Experimental Investigation of Operating Parameters in Power Generation by Lab-Scale Reverse Electro-Dialysis (RED)

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Reverse electro-dialysis (RED) is a technology that produces electricity by mixing waters with different concentration. However, the power output of RED is subject to change with operating conditions. In this study, the authors fabricated a lab-scale RED, and attempted to evaluate the RED performance upon different operating parameters. First, the effect of salinity ratio on RED performance was examined by varying the concentration of low-salinity water. Their relationship was rationalized based on the change in open circuit voltage and individual resistance that was obtained from impedance analysis. Second, the authors have investigated the effect of rate of feed solution, which turned out to affect the concentration polarization of solution in RED. Finally, the effect of flow rate of rinse solution was studied. In conclusion, estimation on the trends in power output by changing operating parameters were made to determine the effective and practical operation of RED.