

**PATH TO TRANSPARENT WOOD: TEST ON DELIGNIFICATION
RATE OF RED AND WHITE MERANTI AND REACTIVITY OF
EPOXY RESIN**

ADZRI SHAH BIN FAIZAL

**Final Year Project Report Submitted in Partial Fulfilment of the
Requirements for the Bachelor of Science (Hons.) Furniture
Technology in the Faculty of Applied Sciences
Universiti Teknologi MARA**

JULY 2019

TABLE OF CONTENTS

	Page
APPROVAL SHEET	II
ACKNOWLEDGEMENTS	III
TABLE OF CONTENTS	IV
LIST OF TABLES	VI
LIST OF FIGURES	VII
LIST OF PLATE	VIII
LIST OF ABBREVIATIONS	IX
ABSTRACT	X
ABSTRAK	XI
CHAPTER 1 INTRODUCTION	1
1.1 Background of the study	1
1.2 Research Problem	2
1.3 Objectives of study	3
1.4 Significant study	3
CHAPTER 2 LITERATURE REVIEW	4
2.1 Wood	4
2.2 Transparent wood	5
2.3 Production of transparent wood	8
2.4 Lignin removal	8
2.4.1 Delignification using chlorite solution	9
2.4.2 Deep Eutectic Solvents (DESS)	9
2.4.3 Soda/Anthraquinone (Soda/AQ)	9
2.4.4 Hydrotropic Treatments	10
2.5 Resin	10
2.5.1 General	10
2.5.2 Epoxy	11
2.6 Meranti	12
CHAPTER 3 MATERIALS AND METHODS	14
3.1 Introduction	14
3.2 Method	14
3.2.1 Delignification method	14
3.2.2 Reactivity of resin epoxy method	15
3.3 Delignification	15

3.3.1	Substrate preparation	15
3.3.2	Solution preparation	16
3.3.3	Delignification process	17
3.3.4	Bleaching	18
3.3.5	Wood Preservation	19
3.4	Reactivity of resin epoxy	19
3.5	Test	20
3.5.1	Lignin test	20
3.5.2	Qualitative comparison	21
3.5.3	Epoxy cured	21
3.6	Design of experiment	21
 CHAPTER 4 RESULT AND DISCUSSION		 23
4.1	Lignin test	23
4.2	Statistical significance	24
4.3	Qualitative comparison	25
4.4	Observation rate of cured epoxy	26
 CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS		 30
5.1	Conclusions	30
5.2	Recommendation	31
 REFERENCES		 32
PUBLICATION OF THE PROJECT REPORT UNDERTAKING		34
PERMISSION FOR REFERENCES AND PHOTOCOPYING		35
EVALUATION OF FINAL YEAR PROJECT REPORT		36
CURRICULUM VITAE		37

LIST OF FIGURES

Figure 2.1 The opaque wood on the left can be convert to transparent wood on the right.	6
Figure 2.2 Lignin with wood structure.	7
Figure 2.3 Cross section of red meranti	13
Figure 2.4 Cross section of white meranti	13
Figure 3.1 Flow method of Delignification	14
Figure 3.2 Flow of method Reactivity of resin epoxy	15
Figure 3.3 Design of Experiment	22
Figure 4.1 Trend of Lignin reduction over time	24
Figure 4.2 Rate of epoxy cure	29

ABSTRACT

PATH TO TRANSPARENT WOOD: TEST ON DELIGNIFICATION RATE OF RED AND WHITE MERANTI AND REACTIVITY OF EPOXY RESIN

Transparent wood is considered to be a new invention even though the idea was from 1992. Transparent wood is wood that allow light to pass through. This is opposed to the nature of wood structure which is normally not transparent and has solid structure that block the path of light. In this project only path to transparent wood studied; i) suitable time for delignification and ii) rate of reactivity of epoxy. The experiment was done by using two types of wood species (red meranti & white meranti) in veneer form with thickness of 1.5mm. The time tested for delignification process was 0 h, 3 h, 6 h, 9 h and 12 h. It was found that 9 hours is adequate to be use in delignification of wood. For all delignified sample, transparency was evident. Test on with 9 ratios of epoxy reactivity (hardener:resin) at 1:1, 1:2, 1:3, 1:4, 1:5, 1:6, 1:7 1:8 and 1:9 was done. The result show that ratios between 1:6 and 1:8 are suitable curing time the epoxy for impregnation of wood where the time required which is between 18 to 24 h.