UNIVERSITI TEKNOLOGI MARA

PROPERTIES OF UNTREATED AND ALKALINE TREATED KELEMPAYAN (*Neolamarckia cadamba*) PARTICLEBOARD

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ABSTRACT

Kelempayan is a fast-growing species which provides both opportunities to satisfy the increasing need for wood composites and contribute to reduce environmental issues. The main objective of this study is to determine the properties of Kelempayan particleboard under the laboratory conditions and to evaluate the potentials of Kelempayan wood. Alkaline treatment was conducted to remove barrier for the interaction of particle and resin to develop particleboard with better physical and mechanical properties. The effect of alkaline treatment on chemical properties of Kelempayan, physical and mechanical properties of particleboard were determined. Samples for the physical properties evaluation were prepared from three portions, bottom, middle and top, at near pith, intermediate and near bark radial positions of the tree. Sampling and preparation of samples for physical and chemical analysis were conducted according to the standard Technical Association of the Pulp and Paper Industry USA (TAPPI) T 208 om-94 (1996). In the manufacture of untreated and treated particleboards, Kelempayan wood was used as the raw material and phenol formaldehyde (PF) resin as a binder. This experimental design involved four essential variables, namely, particle size, board density, resin content and hot press temperature for untreated boards. The variables involved in manufacturing of treated boards were particle size and alkaline concentration. Bending strength, internal bond strength and thickness swelling tests were evaluated for particleboards performance. Preparation of test samples and evaluation of board performance were carried out according to Malaysian Standard (MS, 2005). From this study, the statistical analysis revealed that tree portion and radial position significantly affect the physical properties. Chemical properties from bottom to top portion of the tree did not show any significant difference. For particle analysis, particle size was found to affect particle geometric characteristics. In the manufacture of untreated particleboards, all parameters including particle size, board density, resin content and hot press temperature had significant effect on physical and mechanical properties of boards. For chemical analysis of treated samples, alkaline concentration had significant effect on chemical composition. In manufacturing of treated particleboards, both main parameters of particle size and alkaline concentration significantly affect the physical and mechanical properties of the boards. It was concluded that alkaline treatment was effective to improve mechanical and dimensional stability of particleboards from Kelempayan wood. Correlation of particle characteristics, physical and chemical properties had less association with board properties. Regression analysis of the data revealed that there is a very good relationship between the manufacturing parameters and board properties

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TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	**ii**
AUTHOR'S DECLARATION	**iii**
ABSTRACT	**iv**
ACKNOWLEDGEMENT	**v**
TABLE OF CONTENTS	**vi**
LIST OF TABLES	**xii**
LIST OF FIGURES	**xv**
LIST OF PLATES	**xviii**
LIST OF ABBREVIATIONS	**xix**
CHAPTER ONE: INTRODUCTION	**1**
1.1 Background of Study	1
1.1.1 Particleboard Industry in Malaysia	1
1.2 Problem Statement	4
1.3 Significance of the Study	7
1.4 Objectives of the Study	7
1.5 Scope and Limitations of the Study	8
CHAPTER TWO: LITERATURE REVIEW	**9**
2.1 Wood-Based Industry in Malaysia	9
2.2 Wood Composites	12
2.3 Raw Material Supply for Wood Composites	13
2.3.1 Rubberwood	15
2.3.2 *Acacia mangium*	17
2.3.3 Mixed Tropical Hardwood Wastes from Sawmill	19
2.3.4 Forest Plantation Species	20
2.3.5 Kelempayan	23

2.3.5.1 Distribution 24
2.3.5.2 Properties of Kelempayan 25
2.4 Particleboard Manufacture 25
2.4.1 Definition 25
2.4.2 Types of Particles 26
2.4.3 Particleboard Manufacturing Process 28
2.4.3.1 Particle Preparation 28
2.4.3.2 Drying and Screening 28
2.4.3.3 Blending 29
2.4.3.4 Mat Forming and Finishing 31
2.4.4 Wood Modification 32
2.4.4.1 Thermal Modification 33
2.4.4.2 Impregnation Modification 33
2.4.4.3 Surface Modification (Alkaline Treatment) 34
2.5 Properties 38
2.6 Uses 39
2.7 Factors Affecting Particleboard Properties 40
2.7.1 Effects of Particle Size 41
2.7.2 Effects of Resin Content 41
2.7.3 Effects of Board Density 42
2.7.4 Effects of Hot Press Temperature 43
2.8 Types of Particleboard 44
2.9 Particleboard Market Development 45

CHAPTER THREE: RESEARCH METHODOLOGY 51
3.1 Experimental Design of Study 51
3.1.1 Stage 1: Properties of Untreated Particleboard from 2 mm Particle Size 51
3.1.2 Stage 2: Properties of Untreated Particleboard from 0.5 and 1.0 mm Particle Sizes 52
3.1.3 Stage 3: Properties of Alkaline Treated Particleboard 53
3.2 Raw Material Procurement 56
3.3 Sampling for Physical and Chemical Properties Determination 57
3.3.1 Sampling for Physical Properties 57