

[DESCRIPTION]

[Invention Title]

MANIFOLD ASSEMBLY AND CHEMICAL SAMPLING DEVICE
INCLUDING SAME

[Technical Field]

An embodiment relates to a manifold assembly and a chemical sampling device including the same, and more particularly, to a manifold assembly and a chemical sampling device including the same, which are capable of simplifying a process of discharging, removing, and sampling a chemical and improving stability and reliability.

[Background Art]

A company that handles chemicals harmful to human bodies, for example, a company, which manufactures chemicals such as a company that manufactures semiconductors, LCDs, OLEDs, medicines, paint, or the like, uses various types of chemicals for a single process or a plurality of unit processes.

In general, the chemicals are supplied to a main storage tank by means of a tank truck or the like, and some of the chemicals stored in the main storage tank are divided and stored in the plurality of sub-storage tanks, such that the chemicals may be sequentially supplied to the single unit process or individually supplied to the plurality of unit processes.

As another example, when the number of chemicals is small or when the tank truck cannot be used because of the nature of the chemicals, the chemicals may be supplied directly to the sub-storage tanks by means of drums, bottles, or the like.

Meanwhile, if the chemicals are contaminated in the tank trucks, the drums, the bottles, the storage tanks, pipes, and the like, defects may occur in the unit process to

which the chemicals are supplied. Therefore, it is necessary to manage a degree of contamination of the chemicals at an appropriate level at a main position on each of the tank trucks, the drums, the bottles, the storage tanks, the pipes, and the like.

Therefore, recently, sampling devices have been developed to sample a chemical at the main position of each of the tank trucks, the drums, the bottles, the storage tanks, the pipes, and the like.

However, in the related art, an operator needs to accurately place a sampling bottle at a position of a nozzle for a desired chemical among the positions of the nozzles for various chemicals one by one in order to discharge, clean, and sample the chemical at the main position. In addition, among the several valves in a connected sampling line, the desired valve needs to be accurately operated to discharge, clean, and sample the chemical, which complicates the process of discharging, removing, and sampling the chemical.

In addition, if the sampling bottle is placed at an incorrect position or the valve is erroneously operated because of the operator's mistake during the process of placing the sampling bottle at the position of the nozzle for the desired chemical, there is a problem in that the chemical is exposed to the floor outside of the sampling bottle without change or the operator is exposed to the chemical during a process of moving the sampling bottle containing the chemical.

In addition, when a single position at which the sampling bottles are placed is provided by grouping pipes at rear ends of the several valves to solve the above-mentioned problems, the remaining chemical stagnates in a space defined from the rear ends of the valves to the grouped pipes, which causes a problem in that the remaining chemical affects a degree of contamination and a result of analyzing substances during a process of sampling different chemicals.

Therefore, recently, various studies have been conducted to simplify a process of sampling a chemical and improve stability and reliability, but the study results are still insufficient. Accordingly, there is a need to develop a technology to simplify a process of sampling a chemical and improve stability and reliability.

[Disclosure]

[Technical Problem]

An object of the embodiment is to provide a manifold assembly and a chemical sampling device including the same, which are capable of simplifying a process of discharging, removing, and sampling a chemical and improving stability and reliability.

In particular, the object of the embodiment is to discharge, remove, and sample, at a single position, chemicals supplied from a plurality of sampling lines.

Another object of the embodiment is to minimize contamination of chemicals, deterioration in purity, and error of an analysis result during a process of discharging, removing, and sampling the chemicals supplied from different sampling lines.

Still another object of the embodiment is to improve accuracy related to an analysis of a degree of contamination and substances of chemicals.

Yet another object of the embodiment is to simplify a structure and improve spatial utilization.

The objects to be achieved by the embodiments are not limited to the above-mentioned objects, but also include objects or effects that may be understood from the solutions or embodiments described below.

[Technical Solution]

To achieve the above-mentioned objects, an exemplary embodiment of the present invention provides a manifold assembly including: a body having a common chamber provided therein; a first chemical flow channel connected to the common

chamber and configured to supply a first chemical; a first valve configured to selectively open or close the first chemical flow channel; a second chemical flow channel connected to the common chamber and configured to supply a second chemical; a second valve configured to selectively open or close the second chemical flow channel; and a discharge flow channel configured to communicate with the common chamber and discharge the first or second chemical, which is introduced into the common chamber, to the outside of the body.

This is to simplify a process of discharging, removing, and sampling the chemical and improve stability and reliability.

According to the embodiment, it is not necessary to move a sampling bottle containing a chemical at each main position, which makes it possible to obtain an advantageous effect of improving stability and reliability and minimizing a situation in which the chemical is exposed to an operator.

The first chemical flow channel may have various structures capable of supplying the first chemical to the common chamber.

For example, the first chemical flow channel includes: a first supply flow channel provided in the body and configured to supply the first chemical; a first inflow flow channel provided in a lateral surface of the body and configured to communicate with the common chamber; and a first guide flow channel provided in the lateral surface of the body and configured to communicate with the first supply flow channel and the first inflow flow channel and guide the first chemical to the first inflow flow channel.

In particular, the first supply flow channel includes a first vertical flow channel provided in an upper surface of the body, and a first horizontal flow channel provided in the lateral surface of the body and configured to communicate with the first vertical flow channel.

The first valve may have various structures capable of selectively opening or closing the first chemical flow channel. The present invention is not restricted or limited by the type and structure of the first valve.

For example, the first valve includes: a valve body disposed to cover the first guide flow channel; a cylinder member provided in the valve body and configured to be rectilinearly movable in directions toward and away from the wall surface of the first guide flow channel; and a diaphragm configured to selectively come into close contact with the wall surface of the first guide flow channel by being pressed by the cylinder member.

The second chemical flow channel may have various structures capable of supplying the second chemical to the common chamber.

For example, the second chemical flow channel includes: a second supply flow channel provided in the body and configured to supply the second chemical; a second inflow flow channel provided in a lateral surface of the body and configured to communicate with the common chamber; and a second guide flow channel provided in the lateral surface of the body and configured to communicate with the second supply flow channel and the second inflow flow channel and guide the second chemical to the second inflow flow channel.

In particular, the second supply flow channel includes a second vertical flow channel provided in the upper surface of the body, and a second horizontal flow channel provided in the lateral surface of the body and configured to communicate with the second vertical flow channel.

The second valve may have various structures capable of selectively opening or closing the second chemical flow channel. The present invention is not restricted or limited by the type and structure of the second valve.

For example, the second valve includes: a valve body disposed to cover the second guide flow channel; a cylinder member provided in the valve body and configured to be rectilinearly movable in directions toward and away from the wall surface of the second guide flow channel; and a diaphragm configured to selectively come into close contact with the wall surface of the second guide flow channel by being pressed by the cylinder member.

According to the exemplary embodiment of the present invention, the manifold assembly may include a third chemical flow channel connected to the common chamber and configured to supply a third chemical, and a third valve configured to selectively open or close the third chemical flow channel.

The third chemical flow channel may have various structures capable of supplying the third chemical to the common chamber.

For example, the third chemical flow channel includes: a third supply flow channel provided in the body and configured to supply the third chemical; a third inflow flow channel provided in a lateral surface of the body and configured to communicate with the common chamber; and a third guide flow channel provided in the lateral surface of the body and configured to communicate with the third supply flow channel and the third inflow flow channel and guide the third chemical to the third inflow flow channel.

In particular, the third supply flow channel includes a third vertical flow channel provided in the upper surface of the body, and a third horizontal flow channel provided in the lateral surface of the body and configured to communicate with the third vertical flow channel.

The third valve may have various structures capable of selectively opening or closing the third chemical flow channel. The present invention is not restricted or limited by the type and structure of the third valve.

For example, the third valve includes: a valve body disposed to cover the third guide flow channel; a cylinder member provided in the valve body and configured to be rectilinearly movable in directions toward and away from the wall surface of the third guide flow channel; and a diaphragm configured to selectively come into close contact with the wall surface of the third guide flow channel by being pressed by the cylinder member.

According to the exemplary embodiment of the present invention, a first inclined guide surface may be provided on a wall surface of the first inflow flow channel, and the first inclined guide surface may guide the first chemical, which is introduced into the first inflow flow channel, in a direction inclined with respect to a reference line that passes through a center of the common chamber.

In addition, a second inclined guide surface may be formed on the wall surface of the second inflow flow channel. The second inclined guide surface may guide the second chemical, which is introduced into the second inflow flow channel, in a direction inclined with respect to the reference line that passes through the center of the common chamber.

In addition, a third inclined guide surface may be formed on the wall surface of the third inflow flow channel. The third inclined guide surface may guide the third chemical, which is introduced into the third inflow flow channel, in a direction inclined with respect to the reference line that passes through the center of the common chamber.

As described above, the first, second, or third chemical, which is introduced into the first inflow flow channel, the second inflow flow channel, or the third inflow flow channel, is guided along the first inclined guide surface, the second inclined guide surface, or the third inclined guide surface in the direction inclined with respect to the reference line that passes through the center of the common chamber, such that the chemical

introduced into the common chamber may forcibly form a vortex flow with a swirling shape. Therefore, it is possible to obtain an advantageous effect of more effectively removing the residual chemical that may remain in the common chamber and the first, second, or third inflow flow channel.

That is, because the chemical introduced into the common chamber may form a vortex flow with a swirling shape, it is possible to minimize a situation in which the chemical is discharged while being concentrated in a particular region in the common chamber. Therefore, it is possible to obtain an advantageous effect of more effectively removing the residual chemical that may remain in the common chamber and the inflow flow channel.

Another exemplary embodiment of the present invention provides a chemical sampling device including: a first sampling line configured to supply a first chemical; a second sampling line configured to supply a second chemical; and a manifold assembly including: a body having a common chamber provided therein; a first chemical flow channel connected to the first sampling line and configured to supply the first chemical to the common chamber; a first valve configured to selectively open or close the first chemical flow channel; a second chemical flow channel connected to the second sampling line and configured to supply the second chemical to the common chamber; a second valve configured to selectively open or close the second chemical flow channel; and a discharge flow channel configured to communicate with the common chamber and discharge the first or second chemical, which is introduced into the common chamber, to the outside of the body.

According to the exemplary embodiment of the present invention, the first chemical flow channel includes: a first supply flow channel provided in the body and configured to supply the first chemical; a first inflow flow channel provided in a lateral

surface of the body and configured to communicate with the common chamber; and a first guide flow channel provided in the lateral surface of the body and configured to communicate with the first supply flow channel and the first inflow flow channel and guide the first chemical to the first inflow flow channel, the first valve selectively opens or closes an outlet of the first supply flow channel or an inlet of the first inflow flow channel, the second chemical flow channel includes: a second supply flow channel provided in the body and configured to supply the second chemical; a second inflow flow channel provided in the lateral surface of the body and configured to communicate with the common chamber; and a second guide flow channel provided in the lateral surface of the body and configured to communicate with the second supply flow channel and the second inflow flow channel and guide the second chemical to the second inflow flow channel, and the second valve selectively opens or closes an outlet of the second supply flow channel or an inlet of the second inflow flow channel.

According to the exemplary embodiment of the present invention, the first supply flow channel includes: a first vertical flow channel provided in an upper surface of the body; and a first horizontal flow channel provided in a wall surface of the first guide flow channel and configured to communicate with the first vertical flow channel, an end of the first horizontal flow channel defines the outlet of the first supply flow channel in the wall surface of the first guide flow channel, the second supply flow channel includes: a second vertical flow channel provided in an upper surface of the body; and a second horizontal flow channel provided in a wall surface of the second guide flow channel and configured to communicate with the second vertical flow channel, and an end of the second horizontal flow channel defines the outlet of the second supply flow channel in the wall surface of the second guide flow channel.

According to the exemplary embodiment of the present invention, the second

chemical is drained through the common chamber before the second chemical is sampled after the first chemical is sampled.

As described above, the second chemical is not sampled immediately after the first chemical is sampled, but the second chemical is drained through the common chamber for a predetermined time (or at a predetermined flow rate). Therefore, it is possible to obtain an advantageous effect of minimizing the contamination of the second chemical, the deterioration in purity, and the error of the analysis result caused by the residual chemical (first chemical) remaining in the common chamber and an advantageous effect of improving the reliability related to the analysis of the degree of contamination and substances of the chemical.

[Advantageous Effects]

According to the embodiment of the present invention described above, it is possible to obtain an advantageous effect of simplifying the process of discharging, removing, and sampling the chemical and improving the stability and reliability.

In particular, according to the embodiment of the present invention, it is possible to obtain an advantageous effect of discharging, removing, and sampling, at the single position, the chemicals supplied from the plurality of sampling lines.

In addition, according to the embodiment of the present invention, it is possible to obtain an advantageous effect of minimizing the contamination of the chemicals, the deterioration in purity, and the error of the analysis result during the process of discharging, removing, and sampling the chemicals supplied from the different sampling lines.

In addition, according to the embodiment of the present invention, it is possible to obtain an advantageous effect of improving the accuracy related to the analysis of the degree of contamination and substances of the chemical.

In addition, according to the embodiment of the present invention, it is possible to obtain an advantageous effect of simplifying the structure and improving the spatial utilization.

[Description of Drawings]

FIG. 1 is a view for explaining a chemical storage facility according to an embodiment of the present invention.

FIG. 2 is a view for explaining a manifold assembly according to the embodiment of the present invention.

FIG. 3 is a view for explaining a discharge flow channel of the manifold assembly according to the embodiment of the present invention.

FIG. 4 is a view for explaining a guide flow channel of the manifold assembly according to the embodiment of the present invention.

FIG. 5A is a cross-sectional view for explaining a first chemical flow channel of the manifold assembly according to the embodiment of the present invention.

FIG. 5B is a view illustrating a structure in the related art in which a plurality of sampling lines is connected to a single discharge flow channel.

FIG. 6 is a cross-sectional view for explaining a second chemical flow channel of the manifold assembly according to the embodiment of the present invention.

FIG. 7 is a cross-sectional view for explaining a third chemical flow channel of the manifold assembly according to the embodiment of the present invention.

FIGS. 8 and 9 are views for explaining a structure for operating a valve of the manifold assembly according to the embodiment of the present invention.

FIG. 10 is a view for explaining an inclined guide surface of the manifold assembly according to the embodiment of the present invention.

[Mode for Invention]

Hereinafter, embodiments of the present invention will be described with reference to the accompanying drawings.

However, the technical spirit of the present invention is not limited to some embodiments described herein but may be implemented in various different forms. One or more of the constituent elements in the embodiments may be selectively combined and substituted for use within the scope of the technical spirit of the present invention.

In addition, unless otherwise specifically and explicitly defined and stated, the terms (including technical and scientific terms) used in the embodiments of the present invention may be construed as the meaning which may be commonly understood by the person with ordinary skill in the art to which the present invention pertains. The meanings of the commonly used terms such as the terms defined in dictionaries may be interpreted in consideration of the contextual meanings of the related technology.

In addition, the terms used in the embodiments of the present invention are for explaining the embodiments, not for limiting the present invention.

In the present specification, unless particularly stated otherwise, a singular form may also include a plural form. The expression "at least one (or one or more) of A, B, and C" may include one or more of all combinations that can be made by combining A, B, and C.

In addition, the terms first, second, A, B, (a), and (b) may be used to describe constituent elements of the embodiments of the present invention.

These terms are used only for the purpose of discriminating one constituent element from another constituent element, and the nature, the sequences, or the orders of the constituent elements are not limited by the terms.

Further, when one constituent element is described as being 'connected', 'coupled', or 'attached' to another constituent element, one constituent element may be connected,

coupled, or attached directly to another constituent element or connected, coupled, or attached to another constituent element through still another constituent element interposed therebetween.

In addition, the expression "one constituent element is provided or disposed above (on) or below (under) another constituent element" includes not only a case in which the two constituent elements are in direct contact with each other, but also a case in which one or more other constituent elements are provided or disposed between the two constituent elements. The expression "above (on) or below (under)" may mean a downward direction as well as an upward direction based on one constituent element.

Referring to FIGS. 1 to 9, a manifold assembly 100 according to an embodiment of the present invention includes: a body 110 having a common chamber 112 provided therein; a first chemical flow channel 120 connected to the common chamber 112 and configured to supply a first chemical; a first valve 152 configured to selectively open or close the first chemical flow channel 120; a second chemical flow channel 130 connected to the common chamber 112 and configured to supply a second chemical; a second valve 154 configured to selectively open or close the second chemical flow channel 130; and a discharge flow channel 114 configured to communicate with the common chamber 112 and configured to discharge the first or second chemical, which is introduced into the common chamber 112, to the outside of the body 110.

For reference, the manifold assembly 100 according to the embodiment of the present invention is provided to collect chemicals supplied through sampling lines L1, L2, and L3. For example, the manifold assembly 100 may be mounted in a chemical storage facility 1 and constitute a chemical sampling device 10 in order to sample a chemical at a main position on a tank truck, a drum, a bottle, a storage tank, a pipe, or the like.

Referring to FIG. 1, the chemical storage facility 1 may include an automatic

clean quick coupler (ACQC) unit 2, a first chemical storage tank 3, a chemical distribution device 4, and a plurality of second chemical storage tanks 5 and 6.

The ACQC unit 2 may transfer chemicals, which are supplied from a tank truck, to the first chemical storage tank 3. The chemical distribution device 4 may divide some of the chemicals stored in the first chemical storage tank 3 and supply the chemicals to the plurality of second chemical storage tanks 5 and 6.

For example, the chemical sampling device 10 may be connected to the chemical storage tanks 3, 5, and 6 through the plurality of sampling lines L1, L2, and L3. On-off valves V and pumps P for adjusting the transfer of the chemicals may be provided in the sampling lines L1, L2, and L3.

According to another embodiment of the present invention, gas (e.g., nitrogen or air) may be supplied to a chemical supply source, such that the chemical from the chemical supply source may be transferred through the sampling line.

In the embodiment of the present invention, the example has been described in which the sampling lines L1, L2, and L3 are connected to the chemical storage tanks. However, according to another embodiment of the present invention, the sampling lines may be connected to all types of chemical supply sources such as the tank truck, the drum, the bottle, the storage tank, and the pipe that supply, store, or transfer the chemicals. The present invention is not restricted or limited by the object or position to which the sampling line is connected.

According to the exemplary embodiment of the present invention, the manifold assembly 100 includes the plurality of chemical flow channels 120, 130, and 140 respectively connected to the plurality of sampling lines L1, L2, and L3, and a plurality of valves 152, 154, and 156 configured to independently open or close the chemical flow channels 120, 130, and 140.

Hereinafter, an example will be described in which three chemical flow channels are formed in the manifold assembly 100, and the three sampling lines L1, L2, and L3 are respectively connected to the chemical flow channels. According to another embodiment of the present invention, two or four or more sampling lines may be connected to the manifold assembly. The present invention is not restricted or limited by the number of sampling lines (the number of chemical flow channels).

More specifically, referring to FIGS. 2 to 9, the manifold assembly 100 includes: the body 110 having the common chamber 112 provided therein; the first chemical flow channel 120 connected to the common chamber 112 and configured to supply the first chemical; the first valve 152 configured to selectively open or close the first chemical flow channel 120; the second chemical flow channel 130 connected to the common chamber 112 and configured to supply the second chemical; the second valve 154 configured to selectively open or close the second guide flow channel 136; the third chemical flow channel 140 connected to the common chamber 112 and configured to supply a third chemical; a third valve 156 configured to selectively open or close the third chemical flow channel 140; and the discharge flow channel 114 configured to communicate with the common chamber 112 and configured to discharge the chemical, which is introduced into the common chamber 112, (any one of the first chemical, the second chemical, and the third chemical) to the outside of the body 110.

The common chamber 112 is provided in the body 110 and accommodates the chemical (any one of the first chemical, the second chemical, and the third chemical).

The body 110 may have various structures having the common chamber 112 provided therein. The present invention is not restricted or limited by the shape and structure of the body 110. For example, the body 110 may have an approximately triangular cross-sectional shape.

The common chamber 112 is provided to define a sealed accommodation space in the body 110, and the accommodation space accommodates the chemical.

The common chamber 112 may have various structures capable of accommodating the chemical. The present invention is not restricted or limited by the structure and shape of the common chamber 112.

For example, the common chamber 112 may be provided in the form of an approximately circular block and disposed at a central portion of the body 110. According to another embodiment of the present invention, the common chamber may be provided to have a quadrangular block shape or other shapes.

In particular, an inner wall surface of the common chamber 112 may be provided as a curved surface. In this case, the configuration in which the inner wall surface of the common chamber 112 is provided as a curved surface means that the common chamber 112 is provided in the form of a circular block or an elliptical block.

Because the inner wall surface of the common chamber 112 is configured as a curved surface as described above, it is possible to obtain an advantageous effect of minimizing a situation in which the chemical introduced into the common chamber 112 remains on the inner wall surface (e.g., an edge portion) of the common chamber 112.

The first chemical flow channel 120 is connected to the common chamber 112 and configured to supply the first chemical to the common chamber 112.

The first chemical flow channel 120 may have various structures capable of supplying the first chemical to the common chamber 112.

For example, referring to FIG. 5A, the first chemical flow channel 120 includes: a first supply flow channel 122 provided in the body 110 and configured to supply the first chemical; a first inflow flow channel 124 provided in a lateral surface of the body 110 and configured to communicate with the common chamber 112; and a first guide flow

channel 126 provided in the lateral surface of the body 110 and configured to communicate with the first supply flow channel 122 and the first inflow flow channel 124 and guide the first chemical to the first inflow flow channel 124.

In particular, the first supply flow channel 122 is formed in an approximately "L" shape and includes a first vertical flow channel 122a provided in an upper surface (based on FIG. 2) of the body 110, and a first horizontal flow channel 122b provided in the lateral surface of the body 110 and configured to communicate with the first vertical flow channel 122a. According to another embodiment of the present invention, the first horizontal flow channel may be provided in the lateral surface of the body, and the first vertical flow channel may be provided in the upper surface (or bottom surface) of the body.

The first inflow flow channel 124 communicates with a lateral portion of the common chamber 112 and penetrates the lateral surface of the body 110. That is, one end of the first inflow flow channel 124 communicates with the lateral portion of the common chamber 112, and the other end of the first inflow flow channel 124 is exposed to the lateral surface of the body 110. For example, the first inflow flow channel 124 may be provided to be directed toward a center of the common chamber 112 along a reference line that passes through the center of the common chamber 112.

The first guide flow channel 126 is provided in an outer surface (e.g., the lateral surface) of the body 110 and allows the first supply flow channel 122 and the first inflow flow channel 124 to communicate with each other. The first guide flow channel 126 guides the first chemical, which is supplied to the first supply flow channel 122, to the first inflow flow channel 124.

More specifically, the first guide flow channel 126 is formed in a concave dome shape in one side surface of the body 110 so that the first guide flow channel 126 is

disposed between the lateral surface of the body 110 and the first valve 152 to be described below. An outlet of the first supply flow channel 122 (an outlet of the first horizontal flow channel 122b) and an inlet of the first inflow flow channel 124 are positioned in the first guide flow channel 126.

In this case, the configuration in which the outlet of the first horizontal flow channel 122b and the inlet of the first inflow flow channel 124 are positioned in the first guide flow channel 126 means that the outlet of the first horizontal flow channel 122b and the inlet of the first inflow flow channel 124 are exposed to a wall surface of the first guide flow channel 126 that faces the first valve 152.

The first valve 152 is configured to selectively open or close the first chemical flow channel 120.

In particular, the first valve 152 is configured to selectively open or close the outlet of the first supply flow channel 122 and the inlet of the first inflow flow channel 124.

For reference, in a state in which the first valve 152 closes the outlet of the first supply flow channel 122 and the inlet of the first inflow flow channel 124, the first supply flow channel 122 and the first inflow flow channel 124 may be spatially and completely separated. The first valve 152 may close the outlet of the first supply flow channel 122 and/or the inlet of the first inflow flow channel 124.

Therefore, the first valve 152 may cut off the supply of the first chemical through the first sampling line L1 by preventing the first chemical from being introduced into the first inflow flow channel 124. Therefore, it is possible to prevent the first chemical from being introduced into the common chamber 112 any further.

The first chemical remaining in the common chamber 112, the discharge flow channel 114, and the first inflow flow channel 124 may be removed by using another

chemical. For example, a predetermined amount of the second chemical (or the third chemical) is discharged when the supply of the first chemical through the first sampling line L1 is cut off and the second chemical is supplied through the second sampling line L2 (or the third chemical is supplied through the third sampling line). Therefore, it is possible to remove the first chemical remaining in the common chamber 112, the discharge flow channel 114, and the first inflow flow channel 124. The second and third chemicals remaining in the common chamber 112, the discharge flow channel 114, and the first inflow flow channel 124 may be removed by the same method.

However, the present invention is not necessarily limited thereto. The chemical remaining in the common chamber 112 and the discharge flow channel 114 may be removed by using cleaning water. For example, in a case in which cleaning water is connected to the third sampling line L3, the chemical remaining in the common chamber 112, the discharge flow channel 114, and the first inflow flow channel 124 may be removed by injecting cleaning water through the third sampling line L3 immediately after the first chemical is used. Thereafter, another chemical may be sampled.

If the first chemical, the second chemical, and the third chemical are respectively discharged through independent discharge flow channels 114, the discharge flow channel, through which the first chemical is discharged, cannot be cleaned by using another chemical.

In addition, even in a case in which a single discharge flow channel L4 is formed by connecting the sampling lines L1, L2, and L3 for the first chemical, the second chemical, and the third chemical as illustrated in FIG. 5B, the chemical remaining between the discharge flow channel L4 and valves V1, V2, and V3 respectively connected to the sampling lines L1, L2, and L3 cannot be removed by using another chemical. For example, the first chemical C1 remaining between the discharge flow channel L4 and the

first valve V1 in the first sampling line L1 cannot be removed by using the second or third chemical.

In contrast, the embodiment has an advantage in that the region between the valve and the discharge flow channel may be cleaned by using another chemical. That is, the first to third inflow flow channels, the common chamber, and the discharge flow channel are disposed adjacent to one another, such that the remaining chemical may be removed by using another chemical. Therefore, it is possible to obtain an advantageous effect of preventing contamination of the chemical, deterioration in the purity of the chemical, and an error of an analysis result and improving reliability related to an analysis of a degree of contamination of the chemical.

According to the embodiment, the first valve 152 may close the outlet of the first supply flow channel 122 and/or the inlet of the first inflow flow channel 124. Therefore, when the supply of the first chemical through the first sampling line L1 is cut off, the first chemical in the first supply flow channel 122 may be prevented from being introduced into the common chamber 112 through the first inflow flow channel 124.

The supply of the first chemical to the first inflow flow channel 124 is immediately cut off by the first valve 152, and the second chemical may be supplied through the second sampling line L2 (or the third chemical may be supplied through the third sampling line). In this case, the configuration for removing the chemical before sampling another chemical is as described above. Thereafter, in order to sample the first chemical again, the first valve is opened to discharge the first chemical remaining in the first sampling line and the first inflow flow channel before performing the sampling. Therefore, it is possible to sample the first chemical that is not contaminated. That is, according to the embodiment, because the discharge of the first chemical is controlled by the first valve, a separate valve need not be provided in the sampling line. However, the

present invention is not necessarily limited thereto. A separate valve may be further provided, as necessary.

The first valve 152 may have various structures capable of selectively opening or closing the first chemical flow channel 120. The present invention is not restricted or limited by the type and structure of the first valve 152.

In particular, the first valve 152 may selectively open or close the first chemical flow channel 120 by opening or closing (e.g., simultaneously) the outlet of the first supply flow channel 122 and the inlet of the first inflow flow channel 124. According to another embodiment of the present invention, the first valve may be configured to solely open or close only the inlet of the first inflow flow channel.

More specifically, referring to FIGS. 8 and 9, the first valve 152 includes: a valve body 150a disposed to cover the first guide flow channel 126; a cylinder member 150b provided in the valve body 150a and configured to be rectilinearly movable in directions toward and away from the wall surface of the first guide flow channel 126; and a diaphragm 150c configured to selectively come into close contact with the wall surface of the first guide flow channel 126 by being pressed by the cylinder member 150b.

The valve body 150a of the first valve 152 is coupled to an outer surface of the body 110 so as to cover the first guide flow channel 126. The first guide flow channel 126 is defined between the valve body 150a of the first valve 152 and the outer surface of the body 110.

The cylinder member 150b of the first valve 152 is provided in the valve body 150a of the first valve 152 and configured to be rectilinearly movable in the directions toward and away from the wall surface of the first guide flow channel 126 (the lateral surface of the body 110).

The cylinder member 150b of the first valve 152 may be rectilinearly moved in

the valve body 150a of the first valve 152 by hydraulic or pneumatic pressure. The present invention is not restricted or limited by the method of rectilinearly moving the cylinder member 150b of the first valve 152. In some instances, the cylinder member 150b may be configured to be rectilinearly moved by a motor or other driving sources.

The diaphragm 150c may be made of a flexible material. The diaphragm 150c selectively comes into close contact with the wall surface of the first guide flow channel 126 by being pressed by the cylinder member 150b. The first supply flow channel 122 and the first inflow flow channel 124 communicate with each other in a state in which the diaphragm 150c is spaced apart from the wall surface of the first guide flow channel 126 (see FIG. 8). The first supply flow channel 122 and the first inflow flow channel 124 are spatially blocked from each other in a state in which the diaphragm 150c is in close contact with the wall surface of the first guide flow channel 126 (see FIG. 9).

Referring to FIG. 6, the second chemical flow channel 130 is connected to the common chamber 112 and configured to supply the second chemical to the common chamber 112.

The second chemical flow channel 130 may have various structures capable of supplying the second chemical to the common chamber 112.

For example, the second chemical flow channel 130 includes: a second supply flow channel 132 provided in the body 110 and configured to supply the second chemical; a second inflow flow channel 134 provided in the lateral surface of the body 110 and configured to communicate with the common chamber 112; and a second guide flow channel 136 provided in the lateral surface of the body 110 and configured to communicate with the second supply flow channel 132 and the second inflow flow channel 134 and guide the second chemical to the second inflow flow channel 134.

In particular, the second supply flow channel 132 is formed in an approximately

"L" shape and includes a second vertical flow channel 132a provided in the upper surface (based on FIG. 2) of the body 110, and a second horizontal flow channel 132b provided in the lateral surface of the body 110 and configured to communicate with the second vertical flow channel 132a. According to another embodiment of the present invention, the second horizontal flow channel may be provided in the lateral surface of the body, and the second vertical flow channel may be provided in the upper surface (or bottom surface) of the body.

The second inflow flow channel 134 communicates with the lateral portion of the common chamber 112 and penetrates the lateral surface of the body 110. That is, one end of the second inflow flow channel 134 communicates with the lateral portion of the common chamber 112, and the other end of the second inflow flow channel 134 is exposed to the lateral surface of the body 110.

The second guide flow channel 136 is provided in the outer surface (e.g., the lateral surface) of the body 110 and allows the second supply flow channel 132 and the second inflow flow channel 134 to communicate with each other. The second guide flow channel 136 guides the second chemical, which is supplied to the second supply flow channel 132, to the second inflow flow channel 134. For example, the second inflow flow channel 134 may be provided to be directed toward the center of the common chamber 112 along the reference line that passes through the center of the common chamber 112.

More specifically, the second guide flow channel 136 is formed in a concave dome shape in another side surface of the body 110 so that the second guide flow channel 136 is disposed between the lateral surface of the body 110 and the second valve 154 to be described below. An outlet of the second supply flow channel 132 (an outlet of the second horizontal flow channel 132b) and an inlet of the second inflow flow channel 134

are positioned in the second guide flow channel 136.

In this case, the configuration in which the outlet of the second horizontal flow channel 132b and the inlet of the second inflow flow channel 134 are positioned in the second guide flow channel 136 means that the outlet of the second horizontal flow channel 132b and the inlet of the second inflow flow channel 134 are exposed to a wall surface of the second guide flow channel 136 that faces the second valve 154.

The second valve 154 is configured to selectively open or close the second chemical flow channel 130.

In particular, the second valve 154 is configured to open or close the outlet of the second supply flow channel 132 and/or the inlet of the second inflow flow channel 134.

In a state in which the second valve 154 closes the outlet of the second supply flow channel 132 and the inlet of the second inflow flow channel 134, the second supply flow channel 132 and the second inflow flow channel 134 may be spatially and completely separated.

Therefore, the second valve 154 may cut off the supply of the second chemical through the second sampling line L2 by preventing the second chemical from being introduced into the second inflow flow channel 134. Therefore, it is possible to prevent the second chemical from being introduced into the common chamber 112.

As described above, the second chemical remaining in the common chamber 112, the inflow flow channel 134, and the discharge flow channel 114 may be removed by using another chemical or cleaning water. The second valve 154 may perform the same function as the first valve.

The second valve 154 may have various structures capable of selectively opening or closing the second chemical flow channel 130. The present invention is not restricted or limited by the type and structure of the second valve 154.

In particular, the second valve 154 may selectively open or close the second chemical flow channel 130 by opening or closing (e.g., simultaneously) the outlet of the second supply flow channel 132 and the inlet of the second inflow flow channel 134. According to another embodiment of the present invention, the second valve may be configured to solely open or close only the inlet of the second inflow flow channel.

More specifically, the second valve 154 includes: a valve body 150a disposed to cover the second guide flow channel 136; a cylinder member 150b provided in the valve body 150a and configured to be rectilinearly movable in directions toward and away from the wall surface of the second guide flow channel 136; and a diaphragm 150c configured to selectively come into close contact with the wall surface of the second guide flow channel 136 by being pressed by the cylinder member 150b (see FIGS. 8 and 9).

The valve body 150a of the second valve 154 is coupled to the outer surface of the body 110 so as to cover the second guide flow channel 136. The second guide flow channel 136 is defined between the valve body 150a of the second valve 154 and the outer surface of the body 110.

The cylinder member 150b of the second valve 154 is provided in the valve body 150a of the second valve 154 and configured to be rectilinearly movable in the directions toward and away from the wall surface of the second guide flow channel 136 (the lateral surface of the body 110).

The cylinder member 150b of the second valve 154 may be rectilinearly moved in the valve body 150a of the second valve 154 by hydraulic or pneumatic pressure. The present invention is not restricted or limited by the method of rectilinearly moving the cylinder member 150b of the second valve 154. In some instances, the cylinder member 150b may be configured to be rectilinearly moved by a motor or other driving sources.

The diaphragm 150c may be made of a flexible material. The diaphragm 150c

selectively comes into close contact with the wall surface of the second guide flow channel 136 by being pressed by the cylinder member 150b. The second supply flow channel 132 and the second inflow flow channel 134 communicate with each other in a state in which the diaphragm 150c is spaced apart from the wall surface of the second guide flow channel 136. The second supply flow channel 132 and the second inflow flow channel 134 are spatially blocked from each other in a state in which the diaphragm 150c is in close contact with the wall surface of the second guide flow channel 136.

Referring to FIG. 7, the third chemical flow channel 140 is connected to the common chamber 112 and configured to supply the third chemical to the common chamber 112.

The third chemical flow channel 140 may have various structures capable of supplying the third chemical to the common chamber 112.

The third chemical flow channel 140 includes: a third supply flow channel 142 provided in the body 110 and configured to supply the third chemical; a third inflow flow channel 144 provided in the lateral surface of the body 110 and configured to communicate with the common chamber 112; and a third guide flow channel 146 provided in the lateral surface of the body 110 and configured to communicate with the third supply flow channel 142 and the third inflow flow channel 144 and guide the third chemical to the third inflow flow channel 144.

In particular, the third supply flow channel 142 is formed in an approximately "L" shape and includes a third vertical flow channel 142a provided in the upper surface (based on FIG. 2) of the body 110, and a third horizontal flow channel 142b provided in the lateral surface of the body 110 and configured to communicate with the third vertical flow channel 142a. According to another embodiment of the present invention, the third horizontal flow channel may be provided in the lateral surface of the body, and the third

vertical flow channel may be provided in the upper surface (or bottom surface) of the body.

The third inflow flow channel 144 communicates with the lateral portion of the common chamber 112 and penetrates the lateral surface of the body 110. That is, one end of the third inflow flow channel 144 communicates with the lateral portion of the common chamber 112, and the other end of the third inflow flow channel 144 is exposed to the lateral surface of the body 110. For example, the third inflow flow channel 144 may be provided to be directed toward the center of the common chamber 112 along the reference line that passes through the center of the common chamber 112.

The third guide flow channel 146 is provided in the outer surface (e.g., the lateral surface) of the body 110 and allows the third supply flow channel 142 and the third inflow flow channel 144 to communicate with each other. The third guide flow channel 146 guides the third chemical, which is supplied to the third supply flow channel 142, to the third inflow flow channel 144.

More specifically, the third guide flow channel 146 is formed in a concave dome shape in another side surface of the body 110 so that the third guide flow channel 146 is disposed between the lateral surface of the body 110 and the third valve 156 to be described below. An outlet of the third supply flow channel 142 (an outlet of the third horizontal flow channel 142b) and an inlet of the third inflow flow channel 144 are positioned in the third guide flow channel 146.

In this case, the configuration in which the outlet of the third horizontal flow channel 142b and the inlet of the third inflow flow channel 144 are positioned in the third guide flow channel 146 means that the outlet of the third horizontal flow channel 142b and the inlet of the third inflow flow channel 144 are exposed to a wall surface of the third guide flow channel 146 that faces the third valve 156.

The third valve 156 is configured to selectively open or close the third chemical flow channel 140.

In particular, the third valve 156 is configured to open or close the outlet of the third supply flow channel 142 and/or the inlet of the third inflow flow channel 144.

For reference, in a state in which the third valve 156 closes the outlet of the third supply flow channel 142 and the inlet of the third inflow flow channel 144, the third supply flow channel 142 and the third inflow flow channel 144 may be spatially and completely separated.

Therefore, the third valve 156 may cut off the supply of the third chemical through the third sampling line L3 by preventing the third chemical from being introduced into the third inflow flow channel 144. Therefore, it is possible to prevent the third chemical from being introduced into the common chamber 112.

As described above, the third chemical remaining in the common chamber 112, the third inflow flow channel 144, and the discharge flow channel 114 may be removed by using another chemical or cleaning water.

The third valve 156 may have various structures capable of selectively opening or closing the third chemical flow channel 140. The present invention is not restricted or limited by the type and structure of the third valve 156.

In particular, the third valve 156 may selectively open or close the third chemical flow channel 140 by opening or closing (e.g., simultaneously) the outlet of the third supply flow channel 142 and the inlet of the third inflow flow channel 144. According to another embodiment of the present invention, the third valve may be configured to solely open or close only the inlet of the third inflow flow channel.

More specifically, the third valve 156 includes: a valve body 150a disposed to cover the third guide flow channel 146; a cylinder member 150b provided in the valve

body 150a and configured to be rectilinearly movable in directions toward and away from the wall surface of the third guide flow channel 146; and a diaphragm 150c configured to selectively come into close contact with the wall surface of the third guide flow channel 146 by being pressed by the cylinder member 150b (see FIGS. 8 and 9).

The valve body 150a of the third valve 156 is coupled to the outer surface of the body 110 so as to cover the third guide flow channel 146. The third guide flow channel 146 is defined between the valve body 150a of the third valve 156 and the outer surface of the body 110.

The cylinder member 150b of the third valve 156 is provided in the valve body 150a of the third valve 156 and configured to be rectilinearly movable in the directions toward and away from the wall surface of the third guide flow channel 146 (the lateral surface of the body 110).

The cylinder member 150b of the third valve 156 may be rectilinearly moved in the valve body 150a of the third valve 156 by hydraulic or pneumatic pressure. The present invention is not restricted or limited by the method of rectilinearly moving the cylinder member 150b of the third valve 156. In some instances, the cylinder member 150b may be rectilinearly moved by a motor or other driving sources.

The diaphragm 150c may be made of a flexible material. The diaphragm 150c selectively comes into close contact with the wall surface of the third guide flow channel 146 by being pressed by the cylinder member 150b. The third supply flow channel 142 and the third inflow flow channel 144 communicate with each other in a state in which the diaphragm 150c is spaced apart from the wall surface of the third guide flow channel 146. The third supply flow channel 142 and the third inflow flow channel 144 are spatially blocked from each other in a state in which the diaphragm 150c is in close contact with the wall surface of the third guide flow channel 146.

In particular, the first, second, and third valves 152, 154, and 156 are disposed on the lateral surface of the body 110 and spaced apart from one another at equal intervals in a circumferential direction of the common chamber 112.

In the embodiment of the present invention, the inlets of the first, second, and third supply flow channels 122, 132, and 142 are provided in the upper surface of the body 110, and the first, second, and third valves 152, 154, and 156 are mounted on the lateral surface of the body 110. Therefore, it is possible to obtain an advantageous effect of easily mounting the sampling lines in the inlets of the first, second, and third supply flow channels 122, 132, and 142 without interference between the first, second, and third valves 152, 154, and 156.

The discharge flow channel 114 may be provided in the bottom surface of the body 110 and configured to communicate with the common chamber 112. The first, second, or third chemical, which is introduced into the common chamber 112, may be discharged to the outside of the body 110 through a discharge line connected to the discharge flow channel 114.

For reference, the chemical discharged through the discharge line may be stored in a container (not illustrated). The container filled with the chemical may be fastened to a lid and transferred to a location where the analysis of a degree of contamination and substances is performed.

Various storage means capable of storing the chemical and having a selectively separable lid may be used as the container. The present invention is not restricted or limited by the structure and shape of the container.

For example, a sampling bottle capable of storing the chemical may be used as the container. The lid may be fastened to or separated from the container by being rotated along a screw thread formed on an injection port of the container.

In particular, the residual chemical remaining in the common chamber 112 may be collected by a drain device (not illustrated) before the chemical is discharged through the discharge flow channel 114.

That is, a small amount of the first chemical may remain in the common chamber 112 even after the first chemical is discharged. There is a likelihood that the chemical remaining in the common chamber 112 stagnates and is contaminated or causes sediment as a predetermined time elapses. If the second chemical (or the third chemical) is discharged through the common chamber 112 in this situation, the second chemical stored in the sampling bottle includes a small amount of the first chemical. For this reason, there are problems in that the second chemical is degraded in purity or contaminated, and the reliability related to the analysis of the degree of contamination and substances of the chemical deteriorates.

In contrast, according to the embodiment, the second chemical is not sampled immediately after the first chemical is sampled, but the second chemical is discharged by the drain device while passing through the common chamber 112 for a predetermined time (or at a predetermined flow rate). Therefore, it is possible to obtain an advantageous effect of minimizing the contamination of the second chemical and the deterioration in purity caused by the residual chemical (first chemical) remaining in the common chamber 112 and an advantageous effect of improving the reliability related to the analysis of the degree of contamination and substances of the chemical.

In addition, according to the exemplary embodiment of the present invention, all the first inflow flow channel 124, the second inflow flow channel 134, and the third inflow flow channel 144 communicate with the common chamber 112, such that the second chemical, which is introduced into the common chamber 112 during a process of draining the second chemical, may remove (drain) another chemical, which may remain in the first

inflow flow channel 124 and the third inflow flow channel 144, and another chemical attached to the outer surface of the diaphragm 150c (the surface facing the common chamber 112). Therefore, it is possible to obtain an advantageous effect of more effectively preventing the contamination of the second chemical and the deterioration in purity.

Meanwhile, FIG. 10 is a view for explaining an inclined guide surface of the manifold assembly 100 according to the embodiment of the present invention. Further, the parts identical and equivalent to the parts in the above-mentioned configuration will be designated by the identical or equivalent reference numerals, and detailed descriptions thereof will be omitted.

In the embodiment of the present invention illustrated and described above, the example has been described in which the first inflow flow channel 124, the second inflow flow channel 134, and the third inflow flow channel 144 are provided to be directed toward the center of the common chamber 112. However, according to another embodiment of the present invention, the first inflow flow channel 124, the second inflow flow channel 134, and the third inflow flow channel 144 may be inclined with respect to a reference line CL that passes through the center x of the common chamber 112.

Referring to FIG. 10, a first inclined guide surface 124a may be formed on the wall surface of the first inflow flow channel 124. The first inclined guide surface 124a may guide the first chemical, which is introduced into the first inflow flow channel 124, in a direction inclined with respect to the reference line CL that passes through the center x of the common chamber 112.

In addition, a second inclined guide surface may be formed on the wall surface of the second inflow flow channel 134. The second inclined guide surface may guide the second chemical, which is introduced into the second inflow flow channel 134, in a

direction inclined with respect to the reference line CL that passes through the center x of the common chamber 112.

Likewise, a third inclined guide surface 144a may be formed on the wall surface of the third inflow flow channel 144. The third inclined guide surface 144a may guide the third chemical, which is introduced into the third inflow flow channel 144, in a direction inclined with respect to the reference line CL that passes through the center x of the common chamber 112.

Inclination angles θ of the first inclined guide surface 124a, the second inclined guide surface, and the third inclined guide surface 144a may be variously changed within a range in which a vortex flow with a swirling shape is forcibly formed in the common chamber 112. The present invention is not restricted or limited by the inclination angles θ of the first inclined guide surface 124a, the second inclined guide surface, and the third inclined guide surface 144a.

As described above, the first, second, or third chemical, which is introduced into the first inflow flow channel 124, the second inflow flow channel 134, or the third inflow flow channel 144, is guided along the first inclined guide surface 124a, the second inclined guide surface, or the third inclined guide surface 144a in the direction inclined with respect to the reference line CL that passes through the center x of the common chamber 112, such that the chemical introduced into the common chamber 112 may forcibly form a vortex flow with a swirling shape. Therefore, it is possible to obtain an advantageous effect of more effectively removing the residual chemical that may remain in the common chamber 112 and the first, second, or third inflow flow channel 124, 134, or 144.

That is, because the chemical introduced into the common chamber 112 may form a vortex flow with a swirling shape, it is possible to minimize a situation in which

the chemical is discharged while being concentrated in a particular region in the common chamber 112. Therefore, it is possible to obtain an advantageous effect of more effectively removing the residual chemical that may remain in the common chamber 112 and the inflow flow channel.

The embodiments have been described above, but the embodiments are just illustrative and not intended to limit the present invention. It can be appreciated by those skilled in the art that various modifications and alterations, which are not described above, may be made without departing from the intrinsic features of the present invention. For example, the respective constituent elements specifically described in the embodiments may be modified and then carried out. Further, it should be interpreted that the differences related to the modifications and applications are included in the scope of the present invention defined by the appended claims.

[CLAIMS]

[Claim 1]

A manifold assembly comprising:

a body having a common chamber provided therein;

a first chemical flow channel connected to the common chamber and configured to supply a first chemical;

a first valve configured to selectively open or close the first chemical flow channel;

a second chemical flow channel connected to the common chamber and configured to supply a second chemical;

a second valve configured to selectively open or close the second chemical flow channel; and

a discharge flow channel configured to communicate with the common chamber and discharge the first or second chemical, which is introduced into the common chamber, to the outside of the body, wherein

the first chemical flow channel includes:

a first supply flow channel provided in the body and configured to supply the first chemical; and

a first inflow flow channel provided in a lateral surface of the body and having a first inclined guide surface, the first inflow flow channel configured to communicate with the common chamber,

the second chemical flow channel includes:

a second supply flow channel provided in the body and configured to supply the second chemical; and

a second inflow flow channel provided in a lateral surface of the body and having a second inclined guide surface, the second inflow flow channel configured to communicate with the common chamber,

the first inclined guide surface forms a first inclined angle with respect to a reference line passing through the center of the common chamber to generate a first vortex flow with a swirling shape when the first chemical is introduced into the common chamber, and

the second inclined guide surface forms a second inclined angle with respect to the reference line to generate a second vortex flow with swirling shape when the second chemical is introduced into the common chamber.

[Claim 2]

The manifold assembly of claim 1, wherein the first chemical flow channel further comprises

a first guide flow channel provided in the lateral surface of the body and configured to communicate with the first supply flow channel and the first inflow flow channel and guide the first chemical to the first inflow flow channel.

[Claim 3]

The manifold assembly of claim 2, wherein the first valve opens or closes an outlet of the first supply flow channel or an inlet of the first inflow flow channel.

[Claim 4]

The manifold assembly of claim 3, wherein the first supply flow channel comprises:

a first vertical flow channel provided in an upper surface of the body; and

a first horizontal flow channel provided in a wall surface of the first guide flow channel and configured to communicate with the first vertical flow channel,

wherein an end of the first horizontal flow channel defines the outlet of the first supply flow channel in the wall surface of the first guide flow channel, and

wherein the inlet of the first inflow flow channel is provided in the wall surface of the first guide flow channel.

[Claim 5]

The manifold assembly of claim 4, wherein the first valve comprises:

a valve body disposed to cover the first guide flow channel;

a cylinder member provided in the valve body and configured to be rectilinearly movable in directions toward and away from the wall surface of the first guide flow channel; and

a diaphragm configured to selectively come into close contact with the wall surface of the first guide flow channel by being pressed by the cylinder member.

[Claim 6]

The manifold assembly of claim 2, wherein the first inclined guide surface is provided on a wall surface of the first inflow flow channel, and the first inclined guide surface guides the first chemical, which is introduced into the first inflow flow channel, in a direction inclined with respect to a reference line that passes through a center of the common chamber.

[Claim 7]

The manifold assembly of claim 1, wherein the second chemical flow channel further comprises

a second guide flow channel provided in the lateral surface of the body and configured to communicate with the second supply flow channel and the second inflow flow channel and guide the second chemical to the second inflow flow channel.

[Claim 8]

The manifold assembly of claim 7, wherein the second valve opens or closes an outlet of the second supply flow channel or an inlet of the second inflow flow channel.

[Claim 9]

The manifold assembly of claim 8, wherein the second supply flow channel comprises:

a second vertical flow channel provided in an upper surface of the body; and

a second horizontal flow channel provided in a wall surface of the second guide flow channel and configured to communicate with the second vertical flow channel,

wherein an end of the second horizontal flow channel defines the outlet of the second supply flow channel in the wall surface of the second guide flow channel, and

wherein the inlet of the second inflow flow channel is provided in the wall surface of the second guide flow channel.

[Claim 10]

The manifold assembly of claim 9, wherein the second valve comprises:

a valve body disposed to cover the second guide flow channel;

a cylinder member provided in the valve body and configured to be rectilinearly movable in directions toward and away from the wall surface of the second guide flow channel; and

a diaphragm configured to selectively come into close contact with the wall surface of the second guide flow channel by being pressed by the cylinder member.

[Claim 11]

A chemical sampling device comprising:

a first sampling line configured to supply a first chemical;

a second sampling line configured to supply a second chemical; and

the manifold assembly according to any one of claims 1 to 10.

[Claim 12]

The chemical sampling device of claim 11, wherein the second chemical is drained through the common chamber before the second chemical is sampled after the first chemical is sampled.