CLAIMS:

1. A gas mixing supply device comprising:

a mixing system configured to mix a plurality of types of gases and supply the mixed gas to a tank;

a supply system configured to supply a supply gas stored in the tank to a gas-based apparatus; and

a controller configured to control driving of the mixing system, the tank, and the supply system,

wherein the supply system includes a tank gas supply line connecting the tank and the gas-based apparatus, a tank gas concentration analysis line branched off from the tank gas supply line and has a smaller cross-sectional area than that of the tank gas supply line, a tank gas concentration analysis line valve that opens or closes the tank gas concentration analysis line, and a tank gas concentration analysis unit measures the concentration of the gas flowing along the tank gas supply line by measuring the concentration of the gas flowing along the tank gas concentration analysis line, and

wherein the tank gas concentration analysis unit measures the concentration of the supply gas flowing through the tank gas concentration analysis line when the tank gas concentration analysis line valve is opened by control of the controller,

wherein the controller determines whether the supply gas supplied to the gas-based apparatus is appropriate by comparing the concentration of the supply gas measured by the tank gas concentration analysis unit with a preset reference concentration range.

2. The gas mixing supply device of claim 1, wherein the supply system includes a tank gas supply line valve that opens or closes the tank gas supply line, and

wherein the controller opens the tank gas supply line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit satisfies the reference concentration range, and the controller closes the tank gas supply line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range.

3. The gas mixing supply device of claim 1, wherein the supply system includes a tank gas vent line branched off from the tank gas supply line and connected to an external unit and a tank gas vent line valve that opens or closes the tank gas vent line, and

wherein the controller closes the tank gas vent line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit satisfies the reference concentration range, and the controller opens the tank gas vent line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range.

4. The gas mixing supply device of claim 1, wherein the mixing system includes a plurality of source gas supply lines, a mixing unit in which a plurality of different types of source gases supplied from the plurality of source gas supply lines are mixed to form the supply gas, and a mixing gas supply line connecting the mixing unit and the tank, wherein the plurality of different types of source gases are each supplied to one of the plurality of source gas supply lines.

5. The gas mixing supply device of claim 4, wherein, when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the preset reference concentration range, the controller calculates a concentration correction value so that the concentration of the supply gas flowing through the tank gas supply line satisfies the reference concentration range, and then the controller corrects the concentration of the supply gas supplied to the tank through the mixing system by applying the concentration correction value to the mixing system.

6. The gas mixing supply device of claim 5, wherein the plurality of source gas supply lines include at least one pressure relief valve configured to adjust supply pressures of the plurality of different types of source gases and at least one mass flow controller configured to adjust supply flow rates of the plurality of different types of source gases, and

wherein, when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the preset reference concentration range, the controller adjusts the pressure relief valve and the mass flow controller according to the concentration correction value to adjust a ratio of each of the source gases mixed in the mixing unit so as to correct the concentration of the supply gas supplied to the tank through the mixing gas supply line.

7. The gas mixing supply device of claim 4, wherein the mixing system includes a mixing gas supply line valve that opens or closes the mixing gas supply line, a mixing gas vent line branched off from the mixing gas supply line and

connected to an external unit, and a mixing gas vent line valve that opens or closes the mixing gas vent line.

8. The gas mixing supply device of claim 7, wherein the mixing system further includes a mixing gas concentration analysis unit configured to measure the concentration of the supply gas flowing through the mixing gas supply line, and

wherein the controller opens the mixing gas supply line valve and closes the mixing gas vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit satisfies the preset reference concentration range, and the controller closes the mixing gas supply line valve and opens the mixing gas vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit does not satisfy the preset reference concentration range.

9. The gas mixing supply device of claim 7, wherein the mixing system further includes a mixing gas pressure measurement unit configured to measure a pressure of the supply gas flowing through the mixing gas supply line, and

wherein the controller opens the mixing gas supply line valve and closes the mixing gas vent line valve when the pressure of the supply gas measured by the mixing gas pressure measurement unit is larger than or equal to a gas pressure inside the tank, and the controller closes the mixing gas supply line valve and opens the mixing gas vent line valve when the pressure of the supply gas measured by the mixing gas pressure measurement unit is smaller than the gas pressure inside the tank.

10. The gas mixing supply device of claim 7, wherein the mixing system further includes a mixing gas vent mass flow controller configured to adjust an opening degree of the mixing gas vent line to adjust a discharge amount of the supply gas discharged through the mixing gas vent line.

11. The gas mixing supply device of claim 1, wherein the tank is a batch-type tank.

12. The gas mixing supply device of claim 8, wherein the mixing system includes a mixing gas concentration analysis line branched off from the mixing gas supply line and a mixing gas concentration analysis line valve that opens or closes the mixing gas concentration analysis line, and

wherein the mixing gas concentration analysis unit measures the concentration of the supply gas flowing through the mixing gas concentration analysis line when the mixing gas concentration analysis line valve is opened by control of the controller.

13. The gas mixing supply device of claim 9, wherein the mixing system includes a mixing gas pressure measurement line branched off from the mixing gas supply line and a mixing gas pressure measurement line valve that opens or closes the mixing gas pressure measurement line, and

wherein the mixing gas pressure measurement unit measures the pressure of the supply gas flowing through the mixing gas pressure measurement line when the mixing gas pressure measurement line valve is opened by control of the controller.

14. A gas mixing supply method comprising the steps of:

a) Supply gas is formed by mixing a plurality of different types of source gases supplied from a plurality of source gas supply lines in a mixing unit and supply the supply gas to a tank, and measuring a concentration of the supply gas flowing through a tank gas supply line connecting the tank and a gas-based apparatus by a tank gas concentration analysis unit of a supply system configured to supply the supply gas stored in the tank to the gas-based apparatus by measuring a concentration of a supply gas flowing through a tank gas concentration analysis line branched off from the tank gas supply line and has a smaller cross-sectional area than that of the tank gas supply line; and

b) determining, by a controller, whether the supply gas supplied to the gas-based apparatus is appropriate by comparing the concentration of the supply gas measured by the tank gas concentration analysis unit with a preset reference concentration range,

wherein the supply system includes a tank gas concentration analysis line valve that opens or closes the tank gas concentration analysis line,

wherein, when the tank gas concentration analysis line valve is opened by control of the controller, the tank gas concentration analysis unit measures the concentration of the supply gas flowing through the tank gas concentration analysis line, and

wherein step a) includes allowing the supply gas supplied from the tank to the tank gas supply line to flow to the tank gas concentration analysis line by opening, by the controller, the tank gas concentration analysis line.

15. The gas mixing supply method of claim 14, wherein the controller opens a tank gas supply line valve that opens or closes the tank gas supply line when the concentration of the supply gas measured by the tank gas concentration analysis unit satisfies the reference concentration range, and the controller closes the tank gas supply line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range.

16. The gas mixing supply method of claim 14, wherein the controller closes a tank gas vent line valve that opens or closes a tank gas vent line branched off from the tank gas supply line and connected to an external unit when the concentration of the supply gas measured by the tank gas concentration analysis unit satisfies the reference concentration range, and the controller opens the tank gas vent line valve when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range.

17. The gas mixing supply method of claim 14, wherein, prior to step a), a mixing gas supply step of mixing a plurality of types of gases through a mixing system and supplying the mixed gas to the tank is performed, and

wherein, when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range, step c) discharging the supply gas flowing from the tank to the tank gas supply line to the outside by closing the tank gas supply line valve that opens or closes the tank gas supply line and by opening a tank gas vent line valve that opens or closes a tank gas vent line branched off from the tank gas supply line and connected to an external unit is further performed, and then the mixing gas supply step is performed again.

18. The gas mixing supply method of claim 14, wherein, prior to step a), a mixing gas supply step of mixing a plurality of types of gases through a mixing system and supplying the mixed gas to the tank is performed,

wherein step b) further includes calculating, by the controller, a concentration correction value so that the concentration of the supply gas flowing through the tank gas supply line satisfies the reference concentration range, and

wherein, when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range, the controller applies the concentration correction value to the mixing system to correct the concentration of the supply gas supplied to the tank through the mixing system.

19. The gas mixing supply method of claim 18, further comprising, when the concentration of the supply gas measured by the tank gas concentration analysis unit does not satisfy the reference concentration range, the steps of:

c) discharging the supply gas flowing from the tank to the tank gas supply line to the outside by closing the tank gas supply line valve that opens or closes the tank gas supply line and by opening a tank gas vent line valve that opens or closes a tank gas vent line branched off from the tank gas supply line and connected to an external unit; and

d) performing the mixing gas supply step again and correcting the concentration of the supply gas supplied to the tank through the mixing system by applying the concentration correction value to the mixing system.

20. The gas mixing supply method of claim 17 or 18, wherein the mixing

system includes a plurality of source gas supply lines, a mixing unit in which a plurality of different types of source gases supplied from the plurality of source gas supply lines are mixed to form the supply gas, and a mixing gas supply line connecting the mixing unit and the tank, wherein the plurality of different types of source gases are each supplied to one of the plurality of source gas supply lines,

wherein the plurality of source gas supply lines include at least one pressure relief valve configured to adjust supply pressures of the plurality of different types of source gases and at least one mass flow controller configured to adjust supply flow rates of the plurality of different types of source gases, and

wherein step d) includes correcting the concentration of the supply gas supplied to the tank through the mixing gas supply line by adjusting a ratio of each of the source gases mixed in the mixing unit by adjusting the pressure relief valve and the mass flow controller according to the concentration correction value.

21. The gas mixing supply method of claim 20, wherein the mixing system includes a mixing gas vent line branched off from the mixing gas supply line and connected to an external unit, and a mixing gas vent line valve that opens or closes the mixing gas vent line, and

wherein the controller controls driving of the mixing gas vent line valve to control whether to discharge the supply gas flowing through the mixing gas supply line.

22. The gas mixing supply method of claim 21, wherein the mixing system further includes a mixing gas concentration analysis unit configured to measure the concentration of the supply gas flowing through the mixing gas supply line, and

wherein, when the supply gas is supplied to the tank through the mixing system, the controller opens the mixing gas supply line valve and closes the mixing gas vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit satisfies the preset reference concentration range, and the controller closes the mixing gas supply line valve and opens the mixing gas vent line valve when the concentration of the supply gas measured by the mixing gas concentration analysis unit does not satisfy the preset reference concentration range.

23. The gas mixing supply method of claim 21, wherein the mixing system further includes a mixing gas pressure measurement unit configured to measure a pressure of the supply gas flowing through the mixing gas supply line, and

wherein, when the supply gas is supplied to the tank through the mixing system, the controller closes the mixing gas supply line valve and opens the mixing gas vent line valve when the pressure of the supply gas measured by the mixing gas pressure measurement unit is lower than a gas pressure inside the tank, and the controller opens the mixing gas supply line valve and closes the mixing gas vent line valve when the pressure of the supply gas measured by the mixing gas pressure measurement unit is higher than or equal to the gas pressure inside the tank.

24. The gas mixing supply method of claim 21, wherein the mixing system further includes a mixing gas vent mass flow controller configured to adjust an opening degree of the mixing gas vent line, and

wherein, when the mixing gas vent line valve is opened, and thus the supply gas is discharged to the outside through the mixing gas vent line, the controller adjusts the mixing gas vent mass flow controller to adjust a discharge amount of the

supply gas discharged through the mixing gas vent line.

25. The gas mixing supply method of claim 14, wherein steps a) and b) are performed in real time or at predetermined time intervals while the supply gas stored in the tank is supplied to the gas-based apparatus.

26. The gas mixing supply method of claim 22, wherein the mixing system includes a mixing gas concentration analysis line branched off from the mixing gas supply line and a mixing gas concentration analysis line valve that opens or closes the mixing gas concentration analysis line, and

wherein the mixing gas concentration analysis unit measures the concentration of the supply gas flowing through the mixing gas concentration analysis line when the mixing gas concentration analysis line valve is opened by control of the controller.

27. The gas mixing supply method of claim 22, wherein the mixing gas concentration analysis unit measures the concentration of the supply gas flowing through the mixing gas supply line in real time or at predetermined time intervals while the supply gas is supplied to the tank through the mixing system, and

wherein the controller controls the mixing gas vent line valve and the mixing gas supply line valve in real time according to the concentration of the supply gas measured by the mixing gas concentration analysis unit.

28. The gas mixing supply method of claim 23, wherein the mixing gas pressure measurement unit measures the pressure of the supply gas flowing through

the mixing gas supply line in real time or at predetermined time intervals while the supply gas is supplied to the tank through the mixing system, and

wherein the controller controls the mixing gas vent line valve and the mixing gas supply line valve in real time according to the pressure of the supply gas measured by the mixing gas pressure measurement unit.