

**METHANE REFORMING WITH CARBON DIOXIDE OVER  
Pt/ZrO<sub>2</sub> CATALYST PROMOTED WITH Ce AND Y**



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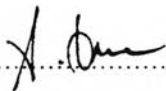
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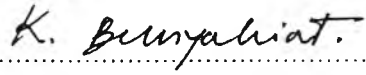
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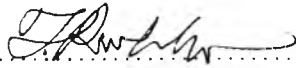
  
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## บทคัดย่อ

มณีนภางค์ บุณนาค: การรีฟอร์มก๊าซคาร์บอนไดออกไซด์ด้วยก๊าซมีเทนโดยใช้แพลทตินัม-เซอร์โคเนียซึ่งมีซีเรียมและอิตเรียมเป็นโปรโมเตอร์เป็นสารเร่งปฏิกิริยา (Methane reforming with carbon dioxide over Pt/ZrO<sub>2</sub> catalyst promoted with Ce and Y) อาจารย์ที่ปรึกษา: ศ. แคนเน็ล อี ริชส์โค รศ. กัญจนา บุญยเกียรติ และ ดร. ปราโมช รังสรรค์วิจิตร 50หน้า ISBN 974-334-129-3

งานวิจัยนี้ศึกษาการรีฟอร์มก๊าซคาร์บอนไดออกไซด์ด้วยก๊าซมีเทนที่อุณหภูมิ 800°C โดยใช้แพลทตินัม-เซอร์โคเนีย (Pt/ZrO<sub>2</sub>) เป็นสารเร่งปฏิกิริยา การเสื่อมสภาพของสารเร่งปฏิกิริยาทำโดยศึกษาปฏิกิริยาของก๊าซผสม CH<sub>4</sub>:CO<sub>2</sub> 2:1 และค่า GHSV 477500 h<sup>-1</sup> ผลกระทบของโปรโมเตอร์ 2 ชนิด คือซีเรียม (Ce) และอิตเรียม (Y) ต่อพหุติกรรม (activity) และเสถียรภาพ (stability) ของสารเร่งปฏิกิริยาพบว่า การเติมโปรโมเตอร์ที่มีความเข้มข้นที่เหมาะสมที่สุด 5% นั้น ไม่เพียงแต่เพิ่มพื้นที่ผิวของสารเร่งปฏิกิริยาโดยการรักษาเสถียรภาพของรูปแบบเตตระโกนอล (tetragonal) ของเซอร์โคเนีย (zirconia) เท่านั้น แต่ยังช่วยเพิ่มเสถียรภาพ (stability) ของสารเร่งปฏิกิริยาด้วย การศึกษาพหุติกรรมในการเร่งปฏิกิริยาของโปรโมเตอร์ผสมโดยใช้การเตรียมต่างกัน 2 วิธีคือ อิมเพรกเนชัน (impregnation) และการตกตะกอนร่วม (co-precipitation) พบว่าที่อุณหภูมิที่ใช้ในการแคลไซน์ (calcination temperature) 800°C นั้น การเตรียมแบบอิมเพรกเนชันให้พื้นที่ผิวและเสถียรภาพสูงกว่าการเตรียมแบบตกตะกอนร่วม พื้นที่ผิว พหุติกรรม และเสถียรภาพของสารเร่งปฏิกิริยาที่เตรียมโดยวิธีการตกตะกอนร่วมดีขึ้นเมื่อลดอุณหภูมิที่ใช้ในการแคลไซน์เป็น 600°C

**ABSTRACT**

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The reforming of CH<sub>4</sub> with CO<sub>2</sub> was studied at 800°C over Pt/ZrO<sub>2</sub> catalysts. The CH<sub>4</sub>:CO<sub>2</sub> concentration ratio of 2:1 and GHSV of 477500 h<sup>-1</sup> were used to observe catalyst deactivation. The effects of two promoters, Ce and Y, on the catalyst activity and stability were investigated. The results showed that the addition of the promoters, at the optimum concentration of 5%, not only increased the catalyst surface area by stabilizing the tetragonal form of ZrO<sub>2</sub> but also improved the catalyst stability. The mixed-promoter catalytic behavior was also studied. The mixed-promoter catalysts were prepared by two different techniques, impregnation and co-precipitation. Comparison of the results indicated that at the calcination temperature of 800°C the impregnation technique yielded higher surface area, activity and stability than the co-precipitation technique. The surface area, activity and stability of the catalysts prepared by the co-precipitation technique were improved when the calcination temperature was decreased to 600°C.

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## TABLE OF CONTENTS

|  | <b>PAGE</b>   |
|--|---------------|
| Title Page   | i             |
| Abstract (in English)                              | iii           |
| Abstract (in Thai)                                 | iv            |
| Acknowledgement                                    | v             |
| Table of Contents                                  | vi            |
| List of Tables                                     | ix            |
| List of Figures                                    | x             |
| <br><b>CHAPTER</b>                                 |               |
| <b>I INTRODUCTION</b>                              | <b>1</b>      |
| 1.1 Introduction                                   | 1             |
| 1.2 Research Objectives                            | 3             |
| <br><b>II BACKGROUND AND LITERATURE SURVEY</b>     | <br><b>4</b>  |
| 2.1 Methane Reforming with Carbon Dioxide Reaction | 4             |
| 2.2 Catalyst Development                           | 8             |
| 2.2.1 Active Metals                                | 8             |
| 2.2.2 Supports                                     | 9             |
| 2.2.3 Promoters                                    | 11            |
| <br><b>III EXPERIMENTAL SECTION</b>                | <br><b>13</b> |
| 3.1 Experimental Setup                             | 13            |
| 3.2 Experimental Procedures                        | 15            |
| 3.2.1 Catalyst Preparation                         | 15            |
| 3.2.1.1 Impregnation Technique                     | 16            |
| 3.2.1.2 Co-precipitation Technique                 | 17            |



**CHAPTER**

**PAGE**

**CURRICULUM VITAE**

**50**



**LIST OF TABLES**

| <b>TABLE</b>  | <b>PAGE</b> |
|---|-------------|
| 3.1 Notation for the unpromoted catalysts   | 16          |
| 3.2 Notation for the promoted catalysts   | 16          |
| 3.3 Notation for the mixed-promoter catalysts   | 16          |
| 3.4 Reactant compositions   | 20          |
| 3.5 GHSV applied in this work   | 21          |
| 4.1 BET surface area, pore volume, and %metal dispersion of Ce-promoted catalysts compared with unpromoted catalyst at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>                   | 28          |
| 4.2 BET surface area and pore volume of Y-promoted catalysts compared with unpromoted catalyst at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>  | 31          |
| 4.3 BET surface area and pore volume of mixed-promoter catalysts prepared by impregnation technique compared with unpromoted catalyst at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup> | 37          |
| 4.4 BET surface area and pore volume of mixed-promoter catalysts prepared by co-precipitation technique at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>                               | 40          |

## LIST OF FIGURES

| FIGURE   | PAGE |
|--|------|
| 2.1 Cleaning mechanism scheme  | 7    |
| 3.1 Schematic of the experimental apparatus  | 14   |
| 4.1 CH <sub>4</sub> conversion as a function of time for Pt/5CeZ at a GHSV of 477500 h <sup>-1</sup> at various CH <sub>4</sub> /CO <sub>2</sub> feed ratios   | 23   |
| 4.2 CO <sub>2</sub> conversion as a function of time for Pt/5CeZ at a GHSV of 477500 h <sup>-1</sup> at various CH <sub>4</sub> /CO <sub>2</sub> feed ratios   | 23   |
| 4.3 H <sub>2</sub> /CO product ratio as a function of time for Pt/5CeZ at a GHSV of 477500 h <sup>-1</sup> at various CH <sub>4</sub> /CO <sub>2</sub> feed ratios                                     | 25   |
| 4.4 CH <sub>4</sub> conversion as a function of time for Pt/5CeZ at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 at various GHSV  | 27   |
| 4.5 CO <sub>2</sub> conversion as a function of time for Pt/5CeZ at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 at various GHSV  | 27   |
| 4.6 XRD patterns for Ce-promoted catalysts compared with unpromoted catalyst; tetragonal form (★), monoclinic form (●)   | 29   |
| 4.7 CH <sub>4</sub> conversion as a function of time for Ce-promoted catalysts compared with unpromoted catalyst at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>   | 30   |
| 4.8 XRD patterns for Y-promoted catalysts compared with unpromoted catalyst; tetragonal form (★), monoclinic form (●)  | 32   |
| 4.9 CH <sub>4</sub> conversion as a function of time for Y-promoted catalysts compared with unpromoted catalysts at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>   | 33   |
| 4.10 CH <sub>4</sub> conversion as a function of time for Ce-promoted catalysts compared with Y-promoted catalysts at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup> | 35   |

| <b>FIGURE</b>   | <b>PAGE</b> |
|---|-------------|
| 4.11 H <sub>2</sub> /CO product ratio as a function of time for Ce-promoted catalysts compared with Y-promoted catalysts at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>  | 36          |
| 4.12 CH <sub>4</sub> conversion as a function of time for mixed-promoter catalysts prepared by impregnation technique at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>   | 38          |
| 4.13 CH <sub>4</sub> conversion as a function of time for mixed-promoter catalysts prepared by impregnation technique compared with Pt/Z, Pt/5CeZ, and Pt/5YZ catalysts at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup> | 39          |
| 4.14 XRD patterns for ZrO <sub>2</sub> prepared by co-precipitation technique calcined at 600°C and 800°C; tetragonal form (★), monoclinic form (●)   | 42          |
| 4.15 CH <sub>4</sub> conversion as a function of time for mixed-promoter catalysts prepared by co-precipitation technique at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>   | 43          |
| 4.16 CH <sub>4</sub> conversion as a function of time for mixed-promoter catalysts prepared by impregnation technique compared with co-precipitation technique at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>          | 43          |
| 4.17 CH <sub>4</sub> conversion as a function of time for mixed-promoter catalysts compared with Pt/Z, Pt/5CeZ, and Pt/5YZ catalysts at CH <sub>4</sub> /CO <sub>2</sub> ratio of 2/1 and GHSV of 477500 h <sup>-1</sup>                                    | 44          |