Preparation of hydrazine-modified CMC/Fe₃O₄ hybrid magnetic particles for adsorption of Reactive Blue 21 from water

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ABSTRACT

In this work, chemically modified carboxymethyl cellulose/Fe₃O₄ particles (MCMC/Fe₃O₄) with hydrazine were prepared and characterized by scanning electron microscopy, X-ray diffraction, and vibrating sample magnetometer. Batch adsorption experiments were performed to remove Reactive Blue 21 (RB 21) from aqueous solution. Various parameters such as pH, initial dye concentration, adsorbent dosage, contact time, and temperature had been studied. Kinetic studies showed that the dye adsorption process followed a pseudo-second-order kinetic model. The equilibrium data were well described by Langmuir and Dubinin–Radushkevich model. Furthermore, the thermodynamic parameters (positive values of ΔH˚ and ΔS˚, negative values of ΔG˚) revealed the feasibility, spontaneity, and endothermic nature of the adsorption.

Keywords: Adsorption; Fe₃O₄; Carboxymethyl cellulose (CMC); Kinetics; Mechanism

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