

Fabrication of Activated Carbon from Palm Trunks for Removal of Harmful Dyes

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Abstract : Date palm trees are abundant and cheap natural resources in Saudi Arabia. In this study, an activated carbon was prepared from palm trunks by chemical processes. The chemical activation was performed by impregnation of the raw materials after grinding with H₃PO₄ solution (63%), followed by placing of the sample solution on a muffle furnace at 400°C for 30 min, and then at 800°C for 10 min. The morphology of the fabricated material was checked using scanning electron microscopy that showed the rough surfaces on the carbon samples. The use of fabricated activated carbon for removal of eosin dye from aqueous solutions at different contact time, initial dye concentration, pH and adsorbent doses was investigated. The experimental results show that the adsorption process attains equilibrium within 20 min. The adsorption isotherm equilibrium was studied by means of the Langmuir and Freundlich isotherms, and it was found that the data fit the Langmuir isotherm equation with maximum monolayer adsorption capacity of 126.58 mg g⁻¹. The results indicated that the home made activated carbon prepared from palm trunks has the ability to remove eosin dye from aqueous solution and it will be a promising adsorbent for the removal of harmful dyes from waste water.

Keywords : activated carbon, date palm trunks, H₃PO₄ activation, adsorption, dye removal, eosin dye, isotherm

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