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ADSORPTION PERFORMANCE OF FIXED-BED COLUMNS FOR THE REMOVAL OF PHENOL USING BAOBAB FRUIT SHELL BASED ACTIVATED CARBON

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Abstract
A continuous adsorption study in a fixed-bed column using baobab fruit shell activated carbon (BF-AC) was investigated for phenol removal from an aqueous solution. Baobab fruit shell (BFS) was chemically activated using potassium hydroxide (KOH) at 700 °C in a nitrogen (N2) atmosphere. Scanning electron microscope (SEM), X-ray diffraction (XRD), and BET surface area analyses were performed for the characterization of BF-AC. Fixed-bed experiments were carried out and the effect of feed flowrate (10, 15, 20 mL/min) and bed height (5, 10, 15 cm) on the adsorption were investigated by evaluating the breakthrough curves. BET surface area of BF-AC was 1263 m2/g, indicating its well-developed pores and its good quality as an adsorbent. The findings showed that the exhaustion time (tδ) and breakthrough time (tb) reduced as the flowrate augmented, while they increased as the bed height augmented. With the increase in the bed height and the flowrate, phenol solution volume treated was augmented. Also, BF-AC with bed height of 15 cm provided better elimination of phenol with carbon usage rate (CUR) of 1.74 g/L and empty bed contact time (EBCT) of 9.9 minutes. According to the findings, BF-AC is an effective adsorbent for removing phenol from aqueous solutions.

Author Keywords
adsorption; Baobab fruit shell; breakthrough curves; fixed-bed column; phenol

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