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Mathematical model of mass transfer in an electrodialyzer with net-like spacers

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ABSTRACT

Data on DC current have been recorded for EDR-III/200-0.8 electrodialysis stack available from MEGA a.s., Czech Republic, as a function of feed electrolyte (NaCl) concentration and applied voltage. The flow rates and temperature have been fixed during the tests. Spacers used between the ion-exchange membranes in the stack are of net-like type. Different approaches to the mathematical modeling of mass transfer in an electrodialyzer have been verified to select one that best fits experimental data obtained for the stack. The ''turbulent flow'' model has been evaluated to be the most suitable for this purpose. The model assumes uniform distribution of linear velocities, ideal cross mixing of the liquid in the flow phase and presence of the stationary diffusion layer. In addition, a correlation coefficient has been introduced into the model to take the effect of a turbulence promoter on electrical field shielding into account.

Keywords: Electrodialysis; Mass transfer modeling

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