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Improved Configuration for Batch Pressure-driven membrane separation (Batch Reverse Osmosis)

A novel batch reverse osmosis approach uses a reciprocating piston to increase recovery, reduce energy consumption to below 2 kWh/m^3 for seawater, and cut downtime significantly.

Researchers at Purdue University have developed a new approach to water treatment known as batch reverse osmosis (RO). Reverse osmosis is a critical step to water treatment to meet the need of clean drinking water for a growing global population. The technique created by Purdue researchers features a high-pressured feed tank with a reciprocation piston that fills one side with the following cycle's feedwater and then alternates treated water for new water repeatedly until at least 50% recovery is achieved, keeping permeate separate from either semi-batch. This approach shortens the traditional flushing step of emptying the feed tank as well as prevents brackish water and brine from mixing with the new feed, which is a major concern with standard systems. The batch RO method has potential to operate below 2 kWh/m^3 power for seawater and takes just 10% of the downtime of the entire RO process.

Advantages

-Reliable

-Lessens Downtime Between Batches

-Reduces Entropy Generation

-Low Power

Potential Applications

-Reverse Osmosis

-Water Treatment

TRL: 2

Technology ID
2020-WARS-68813

Category
GreenTech/Water & Resource Management

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Intellectual Property:

Provisional-Patent, 2019-10-01, United States | NATL-Patent, 2020-09-30, Saudi Arabia | PCT-Patent, 2020-09-30, WO | NATL-Patent, 2022-03-28, United States | DIV-Patent, 2025-08-21, United States

Keywords: batch reverse osmosis, water treatment, RO, feedwater, clean drinking water, high-pressured feed tank, reciprocation piston, brackish water, brine, low power, Clean Water, Drinking Water, Mechanical Engineering, membranes, Piston, Pressure, Processing, Water, Water Treatment