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Abstract

Capacitive deionization (CDI) is an emerging technology of desalinating brackish/seawater to attain freshwater. The process involves polarization of the two electrodes electrically using direct current; thus the cations and anions are attracted towards the oppositely charged electrode. So far most of the experiments/models involve the charging of the CDI cell at constant voltage. However, charging at constant voltage leads to having a shorter time in a given CDI cell cycle when the system has reached its lowest effluent concentration. This is undesired phenomena. To overcome this problem desalination process is preferred to be performed at constant current. The dynamic response model to describe the variation of the effluent concentration with time under constant current charging has been derived and validated. Also, the effect of processing parameters such as applied current, flow rate, CDI cell dead volume, and capacitance on the lowest effluent concentration is analyzed.

Keywords
Capacitive deionization; Constant current charging; Lowest concentration