

Surfactant-Modified Chitosan Beads: An Efficient and Cost Effective Material for Adsorptive Removal of Lead from Aqueous Solutions

Authors : Preeti Pal, Anjali Pal

Abstract : Chitosan is an effective sorbent for removal of contaminants from wastewater. However, the ability of pure chitosan is specific because of its cationic charge. It causes repulsion in the removal process of various cationic charged molecules. The present study has been carried out for the successful removal of Pb^{2+} ions from aqueous solution by modified chitosan beads. Surface modification of chitosan (CS) beads was performed by using the anionic surfactant (AS), sodium dodecyl sulfate (SDS). Micelle aggregation property of SDS has been utilized for the formation of bilayer over the CS beads to produce surfactant modified chitosan (SMCS) beads. Prepared adsorbents were characterized by Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM) in order to find out their composition and surface morphology. SMCS beads, when compared to the pure CS beads, showed three times higher adsorption. This higher adsorption is believed to be due to the adsolubilization of Pb^{2+} ions on SDS bilayer. This bilayer provides more adsorption sites for quick and effective removal of Pb^{2+} ions from the aqueous phase. Moreover, the kinetic and adsorption isotherm models were employed to the obtained data for the description of the lead adsorption processes. It was found that the removal kinetics follows pseudo-second order model. Adsorption isotherm data fits well to the Langmuir model. The maximum adsorption capacity obtained is 100 mg/g at the dosage of 0.675 g/L for 50 mg/L of Pb^{2+} . The adsorption capacity is subject to increase with increasing the Pb^{2+} ions concentration in the solution. The results indicated that the prepared hydrogel beads are efficient adsorbent for removal of Pb^{2+} ions from the aqueous medium.

Keywords : adsolubilisation, anionic surfactant, bilayer, chitosan, Pb^{2+}

Conference Title : ICEESD 2017 : International Conference on Energy, Environment and Sustainable Development

Conference Location : London, United Kingdom

Conference Dates : October 19-20, 2017