

UNIVERSITI TEKNOLOGI MARA

**PARAMETRIC STUDY OF
LEUCAENA OIL AS BIOADHESIVE
FORMULATION**

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ABSTRACT

A gradually increase in the value of crude oil and a serious worry about the production of non-renewable energy have encouraged the finding of another renewable sources for fuel, energy and new material production. The aim of this study is to synthesis and characterize the physical and chemical properties of bio based phenolic resin compound derived from the *Leucaena sp. wood* by gasification method. This study also carried out to formulate Bio-based phenol formaldehyde adhesive at different condition (temperature, time and catalyst loading) and comparison study with the commercialized petroleum based phenol formaldehyde resole resin adhesive. In order to produce the bio based phenol resin, we use gasification method by using upgrate gasifier reactor while to formulate the phenol formaldehyde which are reaction in the basic condition. The phenol resin and bioadhesive were further analyzed by GC-MS to know the component and composition by percentage in phenolic resin and phenol formaldehyde. The results indicated that the reaction temperature had more effect on the products distribution than the retention time. The optimum temperature, time and catalyst loading are 90°C, 30 mins and 0.4g.

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CHAPTER 1: INTRODUCTION

1.0 Research Background

Nowadays there is a growing the use of composite material such as strand board, flake board and composite lumber, the wood industry is growing rapidly. One material have been used widely as the wood adhesive due to their excellent bonding, water resistance and durability. The material is Phenol formaldehyde. However, phenol is the primary component of the resin used in the wood adhesive derived from fossil fuel resources (petroleum and coal). However, there is a main issue of using this type of resin that is high cost, this is because it follows the fluctuation of the petroleum price. In addition, this type of resin has the material that is considered as the major indoor pollutant and thus very harmful for our health. Thus finding renewable material as other option for the raw material has become the main thing in interest for the resin production.

In this study, we will use the thermochemical gasification method. The gasification of biomass is a procedure used to convert solid biomass into gasified state and then condense the gas. Then it will change the phase from the gas form in liquid form. In the gasification process will conducted at higher temperature. Gasification of biomass can produce phenol resin and make the adhesive mixture due to its free hydroxyl (-OH) group that can polymerize with various functional groups to produce different polymers. Gasified biomass therefore can be used as a part of adhesive mixture by combined it with synthetic adhesive like formaldehyde. overall, gasification of biomass by using the upgrate gasifier reactor that produce product in the form of gas then the gas will condense by using condenser can be used in the production bio-adhesive. It will produce bio-oil. Then, the bio-oil will further the GCMS analysis.