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Removal of Ni(II) ions from aqueous solutions using fixed-bed ion exchange column technique

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ABSTRACT

Ion exchange represents an efficient technique for removing of heavy metals from wastewater effluents. Limited number of studies focuses on fixed bed performance for metal removal. In this study, the removal of Ni^{2+} from synthetic wastewater using a strong acidic cation exchange resin in a fixed bed columns was investigated. The experiments were conducted at different pH (3–7) and initial heavy metal concentrations (1.8, 2.8 and 3.8 g Ni/L). Investigation of the regeneration effect on the resin was conducted. The removal efficiency and rate of removal are shown on the breakthrough curves and the kinetic study of the process was determined. The Thomas model was applied to follow the exchange dynamics, the results from experimental work were compared to those using Thomas model, it is shown that the calculated breakthrough curves agreed well with the measured ones. The metal level in the treated wastewater was examined using the atomic absorption spectrophotometer to show that the Ni^{2+} concentration complies with the standard environmental regulations limits.