

The Study of Chitosan beads Adsorption Properties for the Removal of Heavy Metals

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Abstract : In this study, a predicted pH model was used to determine adsorption equilibrium properties of copper, lead, zinc and cadmium. Chitosan was prepared from the exoskeleton of Cape rock-lobsters, collected from the surroundings of Cape Town, South Africa. The beads were cross-linked with glutaraldehyde to restore its chemical stability in acid media. The chitosan beads were characterized; the beads water contents and pKa varied in the range of 90-96% and 4.3-6.0 respectively and the degree of crosslinking for the beads was 18%. A pH-model, which described the reversibility of the metal adsorbed onto the beads, was used to predict the equilibrium properties of copper, lead, zinc and cadmium adsorption onto the cross-linked beads. The model accounts for the effect of pH and the important model parameters; the equilibrium adsorption constant (Kads) and to a lesser extent the adsorbent adsorption capacity (qmax). The adsorption equilibrium constant for copper, lead, zinc and cadmium were found to be 2.58×10^{-3} , 2.22×10^{-3} , 9.55×10^{-3} , and 4.79×10^{-3} , respectively. The adsorbent maximum capacity was determined to be 4.2 mmol/g.

Keywords : chitosan beads, adsorption, heavy metals, waste water

Conference Title : ICCBPE 2016 : International Conference on Chemical, Biochemical and Process Engineering

Conference Location : Singapore, Singapore

Conference Dates : January 07-08, 2016