Adsorptive removal of bisphenol-A by rice husk ash and granular activated carbon—A comparative study

P. Sudhakar, Indra Deo Mall*, Vimal Chandra Srivastava

Department of Chemical Engineering, Indian Institute of Technology Roorkee, Roorkee 247667, Uttarakhand, India,
Tel. +91 1332 285319; Fax: +91 1332 276535; emails: sudhakarpabhu58@gmail.com (P. Sudhakar), id_mall2000@yahoo.co.in (I.D. Mall), vimalcsr@yahoo.co.in, vimalfch@iitr.ac.in (V.C. Srivastava)

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ABSTRACT

Present study was performed so as to compare adsorptive removal efficiencies of low-cost adsorbent rice husk ash (RHA) and commercial granular activated carbon (GAC) for the removal of bisphenol-A (BPA), an endocrine disrupting chemical, from aqueous solution. Effect of variables such as initial concentration \( C_0 \), adsorbent dose \( m \), temperature \( T \), pH, and time \( t \) were studied. Optimized values at \( C_0 = 100 \) mg/L were found to be: \( m = 30 \) g/L, \( t = 3 \) h for RHA whereas for GAC, optimum values were: \( m = 20 \) g/L and \( t = 2 \) h. Pseudo-second-order model best represented the adsorption kinetic data; and Freundlich and Temkin models best fitted the isotherm data. The adsorption of BPA onto GAC and RHA was found to be endothermic in nature. Value of change in entropy and enthalpy for BPA adsorption onto RHA was found to be: 21.38 J/mol K and 0.335 kJ/mol, respectively. Respective values for BPA adsorption onto GAC were found to be: 29.6 J/mol K and 4.03 kJ/mol, respectively.

Keywords: Bisphenol A; Rice husk ash; Granular activated carbon; Adsorption kinetics; Adsorption isotherm