

Facile synthesis of ethylenediamine-modified magnetic chitosan composite and its adsorption property

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Received 8 November 2017; Accepted 19 June 2018

ABSTRACT

In this study, ethylenediamine-modified magnetic chitosan composite (MCS-NH₂) adsorbent was synthesized facilely by one-pot method. The structural analysis of the composite were obtained from Fourier-transform infrared, X-ray powder diffraction, thermogravimetric analysis, vibrating sample magnetometer, scanning electron microscopy, field transmission electron microscopy, zeta potential, Brunauer–Emmett–Teller specific surface areas, and pore structure. Its adsorption capacities toward anionic dye Orange II (ORII) were studied in a batch system. The highest ORII removal of 94.3% was obtained at the optimum conditions: pH 7.07, initial ORII concentration 100 mg L⁻¹, adsorbent dose 3 g L⁻¹, and room temperature (293 K) at 30 min. In addition, the effect of various salts on the adsorption performance of MCS-NH₂ was also investigated. The kinetic adsorption isotherms and thermodynamics were also studied and the experimental data fitted better with the pseudo-second-order kinetic and the Freundlich model, with spontaneous and exothermic characteristics. The results showed that MCS-NH₂ composite exhibited excellent adsorption capacities toward anionic dye, which should have potential applications in effluent treatment in printing and dyeing industry.

Keywords: Ethylenediamine; Magnetic; Chitosan; ORII; Adsorption

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