UNIVERSITI TEKNOLOGI MARA
Cawangan Terengganu
Kampus Bukit Besi

**TITLE:**

# LIGNIN EXTRACTION & FUNCTIONAL GROUPS STUDY

**SUPERVISOR:**

DR MARSHAHIDA BINTI MAT YASHIM

**SCHOOL OF CHEMICAL ENGINEERING**
**COLLEGE OF ENGINEERING**

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# ABSTRACT

Lignin is second richest natural polymer after cellulose. Research shows the rice husk has a higher of lignin content. The lignin is commonly used in biofuels. From this study, the objectives is to extract the lignin from the rice husk and study the functional group by used an alkaline extraction method. Based on study, the four process parameters of lignin extraction from rice husk that were systematically and completely optimized using the response appear methodology is reaction time, extraction temperature, sodium hydroxide and solid/liquid ratio. For this study, the extraction solution which is a mixture of sodium hydroxide with water with different concentrations of sodium hydroxide: 5%, 10% and 15% were used. The catalyst that used for extraction is sulfuric acid and hydrogen peroxide with a concentration of 5%. Based on the experiment, the functional groups of lignin such as hydroxyl, carbonyl and ether in rice husk waste has been identify. The different types of functional group for lignin samples were characterized by using Fourie-transform infrared spectroscopy (FTIR). The extracted samples show the observation of peak for the two types of mixture solvent (NaOH-H2O2 and NaOH-H2SO4) are slightly different because the different chemical processes. The NaOH-H2O2 treatment mainly leads to oxidation, which can increase the peak, while NaOH-H2SO4 cause to acid hydrolysis that can slightly move or change the peaks.

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# CHAPTER ONE : BACKGROUND

## 1.1 INTRODUCTION

Research show agricultural sector is the main sector in the world. The main agricultural in Asia is rice cultivation. Rice is main food for over half of the global population. About 90% of the global rice is produced and consumed in Asia [1]. However, by the rice production, it will produce the rice husk waste. Rice husk waste is included in the class of organic waste from agricultural activities [2]. Approximately 20 kg of rice husk waste is produced for every 100 kg of paddy grain processed into rice. According to the International Grains Council (IGC) the data that project global rice production has released to reach 511.3 million tons in 2023/24, resulting in the production of 102.3 million tons of rice husk waste [3].

The most common alternative for the management and valorization of rice processing waste is the combustion of rice husk [4]. This can produce dangerously high levels of air pollution as well as the greenhouse gas and this not only does this present a significant risk to human health and to the climate, but it is also a wasted opportunity to obtain whatever economic value the rice waste may have. Concerns about burning rice waste's effects on the environment and human health, the alternatives method that can be used is extract the lignocellulosic biomass which is cellulose, hemicellulose and lignin from the rice husk waste [5]. From the research, the catalytic conversion of lignin is extremely challenging due to the hardness and complexity of the structure [6]. Lignin-rich residues from rice husk processing can be converted into biofuels [7].