



Biosorption - a case study of hexavalent chromium removal with raw pomegranate peel

Femina Abdul Salam, Anantharaman Narayanan*

Department of Chemical Engineering, National Institute of Technology Tiruchirappalli, Tiruchirappalli-620 015, Tamil Nadu, India, Tel. +91 431 2503103, Fax +91431-2500133, email: naraman@nitt.edu (A. Narayanan)

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ABSTRACT

Biosorptive removal of heavy metals from water is an eco-friendly green technology. In this study, raw pomegranate (*Punicagranatum* L.) peel (RPP), without any modification or activation, was used as biosorbent for the removal of chromium (Cr(VI)). The influence of operating parameters such as pH, contact time, temperature and concentration of Cr(VI) were studied in batch mode. A maximum removal of 100% was achieved for a Cr(VI) solution of concentration 20 mg/L at an optimum pH and temperature of 2 and 313 K respectively in 3 min. Among the isotherms tested, Langmuir adsorption isotherm has good correlation with experimental data. A maximum Cr(VI) biosorption capacity of 370.4 mg/g was observed at 313K under equilibrium conditions. RPP is also effective in the removal of Cr(VI) at higher concentrations. Among the kinetic models, pseudo-second order kinetic model fits the data well. The thermodynamic study reveals that the endothermic biosorption taking place on RPP is physico-chemical in nature. The biosorption mechanism of RPP with Cr(VI) indicates that intra-particle diffusion is not the only rate limiting step and film diffusion also plays a major role in biosorption.

Keywords: Biosorption; Equilibrium; Green technology; Kinetics; Pomegranate Peel; Thermodynamics

*Corresponding author.

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