

Orange Peel Derived Activated Carbon /Chitosan Composite as Highly Effective and Low-Cost Adsorbent for Adsorption of Methylene Blue

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Abstract : In this study, the adsorption of Methylene Blue (MB), a cationic dye, onto Orange Peel Derived Activated Carbon (OPAC) and chitosan(OPAC/Chitosan composite) composite (a low-cost adsorbent) was carried out using a batch system. The composite was characterised using IR spectra, XRD, FESEM and Pore size studies. The effects of initial pH, adsorbent dose rate and initial dye concentration on the initial adsorption rate, capacity and dye removal efficiency were investigated. The Langmuir and Freundlich adsorption models were used to define the adsorption equilibrium of dye-adsorbent system mathematically and it was decided that the Langmuir model was more suitable to describe the adsorption equilibrium for the system. In addition, first order, second order and saturation type kinetic models were applied to kinetic data of adsorption and kinetic constants were calculated. It was concluded that the second order and the saturation type kinetic models defined the adsorption data more accurately. Finally, the evaluated thermodynamic parameters of adsorption show a spontaneous and exothermic behavior. Overall, this study indicates OPAC/Chitosan composite as an effective and low-cost adsorbent for the removal of MB dye from aqueous solutions.

Keywords : activated carbon, adsorption, chitosan, methylene blue, orange peel

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