Claims:

1. A method for leak testing a container filled with a consumer product, comprising the step of monitoring presence in the surrounding of said container of at least one analyte that is not helium, the material composition thereof being dependent from said consumer product and exploiting a result of said monitoring as a leak indication, said monitoring comprising mass spectrometry, wherein the method comprises inline testing up to each container of a stream of said containers, and further comprises:

providing subsequent containers of said stream within respective rest test chambers moved as a test chamber stream and controllably time multiplexing an operational gas stream-connection from the interiors of said test chambers to an input port to a single arrangement performing said mass spectrometry by

controllably connecting each of said test chambers, moved as a test chamber stream, to a respective output line,

providing at least two collector chambers which are distinct from the test chambers,

moving said collector chambers into gas stream communication with respective ones of said output lines and collecting in said at least two collector chambers a dose of gas from respective different ones of said output lines,

providing an input line to said mass spectrometry,

sequentially moving one of said collector chambers after the other of said collector chambers with said respectively collected dose into gas stream communication with said one input line to said mass spectrometry and dispatching sequentially one of said doses after the other into said input line.

2. The method of claim 1, wherein said consumer product comprises at least one of a solid product material and of a liquid product material and said analyte is dependent on at least one of said product materials.

3. The method according to claim 2, wherein said analyte is in gaseous state or said analyte is in solid or liquid state and converted to gaseous state before performing said mass spectrometry.

4. The method of claim 1, wherein said consumer product comprises material in gaseous state and said analyte depends from said material in gaseous state.

5. The method according to claim 1, wherein said mass spectroscopy comprises applying a quadrupole mass spectrometer arrangement.

6. The method of claim 5, wherein said mass spectrometry comprises applying selected ion flow tube mass spectrometry, SIFT.

7. The method of claim 6, comprising a conditioning step upon the surrounding into which said container is to be applied.

8. The method of claim 1, comprising subjecting said consumer product within said container to a preparatory step of increasing or establishing a leak rate of said analyte if a leak is present.

9. The method of claim 1, comprising a gasifying step for said analyte before being applied to said mass spectrometry.

10. The method of claim 1, comprising subjecting said container to a leak detection step without mass spectrometry, and performing said mass spectrometry only if the result of said leak detection step without mass spectrometry reveals leakiness of less than a predetermined amount.

11. The method of claim 10, said leak detection step without mass spectrometry comprising evacuating the surrounding of said container and exploiting the time course of pressure in said surrounding of said container as a leak indicative signal and as control signal for enabling/disabling said mass spectrometry.

12. The method of claim 11, wherein said evacuation is performed towards a vacuum level target value below vapor pressure of a component of said consumer product which is liquid.

13. The method of claim 1, comprising generating, if a leak is present, said analyte in the surrounding of said container in gaseous state and isolating a probe of gas from said surrounding within a probe chamber and applying said probe from said probe chamber to said mass spectrometry.

14. The method of claim 13 comprising increasing pressure of said probe in said probe chamber relative to pressure in said surrounding.

15. The method of claim 14 comprising increasing said pressure by pumping said probe from said surrounding to said probe chamber.

16. Method of manufacturing closed containers filled with a consumer product and which are unleaky, comprising providing a container, filling said container exclusively with a consumer product which the container is intended to store, closing the filled container and subjecting the closed and filled container to the method of leak testing according to claim 1 and establishing said container to be unleaky in dependency of said result of monitoring by said method of leak testing.

17. Apparatus for leak testing closed and filled containers comprising a conveyor arrangement for inline conveying a multitude of said containers towards, through and from a leak testing station, said leak testing station comprising a mass spectrometer controllably operationally connectable to a surrounding of each of said containers, an output signal of the mass spectrometer being decisive for unleakiness of each container,

further comprising, conveyed in said leak testing station by a conveyor, at least two sealingly closable test chambers each to accommodate at least one of said containers, said mass spectrometer being controllably operationally connectable to the inside of each of said test chambers, and

further comprising a drivingly movable collector arrangement comprising at least two collector chambers which are distinct from the test chambers, the collector chambers each with a chamber input opening and with a chamber output opening, gas stream lines, each controllably operationally connected to one of said conveyed test chambers and each having a line output, a mass spectrometer input line operationally

connected to said mass spectrometer and having a line input, said collector arrangement being moved so that said chamber input openings are consecutively positioned in gas flow communication with a respective one of said line outputs, and so that said chamber output openings are consecutively positioned in gas flow communication with said line input to said mass spectrometer.

18. The apparatus of claim 17, comprising a leak testing stage operating without mass spectrometry and generating a leak indicating signal for each of said containers, said leak indicating signal disabling an operational connection of said inside of a respective test chamber to said mass spectrometer.

19. The apparatus of claim 17, each of said test chambers being controllably operationally connected to an evacuation pump and to at least one pressure sensor, the output of said pressure sensor being operationally connected to an input of an evaluation unit generating an output signal indicating a leak of a container under test in the respective test chamber, said output signal disabling an operational connection from said respective test chamber to said mass spectrometer.

20. The apparatus of claim 17, wherein said drivingly movable collector arrangement is part of a multiplexing arrangement time multiplexing an operational connection of said test chambers to said mass spectrometer.

21. The apparatus of claim 17, wherein said mass spectrometer is controllably operationally connected to the inside of each of said test chambers via a respective probe chamber.

22. The apparatus of claim 21, wherein the volume of said probe chamber is smaller than the difference volume of the inside volume of said test chamber and of the volume of said container to be accommodated in said test chamber.

23. The apparatus of claim 17, wherein said mass spectrometer is controllably operationally connected to the inside of each of said test chambers via a respective

probe chamber and a pumping arrangement.

24. The apparatus of claim 17, wherein said mass spectrometer is a quadrupole mass spectrometer.

25. The apparatus of claim 17, wherein said mass spectrometer is a selected ion flow tube mass spectrometer, SIFT.

26. The apparatus according to claim 17, comprising at least one of:

a heating and/or cooling arrangement for a line arrangement interconnecting the outside surface of a respective container and said mass spectrometer;

a flushing gas source in controlled communication with a line arrangement interconnecting the outside surface of a respective container and said mass spectrometer;

a plasma source and a reactive gas source acting upon a line arrangement interconnecting the outside surface of a respective container and said mass spectrometer.

27. The apparatus of claim 17 comprising at least one of:

a heating and/or cooling arrangement for said consumer product;

a pressure and/or evacuation source controllably operationally connected to the surrounding of said container;

a mechanical compressing arrangement for said container;

a centrifuge and/or shaking arrangement for said container;

an electromagnetic source generating an electromagnetic field in said container;

a light source generating light radiation in said container.

28. The apparatus of claim 17, comprising at least one of:

a heating arrangement for the surrounding of said container;

a vacuum source controllably operationally connected to the surrounding of said container.

Patent Claims:

1. A method for leak testing containers filled with a consumer product, comprising the step of monitoring presence in the surrounding of said container of at least one analyte, the material composition thereof being dependent from said consumer product and exploiting a result of said monitoring as leak indicative, said monitoring comprising mass spectrometry.

2. The method of claim 1, wherein said content product comprises at least one of a solid and of a liquid product material and said analyte is dependent on at least one of said product materials.

3. The method according to claim 2, wherein said analyte is in gaseous state or said analyte is in solid or liquid state and converted in gaseous state before performing said mass spectrometry.

4. The method of one of claims 1 to 3, wherein said content product comprises material in gaseous state and said analyte depends from said material in gaseous state.

5. The method according to one of the preceding claims, wherein said mass spectroscopy comprises applying a quadrupole mass spectrometer arrangement.

6. The method of claim 5, wherein said mass spectrometry comprises applying selected ion flow tube mass spectrometry, SIFT.

7. The method of one of the preceding claims comprising a conditioning step upon the surrounding into which said container is to be applied.

8. The method of one of the preceding claims comprising subjecting said content product within said container to a preparatory step of increasing or establishing a leak rate of said analyte if a leak is present.

9. The method of one of the preceding claims comprising a gasifying step for said analyte before being applied to said mass spectrometry.

10. The method of one of the preceding claims comprising subjecting said container to a leak detection step without mass spectrometry, and performing said mass spectrometry only if the result of said leak detection step without mass spectrometry reveals leakiness of less than a predetermined amount.

11. The method of claim 10, said leak detection step without mass spectrometry comprising evacuating the surrounding of said container and exploiting the time course of pressure in said surrounding of said container as a leak indicative signal and as control signal for enabling/disabling said mass spectrometry.

12. The method of claim 11, wherein said evacuation is performed towards a vacuum level target value below vapor pressure of a component of said consumer product which is liquid.

13. The method of one of the preceding claims comprising generating, if a leak is present, said analyte in the surrounding of said container in gaseous state and isolating a probe of gas from said surrounding within a probe chamber and applying said probe from said probe chamber to said mass spectrometry.

14. The method of claim 13 comprising increasing pressure of said probe in said probe chamber relative to pressure in said surrounding.

15. The method of claim 14 comprising increasing said pressure by pumping said probe from said surrounding to said probe chamber.

16. The method of one of the preceding claims comprising inline testing up to each container of a stream of said containers.

17. The method of claim 16 comprising providing subsequent containers of said stream within respective test chambers moved as a test chamber stream and controllably time multiplexing an operational gas stream-connexion from the interiors of said test chambers to an input port to a single arrangement performing said mass spectrometry.

18. The method of claim 17 comprising

- controllably connecting each of said test chambers, moved as a test chamber stream, to a respective output line,
- providing at least two collector chambers,
- moving said collector chambers into gas stream communication with respective ones of said output lines and collecting in said at least two collector chambers a dose of gas from respective different ones of said output lines,
- providing an input line to said mass spectrometry

- sequentially moving one of said collector chambers after the other of said collector chambers with said respectively collected dose into gas stream communication with said one input line to said mass spectrometry and dispatching sequentially one of said doses after the other into said input line.

19. Method of manufacturing closed containers filled with a consumer product and which are unleaky, comprising providing a container, filling said container exclusively with a consumer product which the container is intended to store, closing the filled container and subjecting the closed and filled container to the method of leak testing according to one of claims 1 to 18 and establishing said container to be unleaky in dependency of said result of monitoring by said method of leak testing.

20. Apparatus for leak testing closed and filled containers comprising a conveyor arrangement for inline conveying a multitude of said containers towards, through and from a leak testing station, said leak testing station comprising a mass spectrometer controllably operationally connectable to a surrounding of each of said containers, an output signal of the mass spectrometer being decisive for unleakiness of each container.

21. The apparatus of claim 20, further comprising, conveyed in said leak testing station by a conveyor, at least two sealingly closable test chambers each to accommodate at least one of said containers, said mass spectrometer being controllably operationally connectable to the inside of each of said test chambers.

22. The apparatus of one of claims 20 or 21 comprising a leak testing stage operating without mass spectrometry and generating a leak indicating signal for each of said containers, said leak indicating signal disabling an operational connection of said inside of a respective test chamber to said mass spectrometer.

23. The apparatus of claim 21 or 22, each of said test chambers being controllably operationally connected to an evacuation pump and to at least one pressure sensor, the output of said pressure sensor being operationally connected to an input of an evaluation unit generating an output signal indicating a leak of a container under test in the respective test chamber, said output signal disabling an operational connection from said respective test chamber to said mass spectrometer.

24. The apparatus of one of claims 21 to 23 comprising a multiplexing arrangement time multiplexing an operational connection of said test chambers to said mass spectrometer.

25. The apparatus of one of claims 21 to 24, wherein said mass spectrometer is controllably operationally connected to the inside of each of said test chambers via a respective probe chamber.

26. The apparatus of claim 25, wherein the volume of said probe chamber is smaller than the difference volume of the inside volume of said test chamber and of the volume of said container to be accommodated in said test chamber.

27. The apparatus of one of claims claim 21 to 26, wherein said mass spectrometer is controllably operationally

connected to the inside of each of said test chambers via a respective probe chamber and a pumping arrangement.

28. The apparatus of one of claims 21 to 27, further comprising a drivingly movable collector arrangement comprising at least two collector chambers each with a chamber input opening and with a chamber output opening, gas stream lines, each controllably operationally connected to one of said conveyed test chambers and each having a line output, a mass spectrometer input line operationally connected to said mass spectrometer and having a line input, said collector arrangement being moved so that said chamber input openings are consecutively positioned in gas flow communication with a respective one of said line outputs, and so that said chamber output openings are consecutively positioned in gas flow communication with said line input to said mass spectrometer.

29. The apparatus of one of the claims 20 to 28, wherein said mass spectrometer is a quadrupole mass spectrometer.

30. The apparatus of one of the claims 20 to 29, wherein said mass spectrometer is a selected ion flow tube mass spectrometer, SIFT.

31. The apparatus according to one of the claims 20 to 30 comprising at least one of:

- A heating and /or cooling arrangement for a line arrangement interconnecting the outside surface of a respective container and said mass spectrometer;

- a flushing gas source in controlled communication with a line arrangement interconnecting the outside surface of a respective container and said mass spectrometer;
- a plasma source and a reactive gas source acting upon a line arrangement interconnecting the outside surface of a respective container and said mass spectrometer.

32. The apparatus of one of claims 20 to 31 comprising at least one of:

- A heating and/or cooling arrangement for said consumer product;
- a pressure and/or evacuation source controllably operationally connected to the surrounding of said container;
- a mechanical compressing arrangement for said container;
- a centrifuge and/or shaking arrangement for said container;
- an electromagnetic source generating an electromagnetic field in said container;
- a light source generating light radiation in said container.

33. The apparatus of one of claims 20 to 32 comprising at least one of:

- a heating arrangement for the surrounding of said container;
- a vacuum source controllably operationally connected to the surrounding of said container.