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OPTIMIZATION OF IMPORTANT PROCESS PARAMETERS FOR THE REMOVAL OF Cr(VI) BY A MODIFIED WASTE MATERIAL

Varsha Srivastava^{1,2}, Deepak Gusain³, Faizal Bux³, Gopesh Chandra Sharma⁴,
Yogesh Chandra Sharma^{1*}

¹Banaras Hindu University, Indian Institute of Technology, Department of Chemistry, Varanasi 221005, India

²Lappeenranta University of Technology, Faculty of Technology, Laboratory of Green Chemistry,
Sammonkatu 12, FI-50130, Mikkeli, Finland

³Institute for Water and Wastewater Technology Durban University of Technology, PO Box 1334, Durban, 4000, South Africa

⁴Department of Chemistry, Invertis University, Bareilly 243 001, India.

Abstract

This paper highlights the utility of rice husk ash for the adsorption of Cr(VI) ions from aqueous solutions. Rice husk ash (RHA) is produced when rice husk is burnt for various purposes. Application of Treated Rice Husk Ash (TRHA) as an adsorbent for the removal of Cr(VI) from aqueous solutions has been investigated. For this purpose, RHA was thermally treated. RHA and treated RHA (TRHA) were characterized by XRD, SEM and FTIR to investigate the effect of treatment on the nature and surface characteristics of RHA. The experiments were carried out in batch mode. A three factor, three-level Box-Behnken experimental design was employed for optimizing important process parameters for adsorption of Cr(VI) on TRHA. The effect of three parameters, initial Cr(VI) ion concentration (500-1000 µg/L), temperature (25-450C) and initial pH (2.0-8.0) of solution on the removal process was determined. Fifteen experiments designed by Box-Behnken design (BBD) were carried out. It was observed from this investigation that the percentage removal efficiency is significantly influenced by initial concentration, temperature and pH of solutions. The optimum values of the variables were found to be 750 µg/L, 25 0C and 2.0 for initial chromium ion concentration, temperature and pH respectively. The experimental values were in good agreement with predicted values and the model developed was highly significant. Present study revealed that TRHA is an economically viable adsorbent for the removal of Cr(VI) from aqueous solutions.

Key words: adsorption, agro-waste material, Box-Behnken design (BBD), chromium, response surface methodology, rice husk ash

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* Author to whom all correspondence should be addressed: e-mail: ysharma.apc@itbhu.ac.in; Phone: +91 542 6701865; Fax: +91 542 2368428