According to a third aspect of the present invention, there is provided a gas analysis system for a pressure vessel, for determining the partial pressure of at least one gas in a mixture of gasses contained in the pressure vessel, the mixture being pressurised to above local atmospheric pressure, in which the system comprises:

a gas analysis sensor which can be coupled to the pressure vessel so that a portion of the mixture of gasses in the pressure vessel can be directed to the sensor for analysis; and

a pressure control device for reducing the pressure of the portion of the mixture which is to be analysed by the sensor;

in which:

the pressure control device is arranged to reduce the pressure of the portion of the mixture to a level which is below the pressure in the vessel but above local atmospheric pressure;

the sensor is arranged to measure the partial pressure of the at least one gas at the reduced pressure level; and

the system further comprises a processor that is configured to determine the actual partial pressure of the at least one gas in the mixture contained in the vessel based on the partial pressure of the at least one gas measured at the reduced pressure level.

The system may be configured such that, in use: the pressure control device is arranged to reduce the pressure of the portion of the mixture to said level; and the sensor is arranged to measure the partial pressure of the at least one gas at the reduced pressure level, so that said partial pressure can be employed to determine said actual partial pressure. The system may comprise a controller, or the processor can be configured in this way (such as via suitable software in/carried by the processor).

The sensor may be locatable outside the vessel, and the system arranged so that the portion of the mixture to be analysed is directed out of the vessel to the sensor.

The pressure control device may be a pressure reduction valve.

The pressure control device may be arranged to reduce the pressure of the portion of the mixture prior to supply of said portion to the sensor, such as to an input of the sensor. The pressure control device may be arranged to provide an output at a predetermined or selected pressure level.

The pressure control device may be provided integrally with the sensor.

The system may comprise a flow control device for controlling a rate of flow of the portion of the mixture through the sensor. The flow control device may be a throttle, such as a throttle valve.

The flow control device may be arranged to throttle the flow of the mixture upstream of the sensor. The system may comprise a back-pressure regulator positioned downstream of the flow control device, for controlling a pressure of the portion of the mixture analysed by the sensor.

The flow control device may be arranged to throttle the flow of the mixture downstream of the sensor.

The system, in particular the pressure control device, may be arranged to reduce the pressure of the portion of the mixture which is to be analysed to no less than about 1.5 times local atmospheric pressure; no less than about 2 times local atmospheric pressure; and optionally no less than about 3 times local atmospheric pressure. The system, in particular the pressure control device, may be arranged to reduce the pressure of the portion of the mixture which is to be analysed to no more than about 4 times local atmospheric pressure. The pressure control device may be arranged so that the level of pressure selected may be anywhere between about 1.5 to 4 times local atmospheric pressure.

The processor can be configured to determine the actual partial pressure of said gas by multiplying the measured pressure (at the reduced pressure level) by the ratio of the

20. A method as claimed in either of claims 17 or 18, in which the pressure vessel is a decompression chamber, and in which the method is a method of decompressing a person from a pressure which is above local atmospheric pressure down to local atmospheric pressure.

21. A gas analysis system for a pressure vessel, for determining the partial pressure of at least one gas in a mixture of gasses contained in the pressure vessel, the mixture being pressurised to above local atmospheric pressure, in which the system comprises:

a gas analysis sensor which can be coupled to the pressure vessel so that a portion of the mixture of gasses in the pressure vessel can be directed to the sensor for analysis; and

a pressure control device for reducing the pressure of the portion of the mixture which is to be analysed by the sensor;

in which:

the pressure control device is arranged to reduce the pressure of the portion of the mixture to a level which is below the pressure in the vessel but above local atmospheric pressure;

the sensor is arranged to measure the partial pressure of the at least one gas at the reduced pressure level; and

the system further comprises a processor that is configured to determine the actual partial pressure of the at least one gas in the mixture contained in the vessel based on the partial pressure of the at least one gas measured at the reduced pressure level.

22. A system as claimed in claim 21, in which the processor is configured:

to control the pressure control device so that it reduces the pressure of the portion of the mixture to said level; and

to control the sensor is arranged to measure the partial pressure of the at least one gas at the reduced pressure level, so that said partial pressure can be employed to determine said actual partial pressure.

23. A system as claimed in either of claims 21 or 22, in which the sensor is locatable outside the vessel, and in which the system is arranged so that the portion of the mixture to be analysed is directed out of the vessel to the sensor.

24. A system as claimed in any one of claims 21 to 23, in which the pressure control device is arranged to reduce the pressure of the portion of the mixture prior to supply of said portion to the sensor.

25. A system as claimed in any one of claims 21 to 24, in which the pressure control device is arranged to provide an output at a predetermined pressure level.

26. A system as claimed in any one of claims 21 to 25, in which the pressure control device is provided integrally with the sensor.

27. A system as claimed in any one of claims 21 to 26, comprising a flow control device for controlling a rate of flow of the portion of the mixture through the sensor.

28. A system as claimed in claim 27, in which the flow control device is arranged to throttle the flow of the mixture upstream of the sensor, and in which the system comprises a back-pressure regulator positioned downstream of the flow control device, for controlling a pressure of the portion of the mixture analysed by the sensor.

29. A system as claimed in claim 27, in which the flow control device is arranged to throttle the flow of the mixture downstream of the sensor.

30. A system as claimed in any one of claims 21 to 29, in which the processor is configured to determine the actual partial pressure of said gas by multiplying the measured pressure at the reduced pressure level by the ratio of the pressure in the vessel relative to the reduced pressure level.

31. A pressure vessel comprising the gas analysis system of any one of claims 21 to 30.