

Title : Reactive Black 5 Dye Removal by Reusable Biochar

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ABSTRACT

This study aimed to compare the efficacy of biochar derived from palm kernel shells through carbonization under nitrogen atmosphere at 800°C for the adsorption of Reactive Black 5 (RB5) dye. The biochar was subsequently activated utilizing ferric nitrate solution $\text{Fe}(\text{NO}_3)_3$ (PFe-800) and a bimetallic mixture of ferric nitrate and cupric nitrate $\text{Fe}(\text{NO}_3)_3\text{-Cu}(\text{NO}_3)_2$ (PFeCu-800). The pore volume analysis revealed that PFe-800 exhibited an S_{BET} value of 420 m^2/g , with $V_{\text{micro}} = 0.13 \text{ cm}^3/\text{g}$ and $V_{\text{meso}} = 0.19 \text{ cm}^3/\text{g}$, whereas PFeCu-800 demonstrated an S_{BET} value of 415 m^2/g , with $V_{\text{micro}} = 0.13 \text{ cm}^3/\text{g}$ and $V_{\text{meso}} = 0.15 \text{ cm}^3/\text{g}$. The RB5 adsorption efficiencies at an initial concentration of 50 ppm were 98.24% for PFe-800 and 98.55% for PFeCu-800. The adsorbent dosage was 1 g of biochar per 1 liter of RB5 solution at a concentration of 50 ppm. This study further evaluated the performance of five usage cycles and regeneration using the Fenton reaction to assess its long-term efficacy. These findings provide insights into the suitability of various activation methods for biochar application in

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