

Adsorption characteristics of immobilized crab shell beads for silver ions in industrial wastewater

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To efficiently remove silver ions from industrial wastewater, powdered crab shells were immobilized as a bead form by entrapment method using polyvinyl alcohol and boric acid. The beads with 2.0mm of diameter and 11.124 m²/g of surface area were stable until 45°C and pH 10.0 in wastewater without untangling. In addition, the beads have excellent mechanical strength and swelling characteristics. The highest removal efficiency was 83% for silver ions and can be obtained from 4.0g of crab shell contents into the beads. The Langmuir isotherm model showed significant fit to the equilibrium adsorption data and maximum adsorption capacity of 2.951 mg/g of silver ions was achieved at the pH 6.0 of wastewater. The breakthrough point was appeared around 70 (1.0 mL/min) and 120 bed volumes (0.5mL/min), respectively, and 6 bed volumes of 1.0M HNO₃ solution was required to get desorption efficiency of 95% in continuous process. Also, the bed volume for silver ions of firstly reused crab shell beads was 110 and the value shows possibility for reuse.