Desalination and Water Treatment
www.deswater.com
21 (2010) 44–52
September
1944-3994 / 1944-3986
doi: 10.5004/dwt.2010.1185

CTAB modified nanoporous carbon for the adsorption of chromate ions from industrial wastewater

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Received 20 April 2009; Accepted 18 March 2010

ABSTRACT

In the present study, cetyltrimethyl ammonium bromide (CTAB) was coated on the surface of ordered mesoporous carbon (OMC) and was used as an adsorbent to remove hexavalent chromium (Cr(VI)) from aqueous solution. The structural order and textural properties of this mesoporous adsorbent was studied by XRD and nitrogen adsorption. The amount of CTAB on the carbon surface was confirmed by TGA analyses. Adsorption experiments were conducted in the batch mode to evaluate the effect of variables of contact time, solution pH, dose of adsorbents (CTAB-OMC and OMC) and temperature, on the amount of adsorption. Maximum adsorption of chromium was observed at solution pH 4. The mechanism of adsorption was found to be the electrostatic attraction of acid chromate ion towards protonated CTAB-OMC. Adsorption equilibrium was achieved within 3–4 h for initial concentrations of Cr(VI) of 10–100 mg/L. Maximum monolayer capacity of CTAB-OMC was observed as 1.4 mmol/g at pH 3 and temperature of 313 K. The adsorption isotherms of chromate ion were in agreement with the Langmuir model.

Keywords: Mesoporous; Carbon; Surfactant; Chromate; Adsorption; Langmuir; CTAB

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