

Modeling and simulation of a new batch reverse osmosis (BRO)-Adsorption desalination (AD) hybrid system for multipurpose desalination

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.As expanding the capacity of desalination, the huge number of desalination plants installed worldwide make some serious problems, i.e. 1) high energy consumption [3, 4] and 2) environmental harmful effects by brine disposal. Batch reverse osmosis (BRO) is recently developed to minimize irreversible energy loss during the pressurization in the reverse osmosis (RO) system. However, BRO and RO systems cannot increase the recovery extremely for minimization of brine disposal because the maximum durable pressure of RO membrane is limited. Adsorption desalination (AD) was recently suggested to obtain high-quality freshwater by low-grade thermal energy. Because the performances of AD are not heavily influenced by feed concentration unlike RO, the AD system can be employed for brine management following the conventional desalination systems such as RO. In this study, we suggest a new design configuration of BRO-AD hybrid system for multipurpose desalination towards minimal liquid discharge. Mathematical modeling was developed to simulate the performances of BRO-AD hybrid system. The results showed that BRO-AD hybrid system is beneficial for low-energy, high-recovery desalination.