WHAT IS CLAIMED IS:

1. A substrate processing apparatus comprising:

a process chamber wherein a substrate is processed;

a reaction tube comprising: a buffer unit provided with a plurality of gas supply holes configured to supply a process gas into the process chamber; and a gas exhaust unit configured to exhaust the process gas from the process chamber; and

a substrate retainer comprising a plurality of support members configured to support the substrate,

wherein the plurality of gas supply holes are arranged from a region higher than an upper end portion of a substrate processing region of the substrate retainer to a position facing the gas exhaust unit, and a portion of the plurality of gas supply holes located to face the substrate processing region of the substrate retainer are arranged at an interval therebetween different from an interval between a portion of the plurality of gas supply holes located to face an insulation region of the substrate retainer.

2. The substrate processing apparatus of claim 1, further comprising:

a connecting pipe configured to connect a gas inlet through which the process gas is introduced to the buffer unit,

wherein the connecting pipe is connected to the gas inlet provided at a lower portion of the reaction tube, and extends toward a top of the reaction tube along an outer wall surface of the reaction tube to be connected to the buffer unit at a ceiling portion of the reaction tube.

3. The substrate processing apparatus of claim 2, wherein the connecting pipe is comprised of a plurality of pipes at least until the connecting pipe is connected to the buffer unit.

4. The substrate processing apparatus of claim 1, wherein the plurality of gas supply holes are provided from the upper end portion to a lower end portion of the buffer unit at a predetermined interval therebetween.

5. The substrate processing apparatus of claim 1, wherein the plurality of gas supply holes are provided at an interval therebetween which is the same as an interval between the plurality of support members.

6. The substrate processing apparatus of claim 1, further comprising:

an exhaust system comprising a pressure adjusting device configured to control a pressure by adjusting an opening degree of a valve and an exhaust device configured to exhaust a gas in the pressure adjusting device; and

a control unit configured to control the pressure adjusting device and the exhaust device such that a difference between an inner pressure of the process chamber and a pressure of the exhaust system is maintained.

7. The substrate processing apparatus of claim 6, wherein the exhaust system further comprises a sensor configured to detect an overpressure of the inner pressure of the process chamber, and

the control unit is further configured to exhaust a gas from the process chamber without passing through the pressure adjusting device and the exhaust device when the sensor detects the overpressure of the inner pressure of the process chamber.

8. The substrate processing apparatus of claim 1, further comprising a second buffer

unit connected to the gas exhaust unit and disposed on another side surface of the reaction tube which is opposite to a side surface of the reaction tube where the buffer unit is disposed, wherein

the second buffer unit comprises a plurality of gas exhaust ports disposed at a side of the process chamber to be symmetric to the plurality of gas supply holes of the buffer unit constituting one end of the reaction tube about an axis passing through a center of the substrate.

9. The substrate processing apparatus of claim 8, wherein the plurality of gas exhaust ports are provided at an interval therebetween which is the same as an interval between the plurality of support members.

10. The substrate processing apparatus of claim 8, wherein the plurality of gas exhaust ports provided to face the substrate processing region of the substrate retainer are disposed at an interval different from an interval between the plurality of gas exhaust ports provided to face the insulation region of the substrate retainer disposed below the substrate processing region.

11. The substrate processing apparatus of claim 1, wherein the gas exhaust unit comprises a flow path, wherein a cross-sectional area of an upstream portion of the flow path decreases along a downstream direction, a cross-sectional area of a mid-portion of the flow path is constant, and a cross-sectional area of a downstream portion of the flow path increases along the downstream direction.

12. The substrate processing apparatus of claim 11, wherein a protection pipe is provided to cover an entirety of an inner wall of an exhaust pipe facing the flow path.

13. The substrate processing apparatus of claim 11, wherein the protection pipe is

made of quartz.

14. The substrate processing apparatus of claim 1, wherein the buffer unit comprises an opening at a lower end portion thereof.

15. The substrate processing apparatus of claim 1, wherein the buffer unit is configured as a portion of a side surface of the reaction tube.

16. The substrate processing apparatus of claim 1, wherein the gas exhaust unit is integrally installed with the reaction tube and configured as a portion of the reaction tube.

17. The substrate processing apparatus of claim 2, wherein the reaction tube is integrally formed with at least one selected from the group consisting of the gas inlet, the buffer unit, the connecting pipe and the gas exhaust unit.

18. The substrate processing apparatus of claim 10, wherein the plurality of support members of the substrate retainer is capable of accommodating the substrate, and the insulation region of the substrate retainer is capable of accommodating an insulating member.

19. A method of manufacturing a semiconductor device comprising:

loading a substrate into a reaction tube constituting a process chamber wherein a substrate is processed and comprising a buffer unit provided with a plurality of gas supply holes configured to supply a process gas into the process chamber and a gas exhaust unit provided at a lower end portion of a side surface of the reaction tube and configured to exhaust a gas containing the process gas from the process chamber, wherein the plurality of gas supply holes

are arranged from a region located higher than an upper end portion of a substrate processing region of the substrate retainer where the substrate is held to a position facing the gas exhaust unit, and a portion of the plurality of gas supply holes located to face the substrate processing region are arranged at an interval therebetween different from an interval between a portion of the plurality of gas supply holes located to face an insulation region of the substrate retainer;

processing the substrate by supplying the process gas onto the substrate loaded into the reaction tube; and

transferring the substrate out of the reaction tube.