

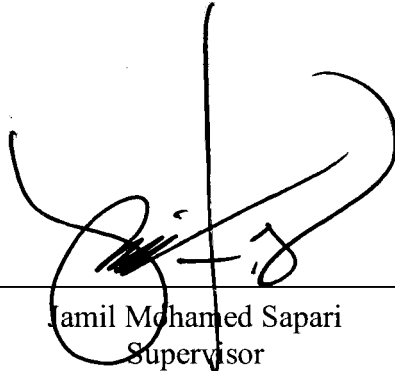
**SYNTHESIS AND CHARACTERIZATION OF HYDROLYSIS
PALM KERNEL OIL-BASED POLYURETHANE**

NURSYASHABILLAH BINTI NOR

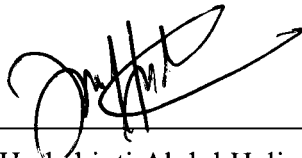
**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

JULY 2017

This Final Year Project Report entitled **“Synthesis and Characterization of Hydrolysis Palm Kernel Oil-Based Polyurethane”** was submitted by Nursyashabillah Binti Nor, in partial fulfilment of requirements for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences and was approved by



Jamil Mohamed Sapari
Supervisor
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah
Negeri Sembilan



Nurul Huda binti Abdul Halim
Project Coordinator
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah
Negeri Sembilan



Mazni Musa
Head of Programme
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah
Negeri Sembilan

Date: _____

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	ix
ABSTRACT	xi
ABSTRAK	xii
CHAPTER 1 INTRODUCTION	1
1.1 Background of study	1
1.2 Problem statement	5
1.3 Significance of study	6
1.4 Objectives of study	7
CHAPTER 2 LITERATURE REVIEW	8
2.1 Introduction	8
2.2 Synthesis of polyol	9
2.2.1 Vegetables oil	10
2.2.2 Palm oil	11
2.2.3 Castor oil	13
2.2.4 Soy bean oil	14
2.2.5 Palm kernel oil	15
2.3 Degradation of polyurethane	18
CHAPTER 3 METHODOLOGY	20
3.1 Materials	20
3.1.1 Raw materials	20
3.1.2 Chemicals	20
3.1.3 Apparatus	20
3.2 Experimental method	21
3.2.1 Synthesis of polyol PKO	21
3.2.2 Preparation of PU controller	22
3.2.3 Hydrolysis of PU	23
3.3 Characterization	25
3.3.1 Morphology	25
3.3.2 Viscosity	25
3.3.3 FTIR spectroscopy analysis	26

CHAPTER 4: RESULTS AND DISCUSSION	27
4.1 Synthesis of polyol PKO	27
4.2 Preparation of PU controller	31
4.3 Hydrolysis of PU	36
4.4 Morphology of PU structure	48
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS	54
5.1 Conclusion	54
5.2 Recommendations	55
REFERENCES	56
APPENDIX	59
APPENDIX I	62
<i>CURRICULUM VITAE</i>	64

ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF HYDROLYSIS PALM KERNEL OIL-BASED POLYURETHANE

This study was conducted to investigate the hydrolysis reaction of rigid palm-based polyurethane. Rigid polyurethane (PU) was synthesized by using monoester-OH kernel oil (polyol). The resulting PU sample was immersed in an aqueous solution of sodium hydroxide (NaOH) concentrations of 0%, 10%, 20%, 30% and 40%. NaOH alkaline aqueous solution can accelerate the rate of hydrolysis. Samples of PU cake were hydrolysable and filtrate every 7, 14, 21 and 28 days. Weights taken showed mass of PU hydrolysable were rise when wet. It showed the PU swelled caused by the absorption of NaOH solution. After the sample is dried, cakes PU hydrolysable were taken its mass, and found its mass was reduced lower than the mass before the hydrolysis reaction is carried out. It showed part of the structure of the PU was degraded as a result of hydrolysis reaction. The higher the concentration of NaOH aqueous solution, the higher the mass of the material decomposes. FTIR spectroscopic analysis showed the decomposition of PU structure through loss absorption peak of C=O, C-O-C and C-N. Image analyzer optical microscope showed the structure of PU particle is reduced and the bond between the particles was damaged. SEM analysis also conducted towards PU control. The morphology of PU structures was porous after the reaction. Despite from that, it was concluded that the decomposition of PU through hydrolysis reaction causes termination chain of PU, in which the soft segment monoester-OH degrade, while the hard segment with cross-linked remained in the structure of the PU.