

TABLE OF CONTENT

RATIFICATION PAGE	ii
RATIFICATION PAGE	ii
STATEMENT PAGE	iii
DEDICATION	iv
PREFACE	v
TABLE OF CONTENT	vi
LIST OF FIGURES	vi
LIST OF TABLES	ix
LIST OF APPENDICES	x
ABSTRACT	xi
INTISARI	xii
CHAPTER I INTRODUCTION	1
I.1 Background	1
I.2 Research Purposes	3
I.3 Research Benefits	3
CHAPTER II LITERATURE REVIEW AND HYPOTHESIS FORMULATION	4
II.1 Literature Review	4
II.1.1 Natural zeolite	4
II.1.2 Acid and base treatment on natural zeolite	6
II.1.3 The Cu, Ni, and Zn metal-supported catalyst	8
II.1.4 Catalytic hydrotreatment of castor oil	8
II.2 Hypothesis Formulation and Research Plan	12
II.2.1 Hypothesis formulation I	12
II.2.2 Hypothesis formulation II	13
II.2.3 Hypothesis formulation III	13
II.2.4 Hypothesis formulation IV	14
II.2.5 Hypothesis formulation V	14
II.2.6 Hypothesis formulation VI	15
II.2.7 Research Plan	16
CHAPTER III RESEARCH METHOD	17
III.1 Materials	17
III.2 Equipment	17
III.3 Research Procedure	18
III.3.1 Acetic acid treatment on natural zeolite	18
III.3.2 NaOH treatment on natural zeolite	18
III.3.3 The Cu, Ni, and Zn metal impregnation onto zeolite	18
III.3.4 Acidity test of catalyst	18
III.3.5 Activity test of catalyst	19
CHAPTER IV RESULT AND DISCUSSION	21
IV.1 The Effect of Acetic acid and NaOH Treatment towards Characters of Zeolite	21

IV.1.1	Metal composition, Si/Al ratio, and acidity	21
IV.1.2	Brønsted and Lewis acid sites analyzed by FTIR	23
IV.1.3	The effect of acetic acid and NaOH towards crystallinity	27
IV.2	The Effect of Impregnation of Cu, Ni, and Zn towards Characters of Zeolite	28
IV.2.1	Crystallinity of metal catalysts analyzed by XRD	28
IV.2.1	Metal content and acidity of metal catalysts	29
IV.3	Phenomena Surface Area Catalysts.	31
IV.3.1	Adsorption isotherm curve	31
IV.3.2	Pore distributions	32
IV.4	Catalytic Activity Towards the Catalyst of Hydrotreatment of Castor Oil	34
IV.4.1	Catalytic and selectivity of ZA, ZAA, ZAB, and ZAAB catalysts in hydrotreatment of castor oil	34
IV.4.2	Catalytic and selectivity of the Cu/ZAA, Ni/ZAA, Zn/ZAA, and Ni/ZAAB catalysts in hydrotreatment of castor oil	35
IV.5	Correlation between Specific Surface Area towards The Activity of The Catalysts	37
CHAPTER V	CONCLUSION	39
V.1	Conclusions	39
V.2	Suggestion	40
REFERENCES		41
APPENDICES		47