Desalination and Water Treatment
www.deswater.com

51 (2013) 2116–2120
February

doi: 10.1080/19443994.2013.734589

Taylor & Francis
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Batch study and kinetics of hexavalent chromium removal from aqueous solutions by anion exchange resin (Dowex 21 KCl)

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Received 8 September 2011; Accepted 5 August 2012

ABSTRACT

In this study, the removal of hexavalent chromium (Cr), a strong oxidant and also carcinogen and mutagen, from aqua solution was done using ion exchange process. The batch experiments were conducted to study the kinetics of Cr removal for the concentrations of 1–20 mg/L Cr solutions. The ion exchange resin dosage was 1 g dry weight of ion exchanger/L for Dowex 21 KCl. The removal efficiency observed for all the Cr concentrations and mixing time was over the 82% for Dowex 21 KCl. During the batch experiments, four different mixing time (15–90 min) and six different pH values (2–7) were evaluated to determine the optimum mixing time and pH value. The highest removal efficiency of hexavalent Cr was obtained using 30 rpm shaker speed at pH 6. The experimental data fitted well to the pseudo-first- and pseudo-second-order kinetic models and then the rate constants were evaluated. Finally, it was concluded that the hexavalent chromium ion exchange kinetics of dowex 21 KCl was well explained by first order kinetic model rather than second order kinetic model.

Keywords: Batch adsorption; Hexavalent chromium; Dowex 21 KCl; Anion exchanger; Kinetics study

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