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Date palm fiber as a potential low-cost adsorbent to uptake chromium (VI) from industrial wastewater

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ABSTRACT

Date palm fiber (DPF) was demonstrated in the present issue as a potential low cost adsorbent for the removal of hexavalent chromium [Cr(VI)] from aqueous solution. A series of batch tests were conducted and the influence of initial metal ion concentration, contact time, pH of the solution and adsorbent dosage was investigated. The adsorbent was characterized by Fourier Transformed Infrared (FTIR) spectroscopy, scanning electron microscopy (SEM) and Brunauer–Emmett–Teller (BET) to confirm the surface properties of the DPF adsorbent. The adsorption process was found to be strongly pH dependent. The adsorption isotherm data were fitted with Langmuir equation and the adsorption process was found to be followed pseudo–second–order rate kinetics. Chromium showed peculiar activities in aqueous solution due to its transition properties and the mechanism of Cr(VI) adsorption onto the DPF solid surface exhibited physisorption due to intermolecular bonding. Therefore, DPF can be employed as an efficient cost–effective adsorbent for the removal of Cr(VI) as a model component for heavy metals present in industrial wastewater.

Keywords: Adsorption; Low-cost adsorbent; Date palm fiber; Cr(VI); reaction kinetics; Adsorption isotherm

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