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Adsorption-reduction removal of Cr(VI) by tobacco petiole pyrolytic biochar:

batch experiment, kinetic and mechanism studies

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Abstract

Tobacco petiole biochar (TPBC) was prepared via pyrolysis and used for Cr(VI) removal. Cr(VI) removal efficiency was reduced by pyrolytic temperature (PyT) increase which mainly affected by functional groups rather than specific surface area. According to the optimal pseudo second-order kinetic, the initial adsorption rate was decreased with PyT increase from 355.91 mg·g⁻¹·min⁻¹ (PyT=300°C) to 3.44 mg·g⁻¹·min⁻¹ (PyT=700°C). The isotherm was optimally explained by Temkin model involved physical absorption with heat of 28.73 J/mol. Simulation result of adsorption-reduction-adsorption process showed the Cr(VI) removal was kinetic controlled by Cr(VI) and Cr(III) adsorptions. TPBC300 was the optimal TPBC for chromium removal from electroplating wastewater with efficiencies of: 66.7%(Cr(VI)).

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