



## Potassium hydroxide-treated palm kernel shell sorbents for the efficient removal of methyl violet dye

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### ABSTRACT

The present work was aimed to evaluate the removal of methyl violet dye by potassium hydroxide-treated palm kernel shell sorbents. The sorbents were prepared by dried impregnation, carbonization and chemical activation in a muffle furnace. The sorbents were characterized for specific surface area, surface morphology and functional groups. Results show that the activated carbon displayed a specific surface area of 302 m<sup>2</sup>/g, which was 54 times greater than the impregnated sorbent. However, the latter showed a 42 mg/g maximum adsorption capacity of methyl violet, nearly four times better than the former. The equilibrium data were fitted well with the Langmuir isotherm, while the rate of sorption data obeyed the pseudo-second-order model. Adsorption of methyl violet was not specific surface area-dependent. The rate-limiting step for methyl violet adsorption was mainly driven by film diffusion at lower concentration, and intraparticle diffusion at higher concentration. A simple impregnation using potassium hydroxide was a promising approach to yield sorbent rich in acidic groups for methyl violet removal.

*Keywords:* Adsorption; Dried impregnation; Methyl violet dye; Palm kernel shell; Potassium hydroxide

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