

## Green synthesis of clay/silver nanocomposite materials for adsorption of hazardous dyestuffs

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### ABSTRACT

In this study, clay/silver nanocomposite material (clay/AgNCs) was biosynthesized using *Acacia cyanophylla* extract, and the synthesized clay/AgNCs material was used as an adsorbent for adsorption of the Methylene Blue (MB) and Telon Blue AGLF (TB) dyes, known as hazardous dyestuffs. The optimum initial pH, temperature, and adsorbent concentration were determined to be 8.0, 45°C, and 1.0 g/L for MB adsorption and 8.0, 55°C, and 1.0 g/L for TB adsorption, respectively. The experimental equilibrium data for MB and TB adsorption were fitted well to the Freundlich and Langmuir isotherm models, respectively. The studied adsorption process followed the pseudo second order kinetic model. Weber-Morris model results showed that both intraparticle and film diffusion were effective on the studied adsorption systems. The thermodynamic parameters showed that MB and TB adsorption on clay/AgNCs were endothermic, increasing in randomness of adsorbed species and spontaneous for MB adsorption, induced for TB adsorption. Moreover, clay/AgNCs were characterized by DLS, FT-IR, XRD, SEM and EDX analysis methods.

*Keywords:* *Acacia cyanophylla*; Adsorbent characterization; Dyestuff adsorption; Biosynthesis; Leaf extract; Nanocomposite

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