interval of 0.5 seconds, the standard system should be able to detect and measure the plume in approximately 0.5 seconds.

[0008] There are several other parameters that can affect the measurement of the particle size distribution of a plume in a chamber. For example, variations in environmental effects inside the chamber, such as turbulence, certain sized powder particles will spend increased amount of time in the measurement zone. This behavior would cause the particles to be measured multiple times (at least more than once), thus increasing their relative presence within the overall particle size distribution which leads to erroneous representation of actual data.

[0009] Additionally, particle size distribution measurements made using prior art systems and relatively small inhalation devices are inconvenient to use and yield erroneous or irreproducible results due to the variations in conditions provided by the chamber, for example, powder deposition in internal surfaces, including the lenses of the adaptor which can result in additional diffractions. Additionally, the adaptor and lenses must be cleaned repeatedly after each use, due to the increased turbulence generated inside the device as described above, all of which can lead to inconsistent measurements of the powder plume.

[0010] Therefore, the inventors have seen the need to design and manufacture a simple device for adapting to any laser diffraction apparatus, and a method for measuring particle distribution to ascertain the powder characteristics emitted by an inhaler in use for determining the quality of the powder and effectiveness of the inhaler in dosing a patient.

SUMMARY

[0011] Disclosed herein is a device configured to be adapted to a laser diffraction apparatus and/or system and for use with inhalation devices. A method for measuring particle size distribution of a powder plume emitted by an inhalation system and/or device during testing with a powder formulation is also disclosed.

[0011a] According to a first aspect of the present invention, there is provided a device configured to adapt to a laser diffraction apparatus, comprising: a chamber configured to enclose a breath-powered, dry powder inhaler having a mouthpiece and a body, and wherein said chamber comprises a distal end and proximal end defining a void, an inlet port and an outlet port; one or more end caps configured to adapt to said inlet port and/or said outlet port, said inlet port configured to receive a source of positive pressure; and inhaler mounting means, wherein a breath powered, dry powder inhaler installed in said inhaler mounting means has its body enclosed within said chamber and forms an air pathway between the chamber void and a chamberless and/or ambient environment.

[0011b] According to a second aspect of the present invention, there is provided a device configured to adapt to a laser diffraction apparatus, comprising: a chamber configured to enclose a breath-powered, dry powder inhaler; said chamber having a distal end and proximal end, and a first end cap configured to adapt to said distal end and a second end cap configured to adapt to said proximal end; said first end cap having an opening configured to receive a tubing which is connected to a flow controller and a source of positive pressure; said proximal end configured to have a mouthpiece mounting means configured to hold said breath-powered, dry powder inhaler.

[0011c] According to a third aspect of the present invention, there is provided a method of measuring at least one particle characteristic with a laser diffraction apparatus, comprising: providing a device comprising a chamber and configured to hold a breath-powered, dry powder inhaler in a closed environment; said breath-powered inhaler having a body and comprising a dry powder formulation; installing said breath-powered inhaler into said chamber so that the body of said dry powder inhaler is enclosed within said chamber; providing positive pressure into said chamber of said device to create a flow of air or gas through said dry powder inhaler to discharge particles of said dry powder formulation, and measuring said at least one particle characteristic with the laser diffraction apparatus, wherein the particles are emitted from the inhaler into a chamberless and/or ambient environment.

[0012] In embodiments described herein, the device comprises an adaptor configured in any shape or size depending on the inhaler to be used or to be tested. In one embodiment, the adaptor or device comprises a tubular or cylindrical structure having a chamber and opposing ends, including a proximal end and a distal end; the distal end being configured to be closed and having an opening to connect a tubing