

ABSTRACT

A complex desalination system using seawater desalination pressure-retarded osmosis technology may include: a pre-treatment facility for pre-filtering seawater; a first pressure exchanger for receiving the seawater from the pre-treatment facility to increase a pressure; a second pressure exchanger for receiving at least some of the seawater supplied from the first pressure exchanger to increase a pressure; a first pressure control device for pressurizing the remaining of the seawater supplied from the first pressure exchanger; a second pressure control device for pressurizing the seawater supplied from the second pressure exchanger; a seawater reverse osmosis facility for producing product water by filtering out salt from the seawater supplied from the first pressure control device and the second pressure control device through a seawater desalination reverse osmosis membrane, and transferring seawater reverse osmosis brine from which salt has not been removed to the second pressure exchanger; a brackish water reverse osmosis facility for receiving effluent from a sewage treatment plant, filtering the effluent through a brackish water desalination reverse osmosis membrane, and discharging brackish water reverse osmosis brine that has not been filtered; and a pressure-retarded osmosis facility for supplying, to the first pressure exchanger, pressure-retarded osmosis product water filtered by performing a pressure-retarded osmosis process on the seawater reverse osmosis brine supplied from the second pressure exchanger and the brackish water reverse osmosis brine supplied from the brackish water reverse osmosis facility, respectively.