

Simultaneous power recovery of gauge and osmotic pressure from brine of SWRO desalination plants

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ABSTRACT

The process of recovering gauge pressure from SWRO desalination plants is well known, and based on implementation work exchangers like DWEER or ERI. The possibility to recover osmotic pressure as mechanical work was developed by Prof. Sidney Loeb 30–35 years ago and patented by the Ben-Gurion University of the Negev. Till now the osmotic pressure present in SWRO brine stream was practically not recovered. The paper presents a way that allows simultaneous power recovery of gauge and osmotic pressure. Simultaneous power recovery of both power sources gives a higher power yield than the two processes applied separately. Recovery of osmotic pressure is made by high fluxes and requires an effective membrane cleaning method. The paper presents a direct osmosis high salinity (DO-HS) membrane cleaning technology. The DO-HS technology provides a new approach to keeping membranes continually clean by frequent and short membrane backwash. RO membranes can be backwashed on-line ones a day without stopping a high pressure pump or decreasing the RO separation pressure. A few second injection of NaCl solution redirects the process from RO to DO and within 1 min the membranes are cleaned, and the process comes back to RO production.

Keywords: Reverse osmosis; Forward osmosis; Direct osmosis; Membrane biofouling; Power recovery
