



Biosorption of methyl orange from aqueous solutions using cationic surfactant-modified wheat straw in batch mode

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ABSTRACT

In this paper, the characterization of wheat straw (WS) and cetyl trimethyl ammonium bromide (CTAB) modified wheat straw (MWS) was determined by Fourier transform infrared spectroscopy (FTIR) and X-ray fluorescence (XRF), indicating that CTAB had entered into the structure of WS successfully. Then, MWS was used as adsorbent for the removal of methyl orange dye (MO, anionic dye) from aqueous solution in batch mode. The experiments were carried out by exploring the most suitable conditions including solution pH, MWS dosage, dye initial concentration, temperature, and contact time. Biosorption capacity of MWS for MO is 50.4 mg g^{-1} at 303 K under the optimum condition of pH of 3, MWS dosage of 1.00 g L^{-1} , contact time of 520 min. The Freundlich and Temkin models were all successful in depicting the equilibrium. The kinetic process can be predicted well by the Elovich, pseudo-second-order and intraparticle diffusion model. In addition, the thermodynamics parameters indicated the biosorption process was spontaneous and exothermic. The best desorption method for MO-loaded MWS was hot water. The results implied that MWS be suitable as effective adsorbent material for the biosorption of MO from aqueous solution.

Keywords: Biosorption; Modified wheat straw; Methyl orange

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