

**IMPROVEMENT ON THE ADSORPTION OF
METHYLENE BLUE DYE ONTO GROUNDNUT SHELL
ACTIVATED CARBON BY ULTRASONICATION**

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**BACHELOR OF SCIENCE (HONS.)
APPLIED CHEMISTRY
IN THE FACULTY OF APPLIED SCIENCES
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This Final Year Project Report entitled **“Improvement on the Adsorption of Methylene Blue Dye onto Groundnut shell Activated Carbon by Ultrasonication”** was submitted by Aina Nadhirah binti Azman in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Applied Chemistry, in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

Adsorption with activated carbon is a typical technique for eliminating MB dye from water. However, commercial activated carbon is costly and frequently insufficient. This study looked at the synthesis of activated carbon from groundnut shell-based activated carbon and its physicochemical parameters, such as pH_{pzc} , bulk density, moisture content, iodine number, and ash content. The adsorption capacity of groundnut shell-based activated carbon was evaluated, with ultrasonication utilized to improve adsorption's performance.

Employing a UV-Visible spectrophotometer, batch adsorption tests were carried out to investigate the influences of initial methylene blue dye concentration (50-200 mg/L), adsorbent dosage (0.1-1.0 g), and contact time (20-60 minutes). Fourier transform infrared spectroscopy (FTIR) analysis was conducted to evaluate surface chemistry of groundnut shell-based activated carbon before and after dye adsorption. The results showed that the maximum methylene blue dye adsorption occurred at 200 mg/L, 1.0 g GNS-AC, and 60 minutes of contact time. The physicochemical parameters of GNS-AC were as follows: 55.56% product yield, 8.56% moisture content, 9.06% ash content, 0.37 g/mL bulk density, and 518.83 mg/g iodine concentration.

Furthermore, ultrasonication enhanced the adsorption capacity of activated carbon, indicating that it had the potential to improve dye removal efficiency. These