

Electrodialysis with a channeled stack for high strength cadmium removal from wastewater

Kyung Jin Min¹⁾, Hyo Jin An²⁾, Hyen-Gon Shin³⁾ and *Ki Young Park⁴⁾

^{1), 2), 4)} *Department of Civil and Environmental Engineering, Konkuk University, Seoul 05029, Korea*

³⁾ *Department of Energy and Environmental Engineering, Shinhan University, Gyeonggi-do 480-857, Korea*

⁴⁾ kypark@konkuk.ac.kr

ABSTRACT

Electrodialysis (ED) has the advantage that no chemicals are required, and the required area is small, but it has the problem of consuming a lot of energy. To improve the energy efficiency of ED, it is to provide a stack structure with thinner channels to reduce the local resistance to mass transfer. In this study, limit current density (LCD) according to pH and linear flow velocity was calculated to treat high concentration of cadmium contain wastewater using ED with a channeled stack, and cadmium removal efficiency and current efficiency were evaluated under each operating condition. As a result of the experiment, the LCD showed an increase as the linear flow velocity increased under the same pH conditions. However, the LCD increased up to pH 3 under the same linear flow velocity condition but decreased sharply at pH 4. The cadmium removal efficiency was also increased when the linear flow velocity was increased at each pH condition. As the membrane surface area increased, the LCD decreased, but the current efficiency was improved. However, the removal efficiency of cadmium decreased over a certain distance between the electrode plates. Adjusting the pH of the dilute and increasing the linear flow velocity is an important factor that increases operating costs, so it would be desirable to select an operating factor in consideration of economic feasibility.

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- 1) Doctor
 - 2) Graduate Student
 - 3) Professor
 - 4) Professor

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