Numerical simulation of the electrodeionization (EDI) process with layered resin bed for deeply separating salt ions

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ABSTRACT

A numerical steady state model was established to describe electrodeionization (EDI) process, the dilute compartment (DC) of which is fixed with layered resin bed (LayeredEDI). The water dissociation influence on current efficiency was considered. The risk of hydroxide precipitation in dilute and concentrated compartment (CC) was investigated. It was found that in LayeredEDI the risk of hydroxide precipitation at anion-exchange membrane (AM) surface is reduced. However, there exist two OH\(^{-}\) concentration peaks at AM surface in CC. The hydroxide precipitation usually exists on these areas. The simulation results show that in DC, the hydroxide precipitation is negligible. The highest concentration area is near cation-exchange membrane–cation resin bed interface.

Keywords: Electrodeionization; Electrodialysis; Water dissociation; Ion-exchange; Membrane