UNIVERSITI TEKNOLOGI MARA

PARAMETRIC STUDY OF BIOMASS OIL (PALM KERNEL SHELL OIL) BASED BIOADHESIVE FORMULATION

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ABSTRACT

Adhesives are used widely in the wood, metal, paper, leather, rubber and glass industries, the demand for these liquid natural adhesives gradually increases from time to time, however, its dependent on the supply of petroleum suffers an impact due to its high cost and depletion of this nonrenewable source. Thus, allowing biomass material as a substitute for the production of phenol formaldehyde as the main material in producing bio adhesive. Palm kernel shell is a renewable source of biomass that can be used and now its potential to be a bio adhesive material are being utilized. With resort to this material as a green technology that helps preserve the environment as it lessen the amount of solid waste, it also caused less pollution and not harmful to human health.In this study, the PKS oil produced through the process of updraft gasification is utilized for the production of bio based phenolic resin. This study will compare the physical and chemical properties of the bio based phenolic resins derived from the palm kernel shell with the reference phenol formaldehyde. It is also carried out to formulate, from palm kernel shell oil a bio based adhesive on a different set of parameters (temperature, time and catalyst loading) with comparison study to the reference phenol formaldehyde adhesive. Characterization of chemical characteristics using GCMS to analyze the amount of phenol content in the bio adhesive. Overall results shows that the best conditions of formulation in producing bio based phenolic resin is at 85°c temperature, with time of 60 min and catalyst loading of 0.6g at this point the highest value of phenol can be obtained. In conclusion, PKS oil shows that it is suitable as a substitute for commercial adhesive.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STUDY

Adhesive is substances that are able to hold materials together by attachment of the surface as defined by the American Society for Testing and Materials (ASTM).

The first evidence upon the use of adhesive date back to 4000 B.C, it was first discovered by archeologist on the burial site of prehistoric tribes, where broken pottery vessels repaired using sticky resins from the tree sap. Adhesives has important role mainly in the construction industry as the large amount of adhesive are used to manufacture building materials such as plywood by far, smaller amounts are used for assembling these building materials. (Nicholson,C. et.al, 1991)

Generally, adhesive can be classified into two classes, which is the natural and synthetic groups. Natural adhesives originate from animal glue, casein, protein based adhesive and natural rubber adhesives. The synthetic adhesives can be divided into two types which is industrial and specialty type. It originates from silicones, acrylics, epoxies and are usually petroleum based adhesives, bio-adhesive are a form of natural adhesive. (Ebnesajjad,