

Effect of Electromagnetic Field on Capacitive Deionization Performance

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Abstract : In this work, the electromagnetic field has been used for improving the performance of the capacitive deionization process. The effect of electromagnetic fields on the efficiency of the capacitive deionization (CDI) process was investigated experimentally. The results showed that treating the feed stream of the CDI process using an electromagnetic field can enhance the electrosorption capacity from 20% up to 70%. The effect of the degree of time of exposure, concentration, and type of ions have been examined. The electromagnetic field enhanced the salt adsorption capacity (SAC) of the Ca^{2+} ions by 70%, while the SAC enhanced 20% to the Na^+ ions. It is hypothesized that the electromagnetic field affects the hydration shell around the ions and thus reduces their effective size and enhances the mass transfer. This reduction in ion effective size and increase in mass transfer enhanced the electrosorption capacity and kinetics of the CDI process.

Keywords : capacitive deionization, desalination, electromagnetic treatment, water treatment

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