

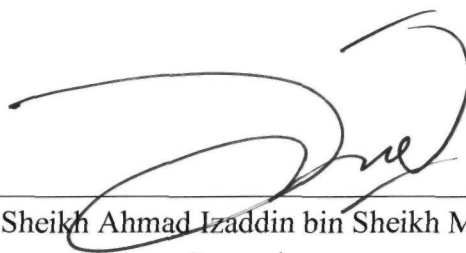
**SYNTHESIS AND CHARACTERIZATION OF 2-METHYL-4-
CHLOROPHENOXYACETIC ACID (MCPA) BY USING
Ca-Al LAYERED DOUBLE HYDROXIDE (CAL)**

ZHARIF HAZIQ BIN SHUKOR

**Final Year Project Report Submitted in
Partial Fulfilment on the Requirement 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 2-Methyl-4-Chlorophenoxyacetic Acid (MCPA) by using Ca-Al Layered Double Hydroxide (CAL)**” was submitted by Zharif Haziq bin Shukor, in partial fulfillment of the requirement for the Degree of Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences, and was approved by



Dr. Tuan Sheikh Ahmad Izaddin bin Sheikh Mohd Ghazali

Supervisor

B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000, Kuala Pilah
Negeri Sembilan



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



Puan Mazni binti Musa
Head of Programme
B. Sc. (Hons.) Chemistry
Faculty of Applied Science
Universiti Teknologi MARA
72000, Kuala Pilah
Negeri Sembilan

Date: 07.08.2017

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	x
ABSTRAK	xi
CHAPTER 1 INTRODUCTION	1
1.1 Background of study	1
1.1.1 Layered Double Hydroxide (LDH)	1
1.1.2 2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	3
1.2 Problem statements	5
1.3 Significance of study	7
1.4 Objectives of study	8
CHAPTER 2 LITERATURE REVIEW	9
2.1 Historical background	9
2.2 Nano-composite material	10
2.3 Intercalation process	12
2.4 Synthesis of Layered Double Hydroxide (LDH)	14
2.4.1 Co-precipitation method	14
2.4.2 Anion-exchanged method	15
2.5 Application of Layered Double Hydroxide (LDH)	16
2.5.1 Pharmaceutical, medical and cosmetic	16
2.5.2 Catalysts	17
2.5.3 Environmental	17
CHAPTER 3 METHODOLOGY	18
3.1 Materials	18
3.1.1 Reagents	18
3.1.2 Apparatus	19
3.1.3 Instruments	19

3.2	Methods	20
3.2.1	Synthesis of Ca-Al Layered Double Hydroxide	20
3.2.2	Synthesis of nanohybrids by ion exchanged method	21
3.2.3	Synthesis of nanohybrid by co-precipitation method	22
3.3	Characterization	23
3.3.1	Powder X-Ray Diffraction (PXRD)	23
3.3.2	Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR-FTIR)	25
CHAPTER 4 RESULTS AND DISCUSSION		26
4.1	Powder X-Ray Diffraction Analysis (PXRD)	26
4.2	Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR-FTIR)	30
CHAPTER 5 CONCLUSION AND RECOMMENDATIONS		36
CITED REFERENCES		37
APPENDICES		41
<i>CURRICULUM VITAE</i>		51

ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF 2-METHYL-4-CHLOROPHENOXYACETIC ACID (MCPA) BY USING Ca-Al LAYERED DOUBLE HYDROXIDE (CAL)

The herbicide used in agriculture industry 2-methyl-4-chlorophenoxyacetic acid (MCPA) has been successfully intercalated into the Ca-Al LDH by using co-precipitation method at the concentration of 0.5 M MCPA, pH 13.0 with Ca and Al molar ratio of 2:4. In this research, nanocomposites were synthesized and characterized using Powder X-Ray Diffraction (PXRD) and Attenuated Total Resonance Fourier Transform Infrared (ATR-FTIR). From PXRD results, the basal spacing of LDH shows an increase from 8.67 Å to 8.72 Å in Ca-Al LDH due to the insertion of anion MCPA into the interlayer region of Ca-Al LDH. Results from PXRD are then supported by ATR-FTIR results when the nitrate peaks intensity are decreases from 1353.52 cm⁻¹ to 1364.73 cm⁻¹ in the spectrum. The disappearance of absorption peak at 1592.83 cm⁻¹ assigned to the C=O stretching and a new absorption peak of 1587.30 cm⁻¹ were formed because of the asymmetric stretching vibration of COO⁻¹ after intercalation has been successful. This study is then can be concluded that MCPA may be intercalate into Ca-Al LDH, thus the adverse effect of 2-methyl-4-chlorophenoxyacetic acid can be control and reduce.