



Study on pretreatment of seawater electrolysis for desalination

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ABSTRACT

The results of seawater electrolysis for pretreatment with self-made diaphragm electrolyzer and ruthenium titanium oxide electrode are presented in this study. The influences of stirring and different concentrations of Cl^- , Mg^{2+} , and Ca^{2+} ions on chlorine evolution reaction were investigated. Experiments of electrolyzing natural seawater were performed to evaluate the effect of current density and water velocity on product water quality and the rate of chlorine evolution. The results show that the rate of the reaction is determined by electrochemical step at low current density ($<10 \text{ mA/cm}^2$), and at higher current density, the diffusion of chloride ions is the rate-determining step. The contents of calcium and magnesium have little influence on chlorine evolution reaction. Under the optimum operating conditions of current density at 20.0 mA/cm^2 and water velocity at 14 L/h , the product water meets the criteria for feeding reverse osmosis desalination, and the rate of the chlorine production is 1.75 mL/s . In addition, the mechanism of purification is discussed.

Keywords: Electrolysis; Chlorine evolution; Reaction; Seawater pretreatment; Desalination

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