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PERFORMANCE EVALUATION OF COMMERCIAL COCONUT SHELL ACTIVATED CARBON IN METHYLENE BLUE ADSORPTION

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This Final Year Project Report entitled **"Performance Evaluation of Commercial Coconut Shell Activated Carbon in Methylene Blue Adsorption"** was submitted by Nurul Aqilah Binti Mohd Yusof in partial fulfilment for the Degree of Bachelor of Science (Hons) Chemistry With Management, in the Faculty of Applied Science, and was approved by

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ABSTRACT

PERFORMANCE EVALUATION OF COMMERCIAL COCONUT SHELL ACTIVATED CARBON IN METHYLENE BLUE ADSORPTION

This research analyses the affordability and sustainability of the use of granular activated carbon (GAC) made from coconut shell in the elimination of methylene blue (MB) dye from liquid solutions while using GAC in dye concentration, adsorbent dosage, pH, time, and temperature of batch experiments in order to assess the level of MB adsorption. Results show the optimal conditions for MB dye removal are a pH of 8, an adsorbent dosage of 0.26 g, a contact time of 60 minutes, and an MB concentration of 80 mg/L. Under the stated conditions, GAC was able to adsorb 38.3 mg/g. To describe the equilibrium data of the adsorption, the best Langmuir isotherm model is ($R2 > 0.99$), which indicates that the adsorbent is homogeneous, with a single layer. The pseudo second order (PSO) model was what the kinetic analysis of the adsorption process followed, therefore, implying that the rate is controlled by chemisorption. The outer surface adsorption and pore diffusion is what the intraparticle analysis of the process showed.Based on the thermodynamic analyses, it has been established that the adsorption process is spontaneous and endothermic, as there are negative values of Gibbs free energy (ΔG°) and positive values of enthalpy change (ΔH°). In general, this study shows that GAC made from coconut shells is a promising, eco-friendly, and effective way to treat industrial wastewater.

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