



Effects of operating parameters on the removal performance of electro dialysis for treating wastewater containing cadmium

Gangchoon Lee

*Department of Chemical Engineering, Dong-eui University, 995 Eomgwangno, Busanjin-gu, Busan 614–714, Republic of Korea
Tel. +82 51 890 1703; Fax: +82 51 890 2630; email: glee001@deu.ac.kr*

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ABSTRACT

To evaluate the feasibility of electro dialysis for cadmium removal from wastewater containing cadmium in high concentration, the effects of initial concentrations of dilute and concentrate, flow rate and applied voltage on the removal of cadmium were experimentally investigated with batch operation mode. The limiting current density (LCD) linearly increased with the cadmium concentration and the flow rate. The elapsed time to reach 0.1 mg Cd/l was directly proportional to initial concentration of dilute, and the concentration of concentrate insignificantly affected the removal rate. Increase of the flow rate gave a positive effect on the removal rate, but the effect became unimportant at flow rate greater than 2.4 l/min. Volume of dilute was continuously decreased by electro-osmotic water transfer, whereas the volume of concentrate was increased. Removal rate was increased with the applied voltage. The increment of the removal rate, however, was decreased as the applied voltage increases. From the operation of the electro dialysis module used in this study, the flow rate of 2.4 l/min and the applied voltage corresponding to the 80~90% of LCD are recommended as a proper operating condition for cadmium removal from highly concentrated cadmium solutions.

Keywords: Electro dialysis; Cadmium; Ion-exchange membrane; Wastewater treatment; Heavy metal; Limiting current density
