

## Removal of methylene blue from waste water using cinnamon wood

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The presence of dyes in industrial effluents is a major cause of water pollution. Cinnamon (*Cinnamomum verum*) is native to Sri Lanka and is available in abundance. Cinnamon wood saw dust may be used as a low cost adsorbent with no processing, or with a simple, yet economical modification for enhanced adsorption. This study investigated the removal of Methylene Blue (MB) by non-modified (NMSD) and alkaline modified (MSD) saw dust from cinnamon wood. Batch adsorption experiments were carried out, and experiments were performed in triplicate along with a control without saw dust. Characterization via SEM and FTIR suggested that change in surface morphology and functional groups may account for the increase in adsorption capacity of MSD, which is fourfold higher than NMSD. The highest adsorption capacity observed for NMSD was 44.4 mg g<sup>-1</sup>, contact time was 90 min, at pH 6 with 0.1 g of NMSD, particle size range less than 0.15 mm, per 25.00 mL of 200 ppm MB solution. The adsorption data for NMSD fitted best with Toth model and insignificant variance with pH, and best fit pseudo first order model indicates physisorption to be dominant over chemisorption. The highest adsorption capacity for MSD was 119.6 mg g<sup>-1</sup>, contact time was 120 min for 0.1 g of MSD, less than 0.15 mm particle size range, for 25.00 mL of 350 ppm MB at pH 4. Redlich-Peterson isotherm and pseudo second order kinetic model was best for MSD with correlation coefficients greater than 0.99. Kinetic data suggests the possibility of liquid film diffusion being the rate determining step rather than intra-particle diffusion for both NMSD and MSD. The results demonstrate the potential use of cinnamon wood as a low cost adsorbent for MB, henceforth adding commercial value for cinnamon wood, which is otherwise used as firewood or discarded as waste.

**Keywords:** Low-cost adsorbent, Methylene blue

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