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Lower rate of $H^+(OH^-)$ ions generation at an anion-exchange membrane in electrodialysis

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ABSTRACT

A way of improvement of electromembrane technology for water production required in heat-and-power engineering by applying modified anion exchange membranes is proposed. The novel membranes are produced by treatment of commercial Russian heterogeneous MA-40 membranes with a polyelectrolyte bearing quaternary ammonium groups. It is found that this modification results in lowering the rate of H^+ and OH^- ions generation (water splitting) at overlimiting currents and in a considerable increase in current efficiency due to the decrease in the OH^- ions transfer across the anion-exchange membrane. Moreover, we observed an increment in the salt counterion transfer through the membrane. The decrease in water splitting rate at the interface 'anion-exchange membrane/depleted solution' leads to increasing pH in the desalting compartment and decreasing pH in the concentrating one. As a consequence, the risk of the salt precipitation on the membrane surface in the concentrating compartment is reduced, and the removal of weak acids from the desalting water is found enhanced.

Keywords: Ion exchange membrane; Modification; Water splitting; $H^+(OH^-)$ ions generation; Electrodialysis; Hybrid baro-electromembane technologies

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