ADSORPTION OF METHYLENE BLUE DYE ON ULTRASONIC ASSISTED PALM OIL EMPTY FRUIT BUNCH ACTIVATED CARBON

SITI NORZARIFAH NADIRAH BINTI NOR ZAHID

Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Applied Chemistry
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This Final Year Project Report entitled "**Adsorption of Methylene Blue Dye on Ultrasonic Assisted Palm Oil Empty Fruit Bunch Activated Carbon**" was submitted by Siti Norzarifah Nadirah binti Nor Zahid in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Applied Chemistry, in the Faculty of Applied Science and was approved by

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ABSTRACT

ADSORPTION OF METHYLENE BLUE DYE ON ULTRASONIC ASSISTED PALM OIL EMPTY FRUIT BUNCH ACTIVATED CARBON

This study explores the viability of palm oil empty fruit bunches (EFB) as a sustainable source for producing activated carbon (AC) to eliminate methylene blue (MB) dye from wastewater. The research centers on synthesizing AC through potassium hydroxide (KOH) activation, enhanced by ultrasonic treatment, to maximize adsorption efficiency. The EFB-based activated carbon (EFB-UAC) was characterized for physicochemical properties such as moisture content, ash content, bulk density, and iodine number, compared to conventionally produced AC (EFB-AC). Results indicated that EFB-UAC demonstrated superior performance with increased adsorption capacity and removal efficiency, attributed to enhanced porosity and availability of functional groups. Optimal adsorption parameters, including adsorbent dosage, contact time, and MB concentration, were determined, with EFB-UAC achieving up to 97% dye removal under optimal conditions. While effective, the study recognizes the constraints of laboratory-controlled environments and the sole focus on MB. The findings highlight the dual advantages of utilizing agricultural waste for eco-friendly adsorbent production and enhancing wastewater treatment technologies. Future research should investigate the application of EFB-UAC for additional pollutants, evaluate scalability, and assess performance in real industrial contexts.

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