



Calligonum polygonoides biomass as a low-cost adsorbent: surface characterization and methylene blue adsorption characteristics

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Received 1 July 2014; Accepted 2 February 2015

ABSTRACT

In this present research work, *Calligonum polygonoides* (CP) was used as an effective biosorbent for the methylene blue (MB) removal from aqueous solution. The biosorbent was used without any chemical treatment. The biosorbent was characterized by various techniques, such as Fourier transform infrared spectroscopy, thermogravimetric analysis, and scanning electron microscopy (SEM). The particle size and surface area were measured by using particle size analyzer and Brunauer–Emmett–Teller (BET) equation. The SEM and BET results expressed that the adsorbent has porous nature. Effect of various experimental conditions, such as initial concentration of MB, initial pH, contact time, dosage of biosorbent, and stirring rate, were also investigated on adsorption capacity of MB on CP. The contact time experiment indicated that the rate of adsorption of MB is a rapid process and equilibrium is reached in 1 h. The kinetics study expressed that MB adsorption on biosorbent followed the pseudo-second order kinetic equation with correlation coefficient value (R^2) of 0.999. The study revealed that CP proved to be an effective, inexpensive, alternative, and environmentally friendly biosorbent for MB from aqueous solution.

Keywords: Methylene blue; *Calligonum polygonoides*; Characterization adsorption kinetics

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