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CAPACITIVE DEIONIZATION WITH WIRE-SHAPED ELECTRODES

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ABSTRACT

Capacitive deionization is a desalination technology to remove ions from aqueous solution in a cyclic manner by applying a voltage between pairs of porous electrodes. We describe the dynamics of this process by including a possible rate limitation in the transport of ions from the interparticle pore space in the electrode into intraparticle pores, where electrical double layers are formed. The theory includes the effect of chemical surface charge located in the intraparticle pores, which is present in the form of acidic and basic groups. We present dynamic data of salt adsorption for electrodes with and without coated ion-exchange membranes. Experiments were conducted in a CDI cell geometry based on wire-shaped electrodes placed together. The electrodes consisted of graphite rods coated with a layer of porous carbon. To fabricate this layer, we examined two procedures that involve the use of different solvents: acetone and N-methyl-2-pyrrolidone (NMP). We found that electrodes prepared with acetone had a lower salt adsorption compared to electrodes prepared with NMP. At equilibrium, the

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