers and sections, these elements, components, regions, layers, and sections should not be limited by these terms. These terms are only used to distinguish one element, component, region, layer, or section from another region, layer, or section. Thus, a first element, component, region, layer, or section discussed below could be termed a second element, component, region, layer, or section without departing from the teachings of example embodiments.

[0035] Spatially relative terms (e.g. “beneath,” “below,” “lower,” “above,” “upper,” and the like) may be used herein for ease of description to describe one element or feature’s relationship to another element(s) or feature(s) as illustrated in the figures. It should be understood that the spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as “below” or “beneath” other elements or features would then be oriented “above” the other elements or features. Thus, the term “below” may encompass both an orientation of above and below. The device may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors herein interpreted accordingly.

[0036] The terminology used herein is for the purpose of describing various example embodiments only and is not intended to be limiting of example embodiments. As used herein, the singular forms “a,” “an,” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “includes,” “including,” “comprises,” and/or “comprising,” when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0037] Example embodiments are described herein with reference to cross-sectional illustrations that are schematic illustrations of idealized embodiments (and intermediate structures) of example embodiments. As such, variations from the shapes of the illustrations should not be expected. Thus, example embodiments should not be construed as limited to the shapes of regions illustrated herein but are to include deviations in shapes that result, for example, from manufacturing.

[0038] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which example embodiments belong. It will be further understood that terms, including those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0039] At least one example embodiment relates to a container for separately containing pre-vapor formulation ingredients prior to filling a reservoir of an electronic vaping device.

[0040] FIG. 1 is a side, cross-sectional view of a refill vial including a first compartment and a second compartment according to an example embodiment.

[0041] In at least one example embodiment, as shown in FIG. 1, a container 10 for separately containing pre-vapor formulation ingredients includes a body 15. The body 15 has an opening 25 therein. The body may also include a first compartment 35 and a second compartment 40 therein. A first seal 30 is positioned between the first compartment 35 and the second compartment 40. The container 10 also includes a lid 20 configured to cover and/or seal the opening 25 of the container 10.

[0042] In at least one example embodiment, the first compartment 35 may be the same size and/or volume as the second compartment 40. In at least one example embodiment, at least one of the first compartment 35 and the second compartment 40 has a volume ranging from about 1 milliliter (mL) to about 200 mL. In at least one example embodiment, the first compartment 35 has a larger or smaller size and/or volume than the second compartment 40.
[0043] In at least one example embodiment, the first compartment 35 and the second compartment 40 each contains some ingredients of a pre-vapor formulation.

[0044] The pre-vapor formulation is a material or combination of materials that may be transformed into a vapor. For example, the pre-vapor formulation and/or the pre-vapor formulation ingredients may be in the form of a liquid, a solid and/or a gel. The pre-vapor formulation ingredients include, but are not limited to, water, beads, solvents, active ingredients, ethanol, plant extracts, natural or artificial flavors, nicotine, vapor formers such as glycerin and propylene glycol, water, and/or acids.

[0045] In at least one example embodiment, the first compartment 35 may contain different pre-vapor formulation ingredients from the second compartment 40. Thus, nicotine may be contained in the first compartment 35 and the vapor formers may be contained in the second compartment 40 to prevent and/or minimize chemical reactions prior to refilling a reservoir of an electronic vaping device. In addition, maintaining ingredients in separate compartments may increase shelf-life by at least about 1 week (e.g., at least 2 weeks, at least one month, at least three months, at least six months, at least nine months, or at least one year).

[0046] For example, in at least one example embodiment, flavors may be contained in the first compartment 35 and vapor formers may be contained in the second compartment 40. Some flavors may be unstable in vapor formers, such as propylene glycol. Thus, separately storing these ingredients increases stability and/or shelf-life.

[0047] For example, in at least one example embodiment, acids may be contained in the first compartment 35 and vapor formers may be contained in the second compartment 40 to avoid and/or minimize reactions between the flavors and vapor formers.

[0048] In another example embodiment, the first compartment 35 may contain ingredients in powder form, while the second compartment 40 contains ingredients in liquid and/or gel form.

[0049] In at least one example embodiment, the first seal 30 is a frangible seal 30 that may be broken to expose ingredients in the first compartment 35 to ingredients in the second compartment 40. The first seal 30 is substantially impermeable, such that the ingredients contained in the first compartment 35 and/or the second compartment 40 cannot pass through the first seal 30.

[0050] In at least one example embodiment, as shown in FIG. 1, the lid 20 is connected to the first seal 30, such that when the lid 20 is removed, the first seal 30 is broken and the ingredients in the first compartment 35 are mixed with ingredients in the second compartment 40.

[0051] In at least one example embodiment, the lid 20 is a screw-top lid. In some example embodiments, the lid 20 may be a child-resistant lid. In other example embodiments, the lid 20 may have a snap-fit (or other type) connection about the opening 25 of the container 10.

[0052] In at least one example embodiment, the first seal 30 is formed of at least one of a plastic and a metal foil coated with an inert substance. In at least one example embodiment, the container 10 and the first seal 30 are formed of the same material. In other example embodiments, the container 10 and the first seal 30 are formed of different materials. The first seal 30 is about 50 microns thick. In at least one example embodiment, the first seal 30 is thick enough to withstand pressure applied during shipment and storage, but thin enough to easily break when the lid 20 is removed from the container 10 or action is taken to break the seal as described in FIG. 6 described below. In at least one example embodiment, the structure in FIG. 1 may be made out of an insert plastic material, such as polyethylene terephthalate or polystyrene using extrusion molding, blow molding, or thermoforming techniques. The individual compartments may be made in a single process step or the compartments may be formed in separate steps and brought together to create the structure of FIG. 1.

[0053] In at least one example embodiment, the body 15, the lid 20, and/or the seal 30 may be coated with an inert substance so as to prevent and/or minimize reactions between the ingredients of the pre-vapor formulation with the materials that form the body 15, the lid 20, and/or the seal 30. The inert substance may be a plastic coating. For example, the seal 30 may be formed of a metal foil coated with a plastic or another inert substance.

[0054] In at least one example embodiment, as shown in FIG. 1, the seal 30 is positioned substantially vertically between the first compartment 35 and the second compartment 40.

[0055] FIG. 2 is a side, cross-sectional view of a refill vial including a first compartment, a second compartment, and a third compartment according to an example embodiment.

[0056] In at least one example embodiment, as shown in FIG. 2, the container 10 is substantially the same as the container of FIG. 1, but the container 10 also includes a third compartment 45 in the container body 15. The third compartment 45 contains at least a third ingredient, which may be the same or different than ingredients contained in the first compartment 35 and the second compartment 40.

[0057] In at least one example embodiment, a second seal 43 separates the third compartment 45 from at least one of the first compartment 35 and the second compartment 40. The second seal 43 is frangible and substantially impermeable, and may be formed of the same or a different material than the first seal 30. The second seal 43 may also include an inert coating thereon.

[0058] In at least one example embodiment, the second seal 43 is positioned substantially vertically within the body 15 of the container 10. In other example embodiments, the second seal 43 may be horizontally positioned while the first seal 30 is vertically positioned (not shown).

[0059] In at least one example embodiment, the second seal 43 is connected to one or more of the lid 20 and the first seal 30.

[0060] FIG. 3 is a side, cross-sectional view of a refill vial including a substantially horizontally extending seal separating a first compartment and a second compartment according to an example embodiment.

[0061] In at least one example embodiment, as shown in FIG. 3, the container 10 is substantially the same as the container of FIG. 1, but the first seal 30 extends substantially horizontally between the first compartment 35 and the second compartment 40. In addition, a seal connector 50 may extend between the lid 20 and the first seal 30 so as to connect the lid 20 to the first seal 30. Thus, when the lid 20 is removed, the seal connector 50 pulls the first seal 30 so as to break the first seal 30.
At least one example embodiment relates to a container for separately containing pre-vapor formulation ingredients prior to filling a reservoir of an electronic vaping device.

FIG. 4 is a side, cross-sectional view of a refill vial including a first compartment and a dropper according to an example embodiment.

In at least one example embodiment, as shown in FIG. 4, a container 10 includes a container body 15 having an opening 25 therein, a first compartment 35 in the container body 15, a lid 20 covering the opening 25, and a dropper 55 extending from the lid 20 into the first compartment 35. The first compartment 35 contains at least a first ingredient. The dropper 55 contains at least a second ingredient. The dropper 55 including a dropper opening 70. The dropper opening 70 is covered with a covering 60. The covering 60 is removable and substantially impermeable.

In at least one example embodiment, the dropper 55 includes measurement markings 65 on a side thereof. The measurement markings 65 include indicia indicating amounts of the second ingredient contained in the dropper 55. The measurement markings 65 may indicate amounts in mL or in other measurements. Once the dropper 55 is removed, a desired amount of the ingredient contained in the dropper 55 can be ejected from the dropper 55 into the ingredients contained in the first compartment 35. Thus, the pre-vapor formulation may be tailored to contain a desired amount of nicotine, acids, and/or flavors.

In at least one example embodiment, the covering 60 is formed of at least one of a plastic and a metal foil coated with an inert substance. The covering 60 may extend over the dropper opening 70 and along sides of the dropper 55. The covering 60 may include a tear strip or other gripping portion (not shown), which can be grasped to remove the covering 60.

FIG. 5 is a side, cross-sectional view of a refill vial including a first compartment, a second compartment, and a dropper according to an example embodiment.

In at least one example embodiment, as shown in FIG. 5, the container 10 is generally the same as in FIG. 4, except that the container 10 includes a second compartment 40. The second compartment 40 contains at least a third ingredient. The container 10 may also include a first seal 30 between the first compartment 35 and the second compartment 40. The first seal 30 is removable and substantially impermeable. The first seal 30 may be connected to at least one of the lid 20 and the dropper 55, such that the first seal 30 is broken when the lid 20 and/or the dropper 55 is removed from the container 10. Thus, ingredients separately contained in the first compartment 35, second compartment 40, and/or the dropper 55 may be mixed upon opening of the container.

FIG. 6 is an illustration of a seal between a first compartment and a second compartment being broken according to at least one example embodiment.

In at least one example embodiment, as shown in FIG. 6, the seal may extend vertically through the container to form the first compartment 35 and the second compartment 40. The perforated lines indicate weak points in the seal that may be formed by altering the thickness of the seal at selected points for ease of breaking the seal.

In at least one example embodiment, if a lid is rotated as shown, the seal would break and contents of the first compartment 35 and the second compartment 40 may mix. The lid could be reapplied once the seal is broken so that the container could be shaken to induce further mixing.

FIG. 7 is a side, cross-sectional view of a refill vial including a first compartment and a second compartment according to at least one example embodiment.

In at least one example embodiment, as shown in FIG. 7, the seal 30 may form a bottom of the first compartment 35 and separate the first compartment 35 from the second compartment 40. In this example embodiment, the second compartment 40 may be filled first, then the seal 30 may be inserted over the second compartment 40, and the first compartment may then be filled. A seal connector 50 may be connected to the seal 30 to enable breaking of the seal 30 once the container is opened.

At least one example embodiment relates to a method of increasing a shelf-life of a pre-vapor formulation.

In at least one example embodiment, a method of increasing shelf-life of a pre-vapor formulation includes storing at least a first ingredient in a first compartment of a container, and storing at least a second ingredient in a second compartment of the container. The first compartment is separated from the second compartment by a first seal. The first seal is fragile and substantially impermeable. The first seal is attached to a container lid. The first seal is configured to be removed upon opening of the container.

In at least one example embodiment, the method includes increasing shelf-life of the pre-vapor formulation and/or ingredients thereof by at least about 1 week (e.g., at least about 2 weeks, at least about 3 weeks, at least about 4 weeks, at least about 2 months, at least about 3 months, at least about 6 months, at least about 9 months, or at least about 1 year).

In at least one example embodiment, the method also includes mixing a desired amount of the first ingredient with the second ingredient.

While a number of example embodiments have been disclosed herein, it should be understood that other variations may be possible. Such variations are not to be regarded as a departure from the spirit and scope of the present disclosure, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

We claim:

1. A container for separately containing pre-vapor formulation ingredients prior to filling a reservoir of an electronic vaping device, the container comprising:
   a container body having a first opening;
   a first compartment in the container body, the first compartment containing at least a first ingredient;
   a second compartment in the container body, the second compartment containing at least a second ingredient;
   a first seal between the first compartment and the second compartment, the first seal being substantially impermeable; and
   a lid configured to cover the opening, the lid connected to the first seal, such that removal of the lid breaks the first seal.

2. The container of claim 1, wherein the first seal is formed of at least one of a plastic and a metal foil coated with an inert substance.

3. The container of claim 2, wherein the container and the first seal are formed of the same material.

4. The container of claim 2, wherein the first seal is about 50 microns to about 1000 microns thick.
5. The container of claim 1, further comprising:
a third compartment in the container body, the third compartment containing at least a third ingredient; and a second seal separating the third compartment from at least one of the first compartment and the second compartment, the second seal being substantially impermeable.

6. The container of claim 5, wherein the second seal is formed of the same material as the first seal and removal of the lid breaks the second seal.

7. The container of claim 5, wherein the second seal is connected to the first seal.

8. The container of claim 6, wherein the second seal is coated with an inert substance.

9. The container of claim 1, wherein at least one of the container body, the lid, and the first seal is coated with an inert substance.

10. The container of claim 1, wherein the lid is a screw-top lid.

11. The container of claim 1, wherein the first compartment contains at least one of nicotine and a flavorant and the second compartment contains at least one of an aerosol former, an acid, and water.

12. The container of claim 1, wherein the first seal extends substantially horizontally between the first compartment and the second compartment.

13. The container of claim 12, further comprising:
a seal connector is attached to the first seal and attached to the lid, such that when the lid is removed from the container, the seal connector pulls the first seal to break the first seal.

14. The container of claim 1, wherein the first seal extends substantially vertically between the first compartment and the second compartment.

15. A container for separately containing pre-vapor formulation ingredients prior to filling a reservoir of an electronic wiping device, the container comprising:
a container body having an opening therein;
a first compartment in the container body, the first compartment containing at least a first ingredient;
a lid covering the opening; and
dropper extending from the lid into the first compartment, the dropper containing at least a second ingredient, the dropper including a dropper opening, the dropper opening covered with a covering, the covering being removable and substantially impermeable.

16. The container of claim 15, wherein the dropper includes measurement markings on a side thereof, the measurement markings including indicia indicating amounts of the second ingredient.

17. The container of claim 15, wherein the covering is formed of at least one of a plastic and a metal foil coated with an inert substance.

18. The container of claim 15, further comprising:
a second compartment in the container body, the second compartment containing at least a third ingredient; and
a first seal between the first compartment and the second compartment, the first seal being impermeable, and the first seal being connected to at least one of the lid and the dropper, such that if the first seal is broken when the lid is removed from the container.

19. A method of increasing shelf-life of a pre-vapor formulation, the method comprising:

storing at least a first ingredient in a first compartment of a container; and

storing at least a second ingredient in a second compartment of the container, the first compartment separated from the second compartment by a first seal, the first seal being substantially impermeable, the first seal attached to a container lid, and the first seal configured to be removed upon opening of the container.