UNIVERSITI TEKNOLOGI MARA

THE PROPERTIES OF ALKALINE-TREATED KENAF PARTICLEBOARD FOR EXTERIOR APPLICATIONS

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MSc

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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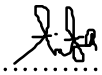
Signature of Student	:	 ……..
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ABSTRACT

The demand for composite panel especially particleboard has increased throughout the world. The increase in human populations has caused rapid growth in particleboard industry. Particleboards are widely used in housing constructions and furniture manufacturing industry. However, particleboard is mainly used as interior fitments or for indoor application such as instalments inside buildings. This is due to the spring-back behaviour of particleboard when exposed to humid condition. In recent years, many countries all over the world including Malaysia have utilised agricultural waste as alternative materials to manufacture composite panels due to lack of wood resources. In 2000, the Malaysian government formed a committee to study the potential of kenaf plant as potential industrial crop. Thus, the main goal of this study was to determine the potential of kenaf as a raw material in the production of biocomposite panels. Specifically, the objectives of this study were to determine the effect of alkaline treatments on the physical and mechanical properties of untreated and treated kenaf particleboard and to analyse the effect of resin content on physical and mechanical properties of kenaf particleboard. Two types of particleboard were manufactured from kenaf particles which comprised of untreated and treated boards with two different resin contents of 8% and 10% of phenol formaldehyde. Two types of alkali were used for chemical treatment, which were 2% NaOH and 2% KOH solution. The mechanical and physical tests were performed according to the Malaysian Standard (MS1787:2004). Results indicated that alkaline-treated particleboards performed better in modulus of elasticity compared to untreated particleboard. There was no significant difference on mechanical and physical properties between treated and untreated boards. Thus, treated kenaf boards produced similar performance with the untreated ones. The average values for water absorption decreased with the increase in resin content. Higher resin content resulted in lower thickness swelling. Scanning electron microscopy (SEM) analysis was used to study the morphological and structural changes of kenaf fibres before and after chemical treatment to understand the effect of chemical treatment and amount of resin. All treated particles showed rough surface as the cellulose had been removed after treatment and resulted in better MOE, MOR and IB strength compared to untreated particles. SEM analysis also showed that higher resin content is adequate to cover all particle surfaces to give better interlocking bonding resulted in better physical properties. However, all boards did not meet the minimum requirement based on the Malaysian Standard. In conclusion, kenaf whole stems consisting of bast fibre and kenaf core could be potential raw materials to produce bio-composite panels. However, further studies with different parameters are needed to fulfil the requirements for exterior type particleboard.

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