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TITLE:

EXTRACTION OF LIGNIN FROM RICE HUSK: A STUDY OF LIGNIN YIELD PERCENTAGES

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ABSTRACT

The purpose of this research is to study the evaluate percentages yield of the rice husk lignin extracted by using two different solvents. This study was focused on compared different solvent-based extraction to examine their effectiveness in lignin yield. In this research, rice husk lignin was extracted using sodium hydroxide, NaOH, hydrogen peroxide, H_2O_2 and sulphuric acid, H_2SO_4 solvent. To achieve the purpose of study, the rice husk was dried in the drying oven to remove moisture before continuing with the lignin extraction process. The extraction process parameter involves the temperature around 90˚C with continuous heating and stirring conditions. Lignin is the complex polymer that we can found especially in plant cell walls. Lignin extraction such a tough process as it has strong bound between cellulose and hemicellulose that cause difficulty to break it. However, a lot of research and technologies has been developed to optimize the extraction process nowadays. Lignin not only the important part in formation of cells wall in the plant but also became valuable material in various industry around the world. In fact, lignin has rich source of valuable chemical such as vanillin, phenolic compound that has their own applications. Moreover, lignin has gained outstanding attention from various industry include pharmaceutical industry. As the increase of demand for sustainable and bio-based materials, lignin emerged as favourable resource because of its biodegradability, biocompatibility and antioxidant properties.

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CHAPTER 1

BACKGROUND

1.1 Introduction

Lignin is one of the important and widely used polymers on earth alongside cellulose and hemicellulose. In plants, it is organically associated with cellulose and hemicellulose with the function to provide stiffness and protecting the cell. The difficult characterization and extraction of this compound usually proceeds slowly because of the esterified "Chains of Rings" structure where aromatic rings are randomly bonded together with ether and C-C bonds. Lignin's are said to be amorphous because unlike cellulose, they do not possess a distinct structure. Randomly, they are multidisciplinary, three-dimensional, and branched polymers. Those structures are challenging to decipher. This is due to the fact that its composition relies on various factors such as the type of plant, the soil utilized for cultivating the plant, and climate. The lignin can be defined as polymeric chain that formed by units of "phenylpropanoids"[1].

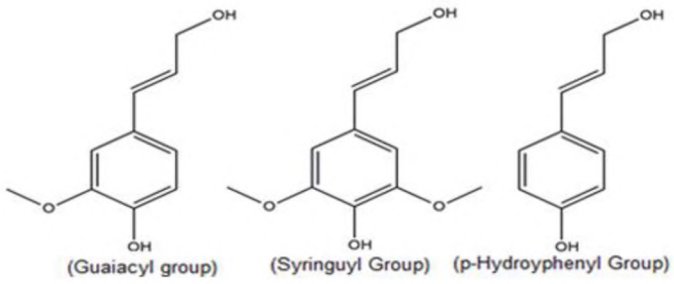

Fig. 1 Main units of "phenylpropanes" that form lignin.

In the natural world, lignin is an aromatic biopolymer that forms numerous linkages with cellulose and hemicellulose like benzyl ether's, which is Wood's primary bond that links the hardwood lignin propane unit (α-carbon) to carbohydrates' hydroxyl groups. Then, benzyl ester which links beta diaryl (α or γ-carbon) to the side chain of xylan (carboxyl of 4-0-methyl glucuronic acid) and phenyl glycoside that links lignin phenolic hydroxyl group with cellulose and hemicellulose's anomeric hydroxyl group. In a research, lignin can be said to has low