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Removal of Copper Ions from Acid Mine Drainage Wastewater Using Ion Exchange Technique: Factorial Design Analysis

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ABSTRACT

A factorial experimental design method was used to examine the "Cu2+" removal from acid mine drainage wastewater by ion exchange technique. Ion Exchange technique is preferred because of reduced sludge generation compared to conventional treatment techniques and better decontamination efficiency from highly diluted solutions. Factorial design of experiments is employed to study the effect of four factors pH (3, 5, and 6), flow rate (5, 10, 15 L/hr), resin bed height (20, 40 and 60 cm) and initial concentration of the metal (100, 150 and 200 mgl-1) at three levels. The efficiency of metal removal was determined after 100 min of treatment. Main effects and interaction effects of the four factors were analyzed using statistical techniques. A regression model was recommended and it was found to fit the experimental data very well. The results were analyzed statistically using the Student ' s t-test, analysis of variance, F-test and lack of fit to define most important process variables affecting the percentage "Cu2+" removal. In this study , pH was thus found to be the most important variable.

KEYWORDS

Acid Mine Drainage, Ion Exchange, Heavy Metal, Copper, Removal, Factorial Design of Experiments

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