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Chitosan Capped Nanozerovalent Iron as A Cost-Effective Adsorbent for the Removal of CR(VI) from Aqueous Solution : Equilibrium And Kinetics

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Abstract : The present study has been attempt to evaluate the removal of hexavalent chromium from aqueous solution using chitosan capped nanozerovalent iron as an cost effective adsorbent under various experimental parameters. The chitosan capped nanozerovalent iron was synthesized by the aqueous phase borohydride reduction method and the synthesized particles were characterized through X-ray diffractogram and scanning electron microscopy. Results on hexavalent chromium reduction indicated that chitosan capped nanozerovalent iron rapidly reduce hexavalent chromium in aqueous solution. The removal efficiency of hexavalent chromium increased with increasing adsorbent dosage and temperature whereas inversely with initial chromium concentration and pH. Maximum reduction rate (98.5%) was obtained when the concentration of adsorbent dosage at 0.4 g/L, and also chitosan capped nanozerovalent iron exhibited excellent adsorbent at an acidic pH. The adsorption kinetic mechanism was investigated using pseudo first order rate reaction. Moreover, the adsorption data on reduction of hexavalent chromium by chitosan capped nanozerovalent iron were then fitted with Langmuir and Freundlich isotherm models. Results obtained from this study indicated that nanozerovalent iron in the presence of chitosan would be a suitable and low cost adsorbent for the treatment of hexavalent chromium in aqueous environment.

Keywords : Nanozerovalent iron, Hexavalent chromium, Chitosan, Chemical reduction, Adsorption kinetics.

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