[Problems to be solved by the Invention]

[0007]

Unfortunately, when the flow rate of supply water is decreased during operation of the electrodeionization system, there is a problem in that scale may occur due to excessive concentration of the concentrated water in each of the plurality of electrodeionization devices installed.

[0008]

Embodiments of the present invention provide an electrodeionization system that reduces the production cost while suppressing the occurrence of scale due to a decrease in the flow rate of supply water to each electrodeionization device.

[Means for solving the Problems]

[0009]

According to a first aspect of the present invention, there is provided an electrodeionization system including a plurality of electrodeionization devices installed in parallel, the electrodeionization system including: a supply water flow rate varying means that varies a flow rate of supply water to the plurality of electrodeionization devices; a concentrated water flow rate adjusting means that adjusts, for each electrodeionization device, a flow rate of concentrated water discharged from each of the plurality of electrodeionization devices; and a concentrated water flow rate maintaining means that maintains the flow rate of the concentrated water discharged from each of the plurality of electrodeionization devices at a certain level or higher, wherein the concentrated water flow rate maintaining means is installed only in a main flow path in which a plurality of sub-flow paths are integrated and a main path in which a

plurality of sub-paths are integrated, wherein desalted water produced in each of the plurality of electrodeionization devices flows through each of the plurality of sub-flow paths while concentrated water discharged from each of the plurality of electrodeionization devices flows through each of the plurality of sub-paths.

[0010]

According to the above aspect, even when the flow rate of supply water to the plurality of electrodeionization devices (also simply referred to as the flow rate of supply water) is varied, the flow rate of concentrated water discharged from each electrodeionization device (also simply referred to as the flow rate of concentrated water) can be kept constant thereby to suppress the occurrence of scale. Moreover, even when the concentrated water flow rate maintaining means is not provided in each of the sub-flow paths or sub-paths, the flow rate of concentrated water can be kept constant, provided that the concentrated water flow rate maintaining means is provided only in each of the main flow path for desalted water and the main path for concentrated water, and it is therefore possible to reduce the production cost of the electrodeionization system.

[0011]

In an embodiment of the above aspect, the supply water flow rate varying means may increase or decrease the flow rate of supply water within a range of 30% to 100%.

[0012]

In an embodiment of the above aspect, the concentrated water flow rate maintaining means may include a first control valve provided in the main flow path and a second control valve provided in the main path.

[0013]

In an embodiment of the above aspect, the concentrated water flow rate adjusting means may be a manual valve provided in each of the sub-paths.

[0014]

According to a second aspect of the present invention, there is provided a control method for an electrodeionization system including a plurality of electrodeionization devices installed in parallel, the control method including: a supply water flow rate varying step of varying a flow rate of supply water to the plurality of electrodeionization devices; a concentrated water flow rate adjusting step of adjusting, for each electrodeionization device, a flow rate of concentrated water discharged from each of the plurality of electrodeionization devices; and a concentrated water flow rate maintaining step of maintaining the flow rate of the concentrated water discharged from each of the plurality of electrodeionization devices at a certain level or higher using a first control valve and a second control valve, wherein the first control valve is provided only in a main flow path in which a plurality of sub-flow paths are integrated while the second control valve is provided only in a main path in which a plurality of sub-paths are integrated, wherein desalted water produced in each of the plurality of electrodeionization devices flows through each of the plurality of sub-flow paths while concentrated water discharged from each of the plurality of electrodeionization devices flows through each of the plurality of sub-paths.

[0015]

According to the above aspect, even when the flow rate of supply water to each electrodeionization device is varied in the electrodeionization system including the plurality of

electrodeionization devices, the flow rate of concentrated water discharged from each electrodeionization device can be kept constant thereby to suppress the occurrence of scale. Moreover, even when each sub-flow path or each sub-path does not include a control valve, the flow rate of concentrated water can be kept constant using the control valves provided only in the main flow path for flowing the desalted water and the main path for flowing the concentrated water, and it is therefore possible to reduce the operation cost of the electrodeionization system.

[0016]

In an embodiment of the above aspect, the supply water flow rate varying step may include increasing or decreasing the flow rate of supply water within a range of 30% to 100%.

[Advantageous Effect of the Invention]

[0017]

According to embodiments of the present invention, it is possible to provide an electrodeionization system that reduces the production cost while suppressing the occurrence of scale due to a decrease in the flow rate of supply water to each electrodeionization device.

[Brief Description of Drawings]

[0018]

FIG. 1 is a flow diagram illustrating an ultrapure water production apparatus to which an electrodeionization system according to the present invention can be applied.

FIG. 2 is a schematic diagram illustrating the electrodeionization system according to the present invention.

FIG. 3 is a schematic diagram illustrating the control