Effects of membrane resistivity, temperature, and flow rate on the pressure retarded osmosis (PRO) system with the spiral wound module for power generation

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Pressure retarded osmosis (PRO), that is the one of osmosis technologies, is able to produce renewable energy by utilizing the differences of concentration between a low salinity feed solution and a high salinity draw solution. The water flux and the solute flux across membrane were calculated. In addition, changes of operating temperature, inlet flow rate, and membrane resistivity were obtained. For the changes of operating temperature from 278K to 298K, water flux across membrane decreases about 30% along the direction of draw-fluid in our system. The changes of draw- and feed-flow rates also influences water flux and power density. As the inlet flow rate of seawater increases about 5 and 10 times, water flux increases about 5% and 10%, respectively. But, the maximum value of power density decreases slightly. On the other hand, the increase of inlet flow rate of water shows the opposite trend. In case of increasing membrane resistivity, the water flux shows the opposite results with membrane resistivity, 1K, for inlet pressure differential.