UNIVERSITI TEKNOLOGI MARA
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TITLE:

Preparation of Activated Adsorbent from Eggshell

Using Chemical Impregnation Method

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AUTHOR'S DECLARATION

"I hereby declare that this report is the resof my own work except for quotations and summaries which have been duly acknowledged."

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ABSTRACT

The increasing generation of eggshell waste poses significant environmental concerns due to its slow biodegradability. However, eggshells, primarily composed of calcium carbonate ($CaCO_3$), present an opportunity for sustainable reuse as an effective adsorbent material. This study focuses on the preparation of activated adsorbents from eggshells using a chemical impregnation method to enhance their adsorption properties. The activation process involved treating eggshell powder with hydrochloric acid (HCl) and sodium hydroxide (NaOH) in a 1:1 ratio to improve porosity, surface area, and functional groups.

The synthesized adsorbents were characterized using Fourier Transform Infrared Spectroscopy (FTIR) to identify functional groups, X-ray Diffraction (XRD) to determine crystalline structure, Elemental Analysis (EA) to assess composition, Proximate Analysis to measure thermal properties, and Microscopic Imaging examine surface morphology. The results confirmed the successful activation of eggshell-based adsorbents, exhibiting enhanced porosity and functionalized surfaces suitable for adsorption applications.

This study demonstrates the potential of eggshell-derived activated adsorbents as an eco-friendly and cost-effective alternative for environmental applications, particularly in wastewater treatment and pollutant removal. Future research should explore optimization strategies to further improve adsorption efficiency and expand its industrial applications.

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