



## Liquid phase adsorption of Indigo Carmine and Methylene Blue on Neem bark

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Received 30 April 2009; accepted 30 May 2010

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### ABSTRACT

This research paper deals with the use of low-cost, easy obtained, high efficiency and eco-friendly adsorbents as an ideal alternative to the current expensive methods of removing dyes from wastewater. This study investigates the potential use of Neem bark powder (NBP) for the removal of Indigo Carmine (I.C) and Methylene Blue (M.B) dyes from simulated wastewater. The effects of different system variables, adsorbent dosage, initial dye concentration, pH and contact time were studied. The results showed that as the amount of the adsorbent increased, the percentage of dye removal increased accordingly. Optimum pH value for dye adsorption was different according to the nature of the dyes. The adsorption of both the dyes was found to be a pseudo-second-order rate equation and fit well with Langmuir equation, better than Freundlich equation. The maximum removal of I.C was obtained at pH 2 and M.B at pH 10. The maximum adsorption capacity obtained from Langmuir equation was  $4.02 \times 10^3$  and  $3.11 \times 10^3$  mol g<sup>-1</sup> for I.C and M.B on NBP. Furthermore, adsorption kinetics of I.C and M.B were studied and the rate of adsorption was found to conform to pseudo-second-order kinetics with a good correlation ( $R^2 > 0.99$ ) with intra-particle diffusion as one of the rate determining steps. Thus low-cost NBP can be an attractive option for dyes removal from diluted industrial effluents.

**Keywords:** Kinetics; Thermodynamics; Wastewater; Adsorption; Neem bark powder; Dyes

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