

## Adsorption of phenol and dye from aqueous solution using chemically modified date pits activated carbons

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### ABSTRACT

The adsorption of phenol and methylene blue (MB) on modified activated carbons has been investigated. The activated carbon was prepared from date pits by physical activation (CO<sub>2</sub> as activating agent). Oxidation in the liquid phase with nitric acid and thermal treatment under flowing nitrogen were carried out in order to produce samples with different surface chemical properties but with no major differences in their textural properties. The surface area and porosity were characterized by N<sub>2</sub> adsorption at 77 K and CO<sub>2</sub> adsorption at 273 K. The changes in surface chemistry were studied by temperature programmed decomposition. Kinetic and equilibrium adsorption data of phenol and dye were carried out. Adsorption kinetic data were tested using pseudo-first-order, pseudo-second-order and intraparticle diffusion models. Equilibrium data were analyzed by Langmuir and Freundlich isotherm models. The maximum adsorption capacities calculated from the Langmuir isotherm model were 161.8 and 216.4 mg.g<sup>-1</sup> for phenol and MB, respectively. The different uptakes obtained are discussed in relation to the chemical properties of the adsorbents. The results show that surface chemistry of the activated carbon plays a key role in phenol and dye adsorption. Finally, activated carbon from date pits with appropriate preparations can reach a high adsorption capacity.

*Keywords:* Date pits; Activated carbon; Acid treatment; Thermal treatment; Adsorption

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