

عنوان مقاله:

Chromium removal and water recycling from electroplating wastewater through direct osmosis: Modeling and optimization by response surface methodology

محل انتشار:

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خلاصه مقاله:

Background: Considering the carcinogenic effects of heavy metals, such as chromium, it is essential to remove these elements from water and wastewater. Direct osmosis is a new membrane technology, which can be a proper alternative to conventional chromium removal processes. **Methods:** The wastewater samples were collected from an electroplating unit, located in Alborz industrial city, Qazvin, Iran. Magnesium chloride was used as the draw solution, and a semipermeable membrane (Aquaporin) was used in this study. The experiments were designed, using response surface methodology (RSM) and central composite design (CCD) with draw solution concentration (0.5- 1.5 M), feed solution concentration (4-12 mg/L), and experiment time (30-90 minutes) as variable factors. The chromium concentration and water flux were also measured, based on atomic absorption spectrophotometry and water flux equation, respectively. **Results:** Direct osmosis was highly efficient in chromium removal and water recycling. Water flux and chromium removal efficiency were 15.6 LMH and 85.58%, respectively, under optimal conditions (draw solution = 1.27 mol/L, feed solution = 4 mg/L, and experiment time = 90 min). In terms of validity, the results predicted by the quadratic polynomial model were in good agreement with the responses reported in the laboratory. **Conclusion:** In direct osmosis, the use of magnesium chloride as the draw solution resulted in the acceptable chromium removal from electroplating wastewater. Using this method, chromium concentration in wastewater reduced to a level lower than the discharge standards, established by Iran's Department of Environment.

کلمات کلیدی:

Direct osmosis, Chromium removal, Electroplating, Optimization

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