ADSORPTION PERFORMANCE OF ACTIVATED CARBON *FROM TABEBUIA ROSEA* FOR REMOVAL OF METHYLENE BLUE IN AQUEOUS SOLUTION

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ABSTRACT

This study emphasizes the agricultural waste from *T. Rosea* dried leaves as a natural low-cost adsorbent precursor of activated carbon for methylene blue dye solution due to its high abundance and availability in Malaysia. Methylene blue dyes which are largely consumed by textiles industry poses several hazardous complications on human health without proper wastewater treatment. Thus, using dried T. Rosea leaves as a low-cost adsorbent can provide an economical alternative for treating blue dye-contaminated wastewater. The dried leaves undergo chemical activation with 60% KOH with a ratio of 1:10 of bamboo leaves activated carbon precursor to the hydrochloric acid. The *T. Rosea* then were carbonized at 500°c for 4h and were neutralized for characterisation and batch adsorption study. The physicochemical properties of TDLAC were characterized using proximate analysis of ash content, moisture content, and carbon acidity. The surface of TDLAC was also characterized by using Fourier Transform Infrared (FTIR) and point of zero charge (pHpzc). Batch adsorption studies were conducted to determine the most favourable condition for TDLAC to adsorb methylene blue dye. TDLAC also indicated a high amount of iodine number at 1237.08 mg/g. The operating variables studied were adsorbent dosage, initial concentration and contact time. This study reported that the optimum adsorbent dosage, initial concentration, and contact time were 0.3 g, 80 ppm, and 30 mins, respectively. TDLAC's FTIR spectra revealed a variety of functional groups. Prior to MB adsorption, the analysis identified hydroxyl (O-H) groups at ~3300 cm^{-1}, carbonyl (C=O) groups of ketones and aldehydes at 1654 cm^{-1}, and nitro compounds (N-O) between ~1567 cm^{-1} and 1654 cm^{-1}. Following MB adsorption, additional bands representing C-N and -CH2 vibrations developed, showing that MB molecules reacted with TDLAC's functional groups.

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