

**EFFECT OF DIFFERENT PARTICLE SIZES OF RICE HUSK POWDER
ON RICE HUSK POWDER REINFORCED HIGH DENSITY
POLYETHYLENE SLAB ON ITS MECHANICAL PROPERTIES**

ABDUL AZIM BIN MAHADI

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

AUGUST 2022

This Final Year Project Report entitled “**Effect of Different Particle Sizes of Rice Husk Powder on Rice Husk Powder Reinforced High Density Polyethylene Slab on Its Mechanical Properties**” was submitted by Abdul Azim bin Mahadi in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Polymer Technology, in the Faculty of Applied Sciences, and was approved by

En. Muhamad Naiman bin Sarip
Supervisor
B. Sc. (Hons.) Polymer Technology
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Dr. Dalina binti Samsudin
Project Coordinator
B. Sc. (Hons.) Polymer Technology
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Dr. Zuliahani binti Ahmad
Head of Programme
B. Sc. (Hons.) Polymer Technology
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

Date: 17 August 2022

TABLE OF CONTENTS

ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	xi
CHAPTER 1	1
INTRODUCTION	1
1.1 Background of study	1
1.2 Problem statement	2
1.3 Significant of study	3
1.4 Objective of study	4
CHAPTER 2	5
LITERATURE REVIEW	5
2.0 Introduction	5
2.1 Bioplastic	5
2.2 Thermoplastic	6
2.2.1 Polyethylene (PE)	7
2.2.2 High-Density Polyethylene (HDPE)	7
2.3 Filler	9
2.3.1 Natural fiber	10
2.3.2 Rice husk	11
2.4 Additives in polymer composite	12
2.4.1 Plasticizer	12
2.4.2 Coupling agents	14
2.5 Composite properties and characterization	15
2.5.1 Mechanical properties	15
2.5.2 Structural characterization	21
CHAPTER 3	24

METHODOLOGY	24
3.0 Introduction	24
3.1 Material	24
3.1.1 HDPE	24
3.1.2 Rice husk	24
3.2 Equipment	25
3.3 Preparation of test sample	25
3.3.1 Preparation of RHP	25
3.3.2 RHP/HDPE slab	26
3.4 Composite properties and characterization	29
3.4.1 Mechanical properties	29
3.4.2 Structural characterization	32
3.5 Flow chart of the preparation of the rice husk powder reinforced high density polyethylene slab.	33
CHAPTER 4	34
RESULTS AND DISCUSSION	34
4.1 Mechanical properties	34
4.1.1 Tensile test	34
4.1.2 Hardness test	40
4.2 Structural characterization	44
4.2.1 FTIR analysis	44
CHAPTER 5	47
CONCLUSION AND RECOMMENDATION	47
5.1 Conclusion	47
5.2 Recommendation	50
REFERENCES	51

LIST OF TABLES

TABLE	TITLE	PAGE
2.1	Example of plasticizer and their chemical structures	14
2.2	Formulation of rice husk filled HDPE	17
2.3	Formulation of pure HDPE, HDPE/plasticizer/rice husk and HDPE/rice husk composites	19
2.4	Frequency (cm^{-3}) and vibration band assigned to HDPE	23
3.1	Formulation of main components in RHP/HDPE blend	27
4.1	Tensile strength of raw HDPE and RHP/HDPE composite	35
4.2	Elongation at break of raw HDPE and RHP/HDPE composite	37
4.3	Young's modulus of raw HDPE and RHP/HDPE composite	39
4.4	Hardness of raw HDPE and RHP/HDPE composite	41
4.5	Impact strength of raw HDPE and RHP/HDPE composite	43