



## Activated carbon from date seeds for chromium removal in aqueous solution

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### ABSTRACT

In this current work, activated carbon from date seeds (ACDS) was prepared through single step chemical activation using phosphoric acid. ACDS was characterized by scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), Thermogravimetric studies (TGA/DTA), surface chemistry and specific area analysis. Performance assessment of the ACDS was carried out through adsorption of chromium (VI) from its aqueous solution. Effect of adsorption parameters such as contact time (1–120 min), pH (2–8), operating temperature (10–50°C), adsorbent dosage (0.01–0.2 g/50 mL) and initial chromium concentration (5–50 mg/L) on Cr(VI) removal by ACDS was studied in detail. Maximum Cr(VI) adsorption of 42.57 mg/g was obtained for a contact time of 60 min and pH of 2 at 30°C using adsorbent dose of 0.1 g/50 mL for an initial feed concentration of 50 mg/L. The Cr(VI) adsorption efficiency of the ACDS was better as compared against commercial activated carbon. Experimental equilibrium data fitted well with Langmuir isotherm ( $R^2 = 0.9958$ ) and kinetics studies predicted the pseudo-second order for Cr(VI) adsorption on ACDS. Re-usability studies showed that the ACDS could be used for a maximum of 3 times with a slight reduction in the Cr(VI) removal efficiency (< 10%). Results indicated the promising use of date seed biomass as a cheap and efficient starting material to prepare activated carbon for Cr(VI) removal from chromium polluted wastewater.

**Keywords:** Activated carbon; Date seeds; Chromium; Adsorption; Chemical activation

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