Desalination and Water Treatment
www.deswater.com

doi: 10.5004/dwt.2017.20562

74 (2017) 163–173
May

N,*N*-Diethylethanolammonium chloride-based DES-functionalized carbon nanotubes for arsenic removal from aqueous solution

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Received 25 September 2016; Accepted 3 February 2017

ABSTRACT

In this study, novel adsorbents for arsenic ions (As^{3+}) were prepared by functionalizing carbon nanotubes (CNTs) with deep eutectic solvents (DESs) based on *N*,*N*-diethyl ethanol ammonium chloride and glycerol. Various characterization techniques were used to investigate the effects of DESs on the surface of CNTs, including Raman, Fourier transform infrared spectroscopy, X-ray powder diffraction, field-emission scanning electron microscopy, energy-dispersive X-ray spectrometer, Brunauer–Emmett–Teller surface area, and zeta potential. Response surface methodology–central composite design experimental design was used to determine the optimum removal conditions, which was found to be at pH 6.0 with adsorbent dosage of 20 mg and contact time of 55 min. The pseudo-second-order kinetics model describes the adsorption of As^{3+}. Moreover, Langmuir isotherm model describes the adsorption isotherm. The maximum adsorption capacity of the novel adsorbent was found to be 17 mg/g.

Keywords: Carbon nanotubes; Arsenic; Adsorption; Deep eutectic solvents

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