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Comparison of adsorption behaviors of lignite and its fly ash for the removal of bisphenol A from aqueous media

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ABSTRACT

This paper presents a study on the batch adsorption of bisphenol A (BPA) from aqueous solution on raw lignite (BC) and its fly ash (FA) to explore their potential use as low-cost adsorbents for water purification. The main parameters influencing BPA adsorption, including initial adsorbent dose, pH, and ionic strength were investigated. The pseudo-first-order, pseudo-second-order, and intraparticle diffusion models were used to describe the kinetic data, and rate constants were evaluated. The results obtained showed that the rate of adsorption followed a pseudo-second-order kinetic model with adsorption rate constants (k_2) of 0.0034 and 0.0058 g/μmol min for BC and FA, respectively. The equilibrium data were analyzed using the Freundlich, Langmuir, Temkin, and Dubinin–Radushkevich isotherms. The adsorption data fit well with the Langmuir isotherm model, with the maximum monolayer adsorption capacity of 13.34 mg/g for BC and 10.88 mg/g for FA, respectively. The results in this study indicated that lignite and fly ash are attractive materials for the removal of BPA from water.

Keywords: Adsorption; Bisphenol A; Low-cost adsorbent; Lignite; Fly ash

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