WHAT IS CLAIMED IS:

1. A high pressure heat treatment apparatus, the apparatus comprising:

an internal chamber formed to accommodate an object to be heat-treated;

an external chamber including a housing defining an inner space, and a partition plate partitioning the inner space into a high-temperature zone accommodating the internal chamber and a low-temperature zone having a lower temperature than the high-temperature zone;

a gas supply module including a process gas line for supplying a process gas for the heat treatment to the internal chamber to reach a first pressure higher than that of the atmosphere and a protective gas line for supplying a protective gas to the external chamber to reach a second pressure set in relation to the first pressure;

a switch module configured to switch a state of the partition plate to a communication state in order that the protective gas in the high-temperature zone can flow to the low temperature zone; and

a purge module configured to purge the protective gas in the high-temperature zone to the low-temperature zone in the communication state.

2. The apparatus of claim 1, wherein the purge module includes

a ring body surrounding the internal chamber, and

a discharge channel positioned in the ring body and formed to discharge an input purge gas toward the internal chamber.

3. The apparatus of claim 2, wherein the discharge channel includes

a loop line extending in a circumferential direction of the ring body, and

a plurality of branch lines connected to the loop line and arranged to face the internal chamber.

4. The apparatus of claim 2, further comprising a heating module disposed in the high-temperature zone and configured to heat the process gas and the protective gas in the high-temperature zone,

wherein the discharge channel is formed to discharge the purge gas into a space between the internal chamber and the heating module.

5. The apparatus of claim 4, wherein the heating module includes

a heater disposed to face the internal chamber, and

a heat insulation block mounted on an inner surface of the external chamber and formed to block heat generated by the heater from being transferred to the outside of the external chamber, and

the discharge channel is formed to discharge the purge gas to flow to the heat insulation block.

6. The apparatus of claim 2, wherein the gas supply module further includes a purge gas line for inputting the purge gas to the discharge channel.

7. The apparatus of claim 1, wherein

the housing further includes a cover part defining the low-temperature zone together with the partition plate, and

at least one of the cover part and the partition plate is formed to accommodate a cooling medium for cooling the protective gas purged into the low-temperature zone.

8. The apparatus of claim 1, wherein the partition plate includes a discharge hole opened to allow the high-temperature zone and the low-temperature zone to communicate with each other, and

the switch module includes

a hole cover positioned to correspond to the discharge hole, and

a driving unit configured to move the hole cover between a closing position for closing the discharge hole and an opening position for opening the discharge hole.

9. The apparatus of claim 1, wherein the external chamber is formed to allow the protective gas to circulate to the high-temperature zone after being cooled in the low-temperature zone by exchanging heat with the cooling medium.

10. The apparatus of claim 1, further comprising a gas exhaust module configured to exhaust the process gas and the protective gas from the internal chamber and the external chamber,

wherein the gas exhaust module is configured to exhaust the protective gas to maintain the second pressure when the purge module is operated.

11. A high pressure heat treatment apparatus, the apparatus comprising:

an internal chamber formed to accommodate an object to be heat-treated;

an external chamber accommodating the internal chamber;

a gas supply module including a process gas line for supplying a process gas for the heat treatment to the internal chamber to reach a first pressure higher than that of the atmosphere and a protective gas line for supplying a protective gas to the external chamber to reach a second pressure set in relation to the first pressure; and

a purge module configured to purge the protective gas by injecting a purge gas into the external chamber,

wherein the purge module includes

a ring body surrounding the internal chamber, and

a discharge channel positioned in the ring body, and discharging the input purge gas to the internal chamber at a plurality of locations along the circumferential direction of the ring body.

12. The apparatus of claim 11, wherein the discharge channel includes

a loop line extending in a circumferential direction of the ring body, and

a plurality of branch lines connected to the loop line and arranged to face the internal chamber.

13. The apparatus of claim 11, further comprising a heating module disposed in the external chamber and configured to heat the process gas and the protective gas,

wherein the discharge channel is formed to discharge the purge gas into a space between the internal chamber and the heating module.

14. The apparatus of claim 11, wherein the gas supply module further includes a purge gas line connected to the protective gas line and formed to supply the purge gas to the discharge channel.

15. The apparatus of claim 11, further comprising a gas exhaust module configured to exhaust the process gas and the protective gas from the internal chamber and the external chamber,

wherein the gas exhaust module is configured to exhaust the protective gas to maintain the second pressure when the purge gas is injected.