

ไฮโดรแครกกิงของนอร์มัลเฮกเซนด้วยตัวเร่งปฏิกิริยาซีโอไลต์

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**N-HEXANE HYDROCRACKING USING ZEOLITE CATALYSTS**

**Miss Ladawan Sirisaengtaksin**

**A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Engineering**

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Thesis Title            n-Hexane Hydrocracking Using Zeolite  
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ลดาวัล ลิริแสงทักษิณ : ไฮโดรแครกกิงของนอร์มัลเฮกเซนด้วยตัวเร่งปฏิกิริยาซีโอไลต์  
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วัตถุประสงค์หลักของงานนี้คือ ศึกษาผลกระทบที่เงื่อนไขการทำปฏิกิริยามีต่อการไฮโดร  
แครกกิงของนอร์มัลเฮกเซนโดยมีซีโอไลต์ 2 ชนิด เป็นตัวเร่งปฏิกิริยา คือ Mordenite และ Na-Y  
เครื่องปฏิกรณ์เคมีที่ออกแบบและสร้างขึ้นใช้ในการศึกษาเป็นแบบท่อบรรจุเบคกิ้งชนิดไหลผ่านลงที่สามารถทน  
ความดันสูง

ค่าของอุณหภูมิ ความดันและความเร็วเชิงสเปสที่แปรเปลี่ยนในการศึกษานี้จะอยู่ในช่วง 260°C-  
340°C , ช่วง 30-95 atg และช่วง 2,000-8,000 hr<sup>-1</sup> ตามลำดับ จากการทดลองพบว่า การ  
เพิ่มอุณหภูมิมีผลต่อการเปลี่ยนแปลงของนอร์มัลเฮกเซนไปเป็นผลิตภัณฑ์ ( hexane conversion ) และ  
ต่อผลิตภัณฑ์ LPG ที่เกิดขึ้นในทำนองเดียวกับการลดความดันหรือความเร็วเชิงสเปสของระบบลง นั่นคือ  
มีผลให้การเปลี่ยนแปลงของนอร์มัลเฮกเซนไปเป็นผลิตภัณฑ์ และผลิตภัณฑ์ LPG เพิ่มสูงขึ้น อย่างไรก็ตาม  
ผลกระทบที่ความเร็วเชิงสเปสมีต่อการเพิ่มขึ้นของผลิตภัณฑ์ LPG จะมีน้อยกว่าผลของอุณหภูมิ และผล  
ของความดัน อนึ่ง ในขณะที่ได้ผลิตภัณฑ์ LPG เพิ่มมากขึ้น ผลิตภัณฑ์แก๊สโซลีน ( Gasoline ) จะลดลง

ความแตกต่างระหว่างตัวเร่งปฏิกิริยา 2 ตัว ที่ใช้คือ ตัวเร่งปฏิกิริยาชนิด Mordenite ให้  
การเปลี่ยนแปลงไปเป็นผลิตภัณฑ์สูงกว่าตัวเร่งปฏิกิริยาชนิด Na-Y อนึ่ง ตัวเร่งปฏิกิริยา Mordenite  
ให้ผลิตภัณฑ์ LPG มากกว่าแก๊สโซลีน แต่ตัวเร่งปฏิกิริยา Na-Y กลับให้ผลิตภัณฑ์แก๊สโซลีนมากกว่า LPG  
 อย่างไรก็ตาม ตัวเร่งปฏิกิริยาทั้งสองชนิดนี้ ให้ผลิตภัณฑ์แก๊สโซลีนที่มีค่าออกเทนัมเบอร์สูง

ภาควิชา ..... วิศวกรรมเคมี  
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ลายมือชื่อนิสิต .....  
ลายมือชื่ออาจารย์ที่ปรึกษา ..... ศ.ดร. ทัศนเทพพงศ์

LADAWAN SIRISAENGTAKSIN : N-HEXANE HYDROCRACKING USING ZEOLITE CATALYSTS. THESIS ADVISOR : ASSO. PROF.WIWUT TANTHAPANICHAKOON. THESIS CO-ADVISOR : DR.DHONGCHAI MEDHANAVYN,Ph.D. 196 PP.

The main objective of this work is to study the effects of reaction conditions on the hydrocracking of n-hexane on the mordenite and Na-Y catalysts. A fixed bed, down-flow and high pressure tubular reactor set was designed and constructed to carry out the experiments.

In the present investigation the temperature was varied within the range of 260°C-340°C while the pressure and the space velocity was varied within the range of 30-95 atg and 2,000-8,000 hr<sup>-1</sup>, respectively. By either increasing the reaction temperature, lowering the pressure, or decreasing the space velocity, the total conversion of n-hexane as well as the yield of the LPG products was found to increase. The increase in yield of the LPG products by decreasing the space velocity was, however, less than that obtained by increasing the reaction temperature or lowering the pressure. In any case, the gasoline product was less as the LPG products rose.

Regarding to the types of Catalysts, the mordenite catalyst gave a higher yield of the LPG products than the gasoline products. On the other hand, the Na-Y catalyst gave a higher yield of gasoline than LPG products. The research octane number of the gasoline portion products was improved after hydrocracking in both cases of catalysts.

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ลายมือชื่อนิสิต .....  
ลายมือชื่ออาจารย์ที่ปรึกษา .....  
Dr. Dongchai Medhanavyn

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