

WHAT IS CLAIMED IS:

1. A portable breath gas and volatile substance analyzer comprising
 - a breath input portion (1) for inputting the breath into the analyzer by blowing breath,
 - 5 a breath delivery portion (2) connected to the breath input portion (1),
 - a breath storage portion (3) connected to the breath delivery portion (2),
 - a sensor (4) provided in the breath storage portion (3) for detecting the breath,
 - and
 - a microcontroller (5) connected to the sensor (4) for receiving the breath data
 - 10 from the sensor (4) to analyze the gas and volatile substance data,
 - characterized in that
 - the breath input portion (1) comprises a mouthpiece (1.1) having a breath input channel (1.1.1) for the users to blow breath, a breath flow adjustment tube (1.2) connected to the mouthpiece (1.1), and an end portion (1.3) connected to the breath flow
 - 15 adjustment tube (1.2), having a breath output channel (1.3.1)
 - wherein the breath flow adjustment tube (1.2) comprises a main tube (1.2.1) arranged between the mouthpiece (1.1) and the end portion (1.3) of the breath input portion (1), and a breath delivery tube (1.2.2) arranged underneath the main tube (1.2.1) to serve as a channel allowing the breath to continue to flow to the breath delivery portion
 - 20 (2), the breath delivery tube (1.2.2) being installed at a position 0.5 to 75 mm far from the mouthpiece (1.1) in a horizontal direction.
2. The portable breath gas and volatile substance analyzer according to claim 1, wherein the main tube (1.2.1) is a tube having a breath flow channel (1.2.1.1) on the inner side, the end portion of the breath flow channel (1.2.1.1) on the side which is connected to the
- 25 breath output channel (1.3.1) being tapered toward the breath output channel (1.3.1).
3. The portable breath gas and volatile substance analyzer according to claim 1 or 2, wherein the main tube (1.2.1) has a length in a range of 15-80 mm, preferably in a range of 30-50 mm.
4. The portable breath gas and volatile substance analyzer according to claim 1, wherein
- 30 the breath delivery tube (1.2.2) is arranged such that it is perpendicular to the horizontal axis of the main tube (1.2.1).

5. The portable breath gas and volatile substance analyzer according to claim 1 or 4, wherein the breath delivery tube (1.2.2) is a hollow round tube with a diameter ranging from 0.5 to 5 mm.
6. The portable breath gas and volatile substance analyzer according to any one of claims 1 to 5, wherein the main tube (1.2.1) and the breath delivery tube (1.2.2) are made of a material which is selected from polyethylene, polypropylene and Teflon, preferably Teflon or polyethylene and polypropylene with a Teflon-coated inner surface.
7. The portable breath gas and volatile substance analyzer according to claim 1, wherein the breath input channel (1.1.1) is an aperture with a diameter ranging from 0.5 to 15 mm and the breath output channel (1.3.1) is an aperture with a diameter ranging from 0.5 to 5 mm.
8. The portable breath gas and volatile substance analyzer according to claim 1, wherein the mouthpiece (1.1), the breath flow adjustment tube (1.2) and the end portion (1.3) are connected together in a detachable manner.
9. The portable breath gas and volatile substance analyzer according to claim 1, wherein the breath delivery portion (2) comprises a breath receiving tube (2.1) connected to the breath delivery tube (1.2.2) of the breath flow adjustment tube (1.2), a pump (2.2) connected to the breath receiving tube (2.1) for controlling the breath flow rate, and the breath output tube (2.3) connected to the pump (2.2) for transferring the breath to the breath storage portion (3) at a region near the sensor (4).
10. The portable breath gas and volatile substance analyzer according to claim 9, wherein the pump (2.2) is installed separately close to the breath storage portion (3).
11. The portable breath gas and volatile substance analyzer according to claim 9 or 10, wherein the pump (2.2) controls the breath flow rate to be within a range of 0 to 3 L/min.
12. The portable breath gas and volatile substance analyzer according to any one of claims 9 to 11, wherein the pump (2.2) is operated intermittently or continuously with the intermittent operation period being 0.06 to 1 minute and the continuous operation period being 0.06 to 10 minutes.
13. The portable breath gas and volatile substance analyzer according to claim 9, wherein the breath receiving tube (2.1) and the breath output tube (2.3) are made of a material which is silicone or Teflon.

14. The portable breath gas and volatile substance analyzer according to claim 1, wherein the breath storage portion (3) comprises a storage chamber (3.1), an inlet (3.2) arranged above the storage chamber (3.1) to serve as a channel for inputting the breath received from the breath delivery portion (2) and a moisture discharge port (3.3) arranged underneath the storage chamber (3.1).
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15. The portable breath gas and volatile substance analyzer according to claim 14, wherein the storage chamber (3.1) has a volume ranging from 0.10 to 3 liters.
16. The portable breath gas and volatile substance analyzer according to claim 14 or 15, wherein the storage chamber (3.1) has a cylindrical shape with a diameter ranging from 15 to 35 mm.
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17. The portable breath gas and volatile substance analyzer according to any one of claims 14 to 16, wherein the storage chamber (3.1) has a height ranging from 30 to 70 mm.
18. The portable breath gas and volatile substance analyzer according to claim 1, wherein the sensor (4) is an acetone gas-specific metal oxide sensor.
- 15 19. The portable breath gas and volatile substance analyzer according to claim 1, wherein the sensor (4) is a temperature sensor, moisture sensor or a combination thereof.
20. The portable breath gas and volatile substance analyzer according to claim 1 wherein, the microcontroller (5) comprises a processor (5.1) for processing the breath data obtained from the sensor (4) and a controller (5.2) for controlling the operation of the breath delivery portion (2).
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21. The portable breath gas and volatile substance analyzer according to claim 20, wherein the processor (5.1) comprises a feature generating portion (5.1.1) for generating features from the breath data signal detected by the sensor (4) and a computing portion (5.1.2) for processing the features to obtain the values indicating the illness identity.
- 25 22. The portable breath gas and volatile substance analyzer according to claim 21, wherein the feature generating portion (5.1.1) generates features from the voltage data signal of the sensor (4).
23. The portable breath gas and volatile substance analyzer according to claim 21, wherein the computing portion (5.1.2) is operated using the artificial neural networks and/or artificial intelligence method.
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24. The portable breath gas and volatile substance analyzer according to any one of claims 1 to 23 further comprising a display (6) for displaying the results of gases and volatile substances analysis.
25. The portable breath gas and volatile substance analyzer according to claim 24, wherein the display (6) is a display with or without a monitor.
26. The portable breath gas and volatile substance analyzer according to any one of claims 1 to 25 further comprising a housing (7) for covering the portable breath gas and volatile substance analyzer such that the mouthpiece (1.1) of the breath input portion (1) extends outwardly.