CLAIMS

1. An aerosol-free vessel, comprising:

   flow conduit having a start point, an end point, and directional turns between the start point and the end point; and

   a fluid containing aerosols flowing from the start point;

   wherein

   the directional turns maximize residence time of the aerosols in the aerosol-free vessel for phase change to vapor;

   the flow conduit is gradually elevated from the start point to the end point; and

   wherein cross section area of the flow conduit decreases from the start point to the end point.

2. An aerosol-free vessel comprising:

   flow conduit having a start point, an end point, and directional turns between the start point and the end point;

   a cone-shaped piece to hold the flow conduit so that the flow conduit is gradually elevated from the start point to the end point; and

   a fluid containing aerosols flowing from the start point;

   wherein the directional turns maximize residence time of the aerosols in the aerosol-free vessel for phase change to vapor.

3. The aerosol-free vessel of Claim 1 or 2, wherein the flow conduit has a cross section with a shape selected from the group consisting of at least partial of a circle, at least of an oval, at least partial of a square, at least partial of a rectangle, and combinations thereof.

4. The aerosol-free vessel of Claim 1 or 2, further comprises a cover to cover the flow conduit.

5. The aerosol-free vessel of Claim 1 or 2, wherein the flow conduit is a pipe having a spiral or a serpentine shape.

6. The aerosol-free vessel of Claim 1 or 2, further comprises a top surface, wherein the top surface of the vessel has a shape selected from circle, oval, square, rectangle, serpentine shape, and combinations thereof.

7. The aerosol-free vessel of Claim 1 or 2, wherein the start point of the flow conduit comprises a screen to reduce aerosols entering the aerosol-free vessel.

8. The aerosol-free vessel Claim 1 or 2, further comprises a heater for enhancing phase change to vapor.

9. The aerosol-free vessel of Claim 1 or 2, further comprises mounting holes for mounting the aerosol-free vessel to a lid of a container or at least one of another aerosol-free vessel.

10. A container for delivering a chemical precursor to a process tool, comprising:

a sidewall;

a base;

a lid;

at least one aerosol-free vessel in any one of Claim 1 to Claim 9 mounted on the lid;

an inlet tube passing through the lid; and

an outlet passing through the lid;

wherein the outlet is in fluid communication with the exit of the last aerosol-free vessel.

11. A system for storage and delivery of a chemical precursor to a process tool, comprising:

a container for delivering a chemical precursor to a process tool, comprising:

a sidewall;

a base;

a lid;

at least one aerosol-free vessel in any one of Claim 1 to Claim 9 mounted on the lid;

an inlet tube passing through the lid; and

an outlet passing through the lid;

wherein the outlet is in fluid communication with the exit of the last aerosol-free vessel; and

vapor of a chemical precursor from the outlet of the container.

12. A method for storage and delivery of a chemical precursor to a process tool, comprising:

providing the system in Claim 11, and

deliver the vapor of the chemical precursor from the outlet of the container to the process tool.