

Electrode Potential Measurement for Ion-Exchange Method Using Oxygen Evolution Anode and Novel Solution Sending

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Summary

As applications of oxygen evolution anodes for seawater electrolysis outside of hydrogen production industry, we have proposed an application for electrodialysis method in salt production. This process causes anode chamber acidification and cathode chamber alkalization during electrolysis. This results in deposition of magnesium hydroxide on electrodialysis membrane in cathode chamber, which is degraded. In addition, the difference in pH between anode chamber and cathode chamber causes an increase in cell voltage theoretically.

We have studied oxygen evolution anodes which do not make chlorine at all during seawater electrolysis, and also researched a seawater feeding method which consists of feeding from acidic solution in anode chamber to cathode chamber. In this paper, the oxygen evolution anode and seawater feeding system have been introduced into a conventional electrodialysis method. The effects of pumping conditions on pH and electrode potential were also investigated. As a result, it has become possible to keep pH low in cathode chamber and electrolyze in the same pH solution for both chambers. However, it found that the potential at cathode did not keep the theoretical value at that pH in cathode chamber. This suggests that the pH near the cathode is lower than the pH in uniform solution during electrolysis. It will be necessary to redesign a electrolyte cell, a cathode and a pumping condition to reduce cell voltage for saving energy.