170 may stop or may not resume an operation of the gas supply module 120 (S15). This configuration may prevent the gas supply module 120 from supplying the active gas and the inert gas to the internal chamber IC (and the external chamber EC) of the high pressure heat-treatment apparatus HA.

The control module 170 may also operate the gas exhaust module 130 to exhaust the gas in the internal chamber IC (and the external chamber EC) (S15). This control is to exhaust the active gas and/or the inflow gas existing in the internal chamber IC, thereby eliminating a risk of the residual gas.

When the gas detectors 143 and 145 detect no residual gas before and after the heat treatment, the control module 170 may end the detection of the residual gas.

The description describes another type of the gas management assembly 100 with reference to FIG. 4.

FIG. 4 is a conceptual diagram of a gas management assembly 200 for a high pressure heat-treatment apparatus according to another embodiment of the present disclosure.

Referring to the drawing, the gas management assembly 200 is substantially the same as the gas management assembly 100 of an embodiment, and different by further including a sensing module 260 and an inflow module 280. Hereinafter, the description focuses on a configuration different from that in an embodiment. In addition, the description omits the configuration of the high pressure heat-treatment apparatus HA (see FIG. 1) to make the drawing simple.

The sensing module 260 may be configured to sense an environment of an inner space 211, and include a gas sensor 261. The gas sensor 261 may be configured to sense the active gas leaking in the inner space 211.

The inflow module 280 may be configured to allow external air to flow into the inner space 211. The inflow module 280 may be a damper that is opened and closed by manual manipulation or the control of the control module 170 (see FIG. 2). In the state where the damper is opened, the external air may flow into the inner space 211 by a negative pressure generated by an operation of a discharge module 250.

The inflow module 280 may be disposed opposite to the discharge module 250 with respect to the housing 210. Referring to the drawing, the discharge module 250 may be disposed above the housing 210, while the inlet module 280 may be disposed below the housing 210. This disposition is to lengthen a flow path of the external air in the housing 210 for the leaking gas to be effectively discharged in all areas of the inner space 211.

Through this configuration, the external air may continuously flow into the inner space 211 by the opening of the inflow module 280 and the operation of the discharge module 250. The external air may cause the gas in the inner space 211 to be discharged through the discharge module 250. For example, the leaking gas may be discharged through the discharge module 250 even when slight gas leak occurs in the connection portion of the branch line 241 and the detection valves 247 and 249. Accordingly, a concentration of the active gas in the inner space 211 may be managed below a set concentration.

During the operation of the discharge module 250, the control module 170 may determine a current concentration of the active gas through the gas detector 261. When the current concentration of the active gas in the inner space 211 exceeds the set concentration, the control module 170 may determine that a significant level of gas leak occurs

and take an additional measure. The control module 170 may stop supplying the gas to the chambers 110 and 120 by closing the gas supply valve 223, for example. Accordingly, the active gas is prevented from entering the inner space 211 either. The gas management assembly 200 may be safely operated by these additional measures even when a significant level of the gas leak occurs in the connection portion and detection valves 247 and 249.

The gas detectors 243 and 245 and the exhaust valves 233 and 237 have the same configurations as those of the preceding embodiment, and thus detailed descriptions thereof are omitted.

The gas management assembly for a high pressure heat-treatment apparatus as described above is not limited to the configurations and operations of the embodiments described above. The above embodiments may be variously modified by selective combinations of all or some of the respective embodiments.

As set forth above, the gas management assembly for a high pressure heat-treatment apparatus according to the present disclosure may include the gas supply module for supplying the gas to the chamber of the high pressure heat-treatment apparatus and the gas exhaust module for exhausting the gas from the chamber, which are provided in the housing, as well as the detection module connected to the gas exhaust module in the housing and detecting the residual gas remaining in the chamber and the control module for controlling the gas supply module and the gas exhaust module based on the detection result, thereby stopping the heat treatment process to exhaust the residual gas when detecting the residual gas in the chamber. In this way, the gas management assembly may structurally

prevent the risk that may be caused by the residual gas remaining in the chamber.