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Enhanced adsorption performance of activated carbon prepared from peanut shell for the adsorption of dyes from aqueous solution

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ABSTRACT

In this study, activated carbon (AC) was prepared from peanut shell by activation with potassium hydroxide. The process parameters to prepare (AC) were optimized with respect to time, temperature and impregnation ration. The prepared AC was characterized by N_2 adsorption–desorption isotherms Brunauer–Emmett–Teller (BET), Fourier-transform infrared spectroscopy and scanning electron microscopy. The maximum BET surface area achieved was found to be 716 m^2/g. The AC exhibited excellent adsorption performance to methylene blue (MB). The Langmuir isotherm model was fitted well to describe the equilibrium adsorption data and the maximum adsorption capacity was achieved to be 1,388 mg/g. The adsorption followed the pseudo-second-order kinetic model. The thermodynamic study showed that the MB adsorption onto AC was exothermic and spontaneous. Considering high adsorption capacity, AC derived from peanut shells can be used as a promising adsorbent for efficient treatment of textile wastewaters.

Keywords: Activated carbon; Peanut shell; Methylene blue; Adsorption; Kinetics; Langmuir isotherm

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