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Textile Dye Removal by Activated Date Seeds

Abstract- The objective of the study was to prepare activated carbon from date seeds (ADS) and use it as a medium for textile dye adsorption. Batch adsorption of reactive green dye showed that dye adsorption depends on the contact time, the dye concentration, and the pH equilibrium. Different concentrations of the prepared activated carbon were used with different dye concentrations and evaluated for dye removal efficiency. The maximum dye adsorption in this study was achieved after 270 min at a pH range of 3-9. In this study, the functional groups in the prepared ADS were identified using Fourier transform infrared (FTIR) while the crystal size was determined using an X-ray diffractometer (XRD). The Langmuir and Freundlich isotherm equation were used to study the adsorption kinetics, isotherms, and dye desorption while the pseudo-second-order kinetics was used to analyze the equilibrium adsorption data of the reactive green dye on the prepared ADS. The dyes’ adsorption kinetics followed pseudo-second-order kinetics, which is adjudged as the best in adsorption studies. The equilibrium data were best fitted with the Freundlich isotherm model. Conclusively, the adsorption of dye onto the prepared ADS was observed to be an endothermic physical adsorption process.

Keywords- Activated carbon, Adsorption, Freundlich isotherm, kinetics, Langmuir isotherm, Reactive green dye.

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