

**EFFECT OF MELAMINE UREA FORMALDEHYDE ON
THE MECHANICAL AND PHYSICAL PROPERTIES OF
THE JACKFRUIT (*Artocarpus Heterophyllus*) RIND PAPER**

NUR ATHIRAH BINTI MOHD KHALID

**BACHELOR OF SCIENCE (Hons.) PHYSICS
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA**

JANUARY 2020

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	x
ABSTRACT	xi
ABSTRAK	xii
CHAPTER 1 INTRODUCTION	
1.1 Background of study	1
1.2 Problem statement	2
1.3 Significance of study	3
1.4 Objectives of study	4
CHAPTER 2 LITERATURE REVIEW	
2.1 Properties of the paper	5
2.2 Jackfruit peel	6
2.3 Melamine urea formaldehyde (MUF)	9
2.3.1 Effect of melamine urea formaldehyde on the mechanical properties of paper	10
2.3.2 Effect of melamine urea formaldehyde on the physical properties of paper	10
CHAPTER 3 METHODOLOGY	
3.1 Apparatus and materials	11
3.2 Methodology	12
3.2.1 Preparation of raw material	12
3.2.2 Preparation of soda pulping process	12
3.2.3 Preparation of screening process	15
3.2.4 Preparation of bleaching process	16
3.2.5 Papermaking process	18

3.3	Characterization test	28
3.3.1	Mechanical properties	28
3.3.2	Physical properties	28
CHAPTER 4 RESULTS AND DISCUSSION		
4.1	Measurement	29
4.2	Mechanical properties	29
4.2.1	Tensile strength & peak load	30
4.2.2	Tearing index	34
4.2.3	Bursting index	36
4.2.4	Strain	38
4.2.5	Tensile energy absorption (TEA)	40
4.3	Physical properties	42
4.3.1	Color of paper	42
4.3.2	Size of fiber	42
4.3.3	Porosity size	46
CHAPTER 5 CONCLUSION AND RECOMMENDATION		50
CITED REFERENCES		52
APPENDICES		56
CURRICULUM VITAE		59

LIST OF TABLES

Table	Caption	Page
2.1	Mechanical characteristics of durian rinds CMP paper	6
2.2	Proximate and ultimate analysis of jackfruit peel (JFP)	7
2.3	Physical properties of jackfruit peel (JFP)	8
2.4	Properties of melamine formaldehyde (MF) and melamine urea formaldehyde (MUF) resins	9
4.1	Amount of MUF and fibre that used in sample	30
4.2	Dry strength index for jackfruit rind paper.	31
4.3	Wet strength index for jackfruit rind paper.	32
4.4	Tearing index for jackfruit rind paper	34
4.5	Bursting index for jackfruit rind paper	36
4.6	Dry and wet strain for jackfruit rind paper	38
4.7	Dry and wet tensile energy absorption (TEA) for jackfruit rind paper	40

ABSTRACT

EFFECT OF MELAMINE UREA FORMALDEHYDE ON THE MECHANICAL AND PHYSICAL PROPERTIES OF THE JACKFRUIT (*Artocarpus Heterophyllus*) RIND PAPER

There are some environment problems that faced when producing the paper from the trees such as deforestation, air pollution, greenhouse gas emissions and disposal of animal habitats. The jackfruit peels (JFP) can be used to make a paper and it can reduce the problems of waste disposal since the peels is solid waste. The jackfruit rind paper has weak wet strength which tends to breakage. Hence, melamine urea formaldehyde (MUF) resins were added to the papermaking process due to its good properties that can stand with the pressure. The objectives of this project are to fabricate the paper from jackfruit rind and to study the effect of MUF on the physical and mechanical properties of jackfruit rind paper. The method in papermaking process was started with the preparation of raw material, soda pulping, screening, bleaching, and lastly is papermaking process. From this project, it hopes that the expected outputs that will be produced are satisfying where the paper have good strength properties to stand with pressure. Besides, it can protect the environment since no more trees to be cut to make a paper. The significance of these outputs gives more benefits to the environment, community and industry. The environment and community will be safe from the pollution and global warming. Since JFP was used to make a paper, the jackfruit industry will expected to increase because of its widely use in the market. As the results, the jackfruit rind paper that was produced has strong wet strength when the MUF increase. The dry strength, strain and tensile energy absorption (TEA) increase as the pulp was increase. While tearing and bursting index decrease by applying resins. For the color, even the amount of MUF used is different, it do not affect the color of paper which all the paper have same color of light yellow. The size of fiber was measured which the length, diameter of fiber and diameter of lumen have value between 1.0 mm to 1.09 mm, 11.3 μm to 18.7 μm and 6.6 μm to 11.9 μm respectively. The porosity size for 0 %, 2.5 % and 5% of MUF have values between 11.86 μm to 35.69 μm , 28.66 μm to 36.37 μm and 27.83 μm to 39.68 μm respectively which it has smaller size of porosity compared with filter paper that has porosity size between 28.69 μm to 81.06 μm .