



Sorption of cobalt(II) from an aqueous medium using Amberlite 200C and Dowex 88 resins: Equilibrium and kinetic studies

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ABSTRACT

Cobalt is a toxic heavy metal found in various industrial wastewaters. In this study, the sorption mechanisms of Co(II) onto Amberlite 200C and Dowex 88 resins were investigated using batch reactors. The removal of Co(II) was examined by varying experimental conditions, such as the solution pH, sorbent dose, and temperature. The most effective pH range for cobalt removal was pH 4–8 for both resins. Langmuir, Freundlich, Redlich–Peterson, and Temkin models were applied to describe equilibrium isotherms. The sorption of Co(II) on the resins followed pseudo-second-order kinetics, and thermodynamic data indicated an endothermic and spontaneous process. ΔG° decreased with increasing temperature, indicating that the sorption process of Co(II) on both resins was more favorable at high temperatures. Desorption studies were conducted using various reagents. For both resins, the maximum percent of metal ion desorption was reached when 2 M H₂SO₄ was used as the reagent.

Keywords: Resin; Cobalt; Sorption; Desorption; Activation energy

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