

TABLE OF CONTENT

| | |
|--|-------------|
| RATIFICATION PAGE | ii |
| PREFACE | iii |
| TABLE OF CONTENT | iv |
| LIST OF FIGURES | vi |
| LIST OF TABLES | vii |
| LIST OF APPENDICES | viii |
| ABSTRACT | ix |
| INTISARI | x |
| CHAPTER I INTRODUCTION | 1 |
| I.1. Background | 1 |
| I.2. Research Objectives | 3 |
| I.3. Research Benefits | 3 |
| CHAPTER II LITERATURE REVIEW AND HYPOTHESIS FORMULATION | 4 |
| II.1. Literature Review | 4 |
| II.1.1 Diethyl ether | 4 |
| II.1.2 Ethanol dehydration to diethyl ether | 5 |
| II.1.3 Zeolite as acidic catalyst | 6 |
| II.1.4 H-zeolite formation | 7 |
| II.1.5 Mordenite | 8 |
| II.2. Hypothesis Formulation and Research Plan | 9 |
| II.2.1 Hypothesis formulation I | 9 |
| II.2.2 Hypothesis formulation II | 9 |
| II.2.3 Hypothesis formulation III | 10 |
| II.2.4 Research Plan | 10 |
| CHAPTER III RESEARCH METHOD | 12 |
| III.1. Materials | 12 |
| III.2. Equipment | 12 |
| III.3. Research Procedure | 12 |
| III.3.1 Preparation and activation of natural zeolite | 12 |
| III.3.2 Acidity test | 13 |
| III.3.3 Catalyst characterization | 14 |
| III.3.4 Catalyst activity test | 14 |
| CHAPTER IV RESULT AND DISCUSSION | 15 |
| IV.1. Catalyst Characterization | 15 |
| IV.1.1 XRD Diffractogram | 15 |
| IV.1.2 SEM-EDX and XRF Analysis | 18 |
| IV.1.3 N ₂ Adsorption Isotherm | 20 |
| IV.1.4 Total Acidity | 22 |
| IV.2. Ethanol Dehydration to Diethyl Ether | 26 |
| IV.2.1 The Effect of Temperature on DEE Yield | 28 |

| | | |
|--|--|-----------|
| IV.2.2 | The Effect of Mass of Catalyst on DEE Yield | 28 |
| IV.2.3 | The Effect of Catalyst Properties on DEE Yield | 29 |
| IV.2.4 | Reusability of Catalyst in Optimum Condition | 30 |
| CHAPTER V CONCLUSION AND RECOMMENDATION | | 32 |
| V.1. | Conclusion | 32 |
| V.2. | Recommendation | 32 |
| REFERENCES | | 33 |
| APPENDICES | | 37 |