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SUPERVISOR:

Puan Zarina Omar

CO-SUPERVISOR:

Dr Nurul Shafikah

TITLE OF PROJECT:

Preparation of Activated Carbon from Coconut Shells Using Mechanical Milling Method

PREPARED BY:

MATRIX NO.	NAME	GROUP/CLASS
2022449196	MOHAMAD AZZAM AIZAT BIN NAZALI	EH110/5A

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AUTHOR'S DECLARATION

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

Name of Student	:	MOHAMAD AZZAM AIZAT BIN NAZALI
Student I.D. No.	:	2022449196
Programme	:	Diploma in Chemical Engineering
College/School	:	College of Engineering/School of Chemical Engineering
Signature of Student	:	
Date	:	12 February 2025

ABSTRACT

This project explores the utilization of coconut shell-activated carbon for the optimization of hydrogen storage. The coconut shells were treated thermally and undergone a mechanical milling process in an effort to produce a material with additional microscopic pores to escalate the surface area. This enables the material to hold hydrogen more efficiently. The study experimented with various temperatures and processes in an effort to determine the optimal way to activate the coconut shells. Experiments showed that hydrogen was stored better in chemically treated coconut shells compared to untreated shells, with a 30% increase in storage capacity. Microscopy imaging confirmed that the material now possessed by very small pores and was hence better at storage hydrogen. The study emphasizes that activated carbon derived from coconut shells can be an improved material for storing hydrogen. It can be suggested that various chemical treatments should be tried and long-term storage behavior needs to be studied.

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CHAPTER ONE
BACKGROUND

1.1 Introduction

Hydrogen storage faces significant challenges, mainly due to slow dehydrogen mobility, which prevents the effectiveness of energy zoia applications (Zou et al., 2021). To assess this problem, a comprehensive invention of activated carbon (AC) has been invented for its ability to increase hydrogen absorption and the desorption effects. The high surface of AC and porous structure provides an effective medium for hydrogen storage, which improves liberation properties (Ahmed and Thedon, 2012). Coconut shell (CS) has received attention as a durable and cost-effective carbon source for the various raw materials used for alternating current production. Their abundance, renewable nature and rich carbon material make them a promising alternative to traditional precursors (Danish and Ahmed, 2018).

The main method for activated carbon preparation is mechanical milling, which provides a simple, efficient and scalable approach. This technique enhances the textural properties of AC by increasing the surface area and porosity, which is crucial for optimizing hydrogen storage capacity (Fu and Hamid, 2012). Moreover, the use of coconut shell-storm AC organizes global durability efforts by promoting waste values and reducing environmental influence. As hydrogen continues to find a clean energy room, improving storage materials through innovative processing methods such as mechanical milling can contribute to the advancement of renewable energy room techniques.

1.2 Literature Review

As the world seeks permanent energy solutions, extensive research has focused on hydrogen storage. Hydrogen can be a clean and efficient energy carrier, but there are challenges in its safe and efficient storage. Existing methods for hydrogen storage, including gas and liquid hydrogen physical storage, have significant safety concerns and energy requirements in addition to limited storage capacities. Material-based hydrogen storage, however, has much more potential due to the rapid advances in carbon-based materials that can improve the effectiveness of hydrogen storage.