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Activated carbon from avocado seeds for the removal of phenolic compounds from aqueous solutions

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ABSTRACT

Avocado seed activated carbon (ASAC) was synthesized by microwave-heating process using $ZnCl_2$ as an activating agent. The adsorbent ASAC was characterized using analytical techniques namely N_2 isotherms, Fourier transform infrared spectroscopy, and scanning electron microscopy. The surface area of ASAC was 1,432 $m^2\ g^{-1}$. The ASAC prepared was used for adsorption of resorcinol and 3-aminophenol from aqueous solutions. Kinetic models namely pseudo-first order, pseudo-second order, and Avrami fractional order and isotherms (Freundlich, Langmuir, and Liu) were applied to the experimental adsorption data. The results demonstrate maximum adsorption capacity for resorcinol (406.9 mg g^{-1}) and 3-aminophenol (454.5 mg g^{-1}) at 50°C. The thermodynamic analysis of data and the effect of temperature studies revealed that the adsorption processes of resorcinol and 3-aminophenol onto ASAC were temperature dependent. The adsorption processes were exothermic and spontaneous. The avocado carbon displayed excellent adsorption properties for the simulated effluents containing phenolic compounds.

Keywords: Avocado seed; Microwave-assisted pyrolysis; Activated carbons; Phenolic compounds; Isotherm and kinetic models; Adsorption

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