bacteria count in minute amount is possible by the apparatus disclosed in Patent Literature 2, contamination inside the apparatus exerts great influence on a count value.

[0010]

For example, a reagent used for luminescence measurement is set in the apparatus after it is opened outside the apparatus, so there is a possibility of contamination occurred during a period from opening to setting in the apparatus.

Further, in the conventional art, according to manual luminescence measurement, a pipette and so on used when a reagent, a sample, and so on are dispensed are disposable and not required to be cleaned. However, when the above luminescence measurement apparatus is automated, there is required to establish a cleaning method of a reagent nozzle and a pipe connected to the nozzle easily and effectively in order to enhance measurement accuracy and sensitivity.

[0011]

Embodiments of ~~Thus,~~ the present invention provide~~s~~ pipe cleaning means that can effectively control introduction of viable bacteria to an inside of the apparatus and occurrence of contamination inside the apparatus and particularly provide a pipe cleaning method and a pipe cleaning mechanism in a luminescence measurement apparatus.

Solution to Problem

[0012]

According to a first aspect of the present invention, there is provided a

cleaning method of a pipe of a luminescence measurement apparatus including: a bacteriolytic step of supplying a sterilization reagent into a supply pipe for hot water or a reagent in the luminescence measurement apparatus and sterilizing an inside of the supply pipe; an ATP removal step of supplying an ATP removal reagent into the supply pipe after the sterilization of the inside of the supply pipe and removing ATP inside the supply pipe; and a step of replacing the ATP removal reagent in the supply pipe with pure water.

[0013]

According to a second aspect of the present invention, there is provided a cleaning method of a pipe of a luminescence measurement apparatus including: a bacteriolytic step of supplying a sterilization reagent from a hot-water supply nozzle from which hot water is supplied to a collection carrier to a membrane filter provided in a pipe on the upstream side of the hot-water supply nozzle and sterilizing an inside of the pipe; an ATP removal step of supplying an ATP removal reagent from the hot-water supply nozzle to the membrane filter and removing ATP in the pipe; and a step of replacing the ATP removal reagent in a course from the hot-water supply nozzle to the membrane filter with a hot-water buffer.

[0014]

According to a third aspect of the present invention, there is provided a cleaning method of a pipe of a luminescence measurement apparatus including: a bacteriolytic step of supplying a sterilization reagent from a buffer supply section to a reagent

dispensing section and sterilizing an inside of a pipe of the reagent dispensing section; an ATP removal step of supplying an ATP removal reagent from the buffer supply section to the reagent dispensing section and removing ATP inside the pipe of the reagent dispensing section; and a step of replacing the ATP removal reagent inside the pipe of the reagent dispensing section with control water.

[0015]

In this case, the sterilization reagent contains surfactant, trichloroacetic acid (TCA), tris buffers, ethanol, and lytic enzyme having protease activity. Also in this case, the ATP removal reagent contains at least one of apyrase, alkaline phosphatase, acid phosphatase, hexokinase, adenosine triphosphatase and adenosine phosphate deaminase.

[0016]

Disclosed herein is~~According to the present invention, there is provided~~ a pipe cleaning mechanism of a luminescence measurement apparatus including: a reagent/carrier container mounting section on which a sterilization reagent or an ATP removal reagent is placed; a hot-water supply section which connects a buffer supply section and a hot-water supply nozzle with a pipe and comprises a membrane filter and a pump on the pipe; and a hot-water supply cleaning control portion which supplies the sterilization reagent or the ATP removal reagent from the hot-water supply nozzle to the membrane filter by reversing the pump to apply sterilization processing or ATP removal processing to an inside of the pipe, and replaces the

sterilization reagent or the ATP removal reagent with a hot-water buffer.

[0017]

Disclosed herein is~~According to the present invention, there is provided~~ a pipe cleaning mechanism of a luminescence measurement apparatus including: a buffer supply section on which a sterilization reagent or an ATP removal reagent is placed; a reagent dispensing section which connects the buffer supply section and a reagent dispensing nozzle with a pipe and comprises a syringe pump on the pipe; and a reagent dispensing cleaning control portion which introduces the sterilization reagent or the ATP removal reagent into the pipe by operating the syringe pump to apply sterilization processing or ATP removal processing to an inside of the pipe, and replaces the sterilization reagent or the ATP removal reagent with control water.

Advantageous Effects of Invention

[0018]

According to embodiments of the pipe cleaning method and the pipe cleaning mechanism in the luminescence measurement apparatus of the present invention according to the above method and constitution, a supply pipe contaminated by bacteria and so on can be automatically cleaned easily and effectively.

Accordingly, the measurement accuracy and sensitivity of the luminescence measurement apparatus can be enhanced. Further, contaminated hot-water supply nozzle or reagent dispensing nozzle can be reused to thereby contribute to cost