A

MAJOR PROJECT REPORT

on

"Removal of dye from aqueous solution by coconut shell and corn cobs activated charcoal"

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CERTIFICATE

This is to certify that thesis entitled "**Removal of dye from aqueous solution by coconut shell and corn cobs activated charcoal**" submitted by **Ms. Anjali Sindram** and **Ms. Pranjali Srivastava** in partial fulfilments for the requirements for the Degree of **Bachelor of Technology** in **Department of Chemical Engineering** is a record of Bonafide and original research work carried out by them under guidance and the thesis does not include any work which has previously been submitted for the award of other degree, diploma, associate-ship, fellowship, or other similar title to them. We further certify that the work reported in this thesis was carried out independently by the candidates.

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ABSTRACT

The escalating discharge of dye-containing wastewater from industries poses a significant environmental threat, necessitating efficient and sustainable treatment technologies. Adsorption using activated carbon (AC) has emerged as a promising method for dye removal due to its high efficiency and versatility. This study focuses on the potential of utilizing low-cost and readily available agricultural wastes, specifically coconut shells and corn cobs, as precursors for the production of activated carbon adsorbents. The preparation of AC from these biomass sources typically involves carbonization followed by chemical activation using agents H_3PO_4. The resulting activated carbons exhibit high surface areas, often exceeding 1000 m^2/g, and possess diverse surface functional groups crucial for dye adsorption. Characterization techniques such as BET surface area analysis, FTIR spectroscopy, are employed to determine the textural and chemical properties of the adsorbents. Both coconut shell and corn cob derived activated carbons have demonstrated significant efficacy in removing various types of dyes from aqueous solutions, with adsorption capacities influenced by factors such as pH, temperature, initial dye concentration, and adsorbent dosage. FTIR spectroscopy was used to identify the surface functional on the activated charcoal made from Corn Cobs and Coconut Shell. For coconut shell hydroxyl (-OH) group was seen at 3695 cm^{-1} and CO group 1730 cm^{-1}. Likewise for corn cobs activated charcoal FTIR spectrum showed Carboxylic group at 916 cm^{-1}, and Carbonyl group at 916 cm^{-1}, OH group at 3685 cm^{-1}. This research underscores the potential of coconut shell and corn cob activated carbons as cost-effective and environmentally sustainable alternatives to commercially available adsorbents for the remediation of Methyl Orange (MO). The absorption of MO of different concentration was measured using UV-vis spectrophotometer different mass ratio of CSAC and CCAC. The highest adsorption % is evaluated by pure CSAC(1:1) is 91.6.

Keywords: Dye-containing wastewater, Environmental threat, Activated carbon (AC), Adsorption, Coconut Shells, Corn Cobs, FTIR spectroscopy, Methyl Orange (MO)