



Removal of methylene blue dye from aqueous solutions by using date stones derived as an activated carbon

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ABSTRACT

In this study, activated carbon (DSAC) was prepared from date stones using sulfuric acid activation, an inexpensive material, showed accepted scavenging behaviour through adsorption for the removal of methylene blue (MB) from aqueous solution. Batch adsorption studies were conducted to evaluate the effects of initial concentration (5–100 mg L⁻¹), pH (2.5–10), adsorbent dose (0.25–3 g.L⁻¹) and effect of temperature (10–55 °C). It was found that pH plays a major role in the adsorption process; adsorption capacity was influenced by the physical and surface chemical properties of carbon and the pH of the solution. The experimental data were analyzed by three different types of isotherm models, the Langmuir isotherm, the Freundlich isotherm and the Temkin isotherm at different temperatures. The experimental results fitted well with the Freundlich and Tempkin adsorption isotherm, indicating thereby multilayer adsorption of the dye. Change in Gibbs free energy (ΔG), entropy (ΔS), and enthalpy (ΔH) were also calculated from the adsorption results were found the adsorption process was endothermic.

Keywords: Adsorption; methylene blue, isotherm; endothermic.
