CROSSLINKED CHITOSAN-POLYVINYL ALCOHOL BLEND BEADS FOR REMOVAL AND RECOVERY OF Cr (II) FROM WASTEWATER

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ABSTRACT

Crosslinked chitosan/poly (vinyl alcohol) (PVA) blend aqueous solution was suspended in toluene-chlorobenzene to form droplets. Some of the water then distilled out as azeotropes with the aromatic hydrocarbons to reduce the water content of the suspension droplets. Glutaraldehyde was finally added to the suspension to result in the cross linked chitosan/PVA beads with low water content and high mechanical strength. In addition, prepared crosslinked beads were characterized by FTIR, X-ray diffraction (XRD), Scanning electron microscopy (SEM), and thermogravimetric analysis (TGA) the efficiency of crosslinked chitosan/PVA bended bead as an adsorbent for the removal of Cr (II)from water was studied. It was found to exhibit substantial adsorption capacity over a wide range of initial Cr (II) ion concentration. Effect of time, temperature pH, adsorbent dose and the concentration of adsorption of Cr (II) were investigated by batch process. Pseudo-first-order and pseudo-second-order model were evaluated. The kinetics data for the adsorption process follow the second order rate equation. The equilibrium studies data could be described well by the Langmuir and Freundlich isotherms. The thermodynamic parameters such as ΔG^0, ΔH^0, ΔS^0, are calculated. It was found that the values $\Delta H^0$and ΔS^0 increase while the values ΔG^0 decline with rise in temperature. Thus the adsorption process was found to be endothermic and spontaneous. The maximum adsorption Cr (II) ion (76.51%) in pH range 5-6 indicated that material could be effectively utilized for the removal of Cr (II) ion from waste water. The adsorption study showed 62% recovery of Cr (II), when 0.1 EDTA solutions were used as an effluent.

KEYWORDS*:* Chitosan/PVA beads, Adsorption*,* Cr(II)ion, Langmuir and Freundlich isotherms etc.