Removal of lead ions from aqueous solutions using sodium alginate-graft-poly(methyl methacrylate) beads

Ahmed Salisu, Mohd Marsin Sanagi, Ahmedy Abu Naim, Wan Aini Wan Ibrahim, Khairil Juhanni Abd Karim

ABSTRACT

The performance of a new adsorbent, sodium alginate-graft-poly(methyl methacrylate) in the form of calcium cross-linked beads has been evaluated for the removal of Pb²⁺ from aqueous solution. Characterization of the adsorbent was performed using Fourier transform infrared spectroscopy, scanning electron microscopy and laser diffraction technique. The Langmuir and Freundlich isotherm models were applied to describe the adsorption equilibrium process. The data obtained from the batch experiments using lead ion concentration from 200 to 1,000 mg/L could be well interpreted by the Langmuir model with maximum adsorption capacity of 526 mg/g. The data from the kinetic studies correlated with the second-order kinetic model. The regeneration experiments revealed that the beads could be successfully reused for multiple times. The adsorbent proved to be potentially excellent for application in the treatment of wastewater containing lead ions.

Keywords: Sodium alginate; Poly(methyl methacrylate); Lead ions; Beads; Regeneration