



Cephalexin adsorption from aqueous solutions by biochar prepared from plantain wood: equilibrium and kinetics studies

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ABSTRACT

The biochar prepared from plantain wood was used to remove Cephalexin antibiotic from aqueous solutions. The effect of some operational parameters such as pH (1–10), contact time (0–120 min), Cephalexin concentration (10, 50, and 100 mg/L), adsorbent dose (0.2–4 g/L), and temperature (10°C–60°C) was evaluated and optimized. The micropore surface area and micropore volume of the biochar were determined to be 896 m²/g and 0.472 cm³/g, respectively. In the optimum conditions (pH = 6.7, initial concentration of Cephalexin = 50 mg/L, contact time = 60 min, and adsorbent dose = 2 g/L), the removal efficiency was 88.5%. The adsorption isotherm of Cephalexin follows the Langmuir model. Thermodynamic results revealed that the process was endothermic, and the kinetics study confirmed that the adsorption followed the pseudo-second-order reaction. The results of this study indicate that the biochar prepared from the plantain wood can be used as a suitable and cost-effective technology for the removal of Cephalexin from aqueous solutions with high removal efficiency.

Keywords: Plantain wood; Adsorption; Cephalexin; Wastewater treatment; Biochar

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