

According to a first example, the vial adaptor may also comprise an expandable housing casing the chamber. The housing provides a protection to the chamber. The expandability of the housing provides space optimization capability to the vial adaptor.

In examples of the first example, the vial adaptor may present any one or any
5 combination of the following features:

- the chamber is configured for imparting expansion to the housing;
- the housing has a contracted state and an expanded state, the housing being less voluminous in the contracted state than in the expanded state, the housing casing the chamber both in the contracted state and in the expanded state;
- 10 – the housing is further contractible;
- the chamber comprises at least a flexible and/or elastic portion, the flexible and/or elastic portion optionally comprising at least one sheet;
- the flexible and/or elastic portion comprises two sheets welded together;
- the two sheets each have an annulus shape;
- 15 – the two sheets are welded together at respective external edges;
- the housing comprises at least two portions configured for sliding one with respect to the other when the housing expands;
- the housing is telescopic;
- the vial connection port defines a vial connection axis, the housing and/or the chamber surrounding the vial connection axis;
- 20 – the housing and/or the chamber surrounds at least a section of the body portion;
- wherein the vial connection port defines a vial connection axis, the section of the body portion that the housing and/or the chamber surrounds extending along the vial connection axis;
- 25 – the housing defines a toroid inside space and/or the chamber defines a toroid inside space;
- the vial adaptor is configured for the housing to expand and/or contract uniformly around the vial connection axis, and/or for the chamber to expand and/or contract uniformly around the vial connection axis;
- 30 – the vial connection port defines a vial connection axis, the vial adaptor being configured for the housing to expand and/or contract along a direction at least

- the vial adaptor further comprises a filter arranged between the regulation passageway and the chamber;
- the vial adaptor comprises a duct member arranged between the chamber and an extremity of the regulation passageway, the diameter of at least a portion of the duct member being smaller than the diameter of the extremity of the regulation passageway;
- the duct member is arranged between the extremity of the regulation passageway and the regulation port;
- the diameter of at least a portion of the duct member is smaller than the diameter of the regulation port;
- the duct member is integrally formed with the sealing member; and/or
- the vial adaptor further comprises a regulation compartment between the regulation passageway and the chamber.

According to a second example, the chamber may comprise at least a flexible and/or elastic portion which comprises two sheets welded together. This provides a chamber relatively easy to manufacture.

According to a third example, the vial connection port may define a vial connection axis and the chamber may surround the vial connection axis. The vial adaptor may be further configured, when connected to a vial, for the chamber to expand in an orientation toward the vial. This provides a vial adaptor stable during use, notably during expansion of the chamber.

In one aspect, the present disclosure refers to a vial adaptor (10a-e, 110a-i, 1010) comprising:

- a body portion (20, 20d-h, 120, 1020) including:
 - a vial connection port (22, 22f-g, 1022),
 - a syringe connection port (24, 1024),
 - an access passageway (26, 1026) between the vial connection port and the syringe connection port, and
 - a regulation passageway (28, 1028);
 - an expandable and/or contractible chamber (40, 40a, 1040) impermeable to gas and/or liquid, the regulation passageway being between the vial connection port and the chamber; and
- an expandable housing (50, 50d-g, 150a-i, 1050) casing the chamber.

According to a fourth example, the vial adaptor may comprise a coupling portion which includes a regulation port. The vial adaptor may comprise a fluid path between the regulation port and an extremity of the regulation passageway. The vial adaptor may further comprise another fluid path between the regulation port and the chamber. This provides a vial adaptor relatively easy to manufacture and safe to use.

According to a fifth example, the vial adaptor may be provided in a sealed package and with a positive volume of (e.g. cleaned and/or sterilized) gas contained in the chamber. This provides a vial adaptor ready for use with a vial having content in fluid form, for example as a liquid.

In examples of these additional examples, the vial adaptor may comprise no housing casing the chamber. In alternative examples, the vial adaptor may comprise a housing casing the chamber. The housing may be non-expandable. The volume of the housing may be fixed

and/or sufficient to authorize expansion of the chamber during use of the vial adaptor. Alternatively, the housing may be expandable, thus of variable volume. When the housing is expandable, the housing may optionally further present any related feature or combination of features of any example of the first example. In all cases, the vial adaptor may optionally present any other feature or combination of features of any example of the first example.

According to a sixth example, the vial adaptor may comprise a shield of variable size which protects the chamber but does not case the chamber, for example a partial skirt. The shield may in examples be made of rigid and/or semi-rigid material. This provides a protection to the chamber. The variability of the size of the shield provides space optimization capability to the vial adaptor. The vial adaptor may optionally present any other feature or combination of features of any example of the other examples.

It is further provided a kit comprising the vial adaptor according to any one of the examples. The kit may further comprise a syringe adaptor and /or a syringe. The syringe adaptor may be configured to cooperate with the vial adaptor. The syringe adaptor may for example be configured to be connected to the vial adaptor. The syringe may enable fluid mixing.

It is further provided a method of using the vial adaptor according to any one of the examples. The method comprises providing at least the vial adaptor, a vial with content in fluid form or in solid form and a syringe. The method also comprises connecting the vial adaptor to the vial and to the syringe, and then reconstituting and/or extracting a solution in the vial.

It is further provided a method of manufacturing the vial adaptor according to any one of the examples. The method comprises providing at least the body portion and the chamber, and assembling the body portion to the chamber such that the regulation passageway is configured for establishing fluid communication between the vial connection port and the chamber. The method may then comprise assembling a housing if any.

BRIEF DESCRIPTION OF THE DRAWINGS

Non-limiting examples will now be described in reference to the accompanying drawings, where:

- FIG. 1 illustrates schematically an example of an assembly comprising the vial adaptor;
- FIGs. 2-17 illustrate an example of the vial adaptor and components thereof;
- FIGs. 18-19 illustrate cooperation of an example of the vial adaptor with an example of the syringe adaptor;

- FIGs. 20-27 illustrate examples of operations of the vial adaptor;
- FIGs. 28-38 illustrate examples of manufacturing steps; and
- FIGs. 39-67 illustrate other examples of the vial adaptor.

DETAILED DESCRIPTION

5 The following discusses examples of the vial adaptor according to the first example. The vial adaptor according to any other example may optionally also present any feature or combination of features of any of these discussed examples.

FIG. 1 illustrates schematically an assembly 1000 comprising vial adaptor 1010.

10 The vial adaptor 1010 comprises a body portion 1020. The body portion 1020 includes a vial connection port 1022, a syringe connection port 1024, an access passageway 1026, and a regulation passageway 1028. The access passageway 1026 is between the vial connection port 1022 and the syringe connection port 1024. This means that the access passageway 1026 is configured for establishing or enabling fluid communication between the vial connection port 1022 and the syringe connection port 1024, or in other words for
15 providing a fluid path between the vial connection port 1022 and the syringe connection port 1024. The access passageway 1026 may form the fluid path, or a conduct in which a component forming the fluid path may be inserted (such as a hollow needle of a syringe adaptor 1080). The vial adaptor 1010 also comprises an expandable and/or contractible chamber 1040 which is impermeable to gas and/or liquid. The regulation passageway 1028 is
20 between the vial connection port 1022 and the chamber 1040. This means that the regulation passageway 1028 is configured for establishing or enabling fluid communication between the vial connection port 1022 and the chamber 1040, or in other words for providing a fluid path between the vial connection port 1022 and the chamber 1040. The vial adaptor 1010 also comprises an expandable housing 1050 which cases the chamber 1040.
25 This provides an improved vial adaptor.

Notably, the vial connection port 1022 allows connection of the vial adaptor 1010 to a vial 1070, and the syringe connection port 1024 allows connection of a syringe 1090 to the vial adaptor 1010. The access passageway 1026 allows fluid communication between the syringe 1090 and the vial 1070. The vial adaptor 1010 thereby forms an intermediate
30 component between the syringe 1090 and the vial 1070 which allows avoiding direct access to the vial 1070 with a manually-handled syringe having a protuberant needle. The vial

sliding is not parallel to the vial connection axis. Vial adaptor 110c keeps the assembly relatively compact, as it achieves expansion in a direction D oriented toward vial 70.

FIGs. 58-59 show a vial adaptor 110e comprising two telescopic section 154e each of a respective mobile portion 152e and configured to slide each inside a telescopic section 158e of a respective fixed unit 156e. Like vial adaptor 110c-d, the housing 150e consists of two housing units and the housing 150e presents only an axial symmetry relative to the vial connection axis, but the sliding is translational. Unlike vial adaptor 10a, the translational sliding is not parallel to the vial connection axis nor with expansion oriented toward vial 70.

FIGs. 60-61 show a vial adaptor 110f comprising a telescopic section 154f of a bowl 152f and configured to slide with respect to a telescopic section 158f of a cover 156f. Like vial adaptor 10a, the housing 150f consists of a single unit and the sliding is translational, parallel to the vial connection axis and with expansion oriented toward vial 70. But unlike vial adaptor 10a, the housing 150f does not surround nor present any symmetry relative to the vial connection axis.

FIGs. 62-67 show yet other telescopic vial adaptors 110g-i comprising telescopic sections 154g-i and 158g-i of sliding portions 152g-i and 156g-i. Unlike vial adaptor 10a, the housing does not surround nor present any symmetry relative to the vial connection axis, nor is the sliding parallel to the vial connection axis or with expansion oriented toward vial 70.

The first example of the vial adaptor has been described. It will however be appreciated that the above discussion applies to other examples of the vial adaptor as well. In particular, all discussed examples may be adapted to work without a housing enveloping the chamber, or with a housing of fixed volume and enveloping the chamber (the volume of the housing being in such a case sufficient for the chamber to achieve any contemplated volume variation). Furthermore, any sub-assembly described above may be contemplated.