

**REGENERATION OF Pt/KL CATALYSTS UTILIZED FOR *n*-OCTANE
AROMATIZATION**



Ms. Dholporn Lertkijcharoenwong

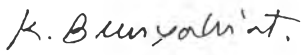
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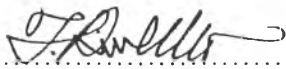
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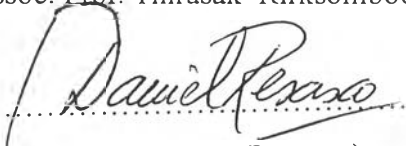
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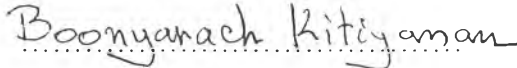
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ABSTRACT

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Keywords : Regeneration/ Aromatization / *n*-Octane/ Pt/K-LTL / Vapor phase
impregnation/ Dehydrocyclization/ DRIFTS.

Aromatization is one of the most important petrochemical processes for aromatic production. Pt/KL catalyst prepared by Vapor Phase Impregnation method is known to be an effective catalyst for *n*-octane aromatization. However, during the reaction, catalysts deactivate due to coke formation. Consequently, it is common practice to regenerate the catalysts to recover their activity. Hence, the attempt of this work is to investigate the influences of air flow rate, temperature and time of regeneration by coke oxidation in air to determine the optimal regeneration conditions of such catalysts. In addition, oxychlorination treatment was also studied to redisperse Pt particles after regeneration in air. It was found that the optimal regeneration temperature, time and air flow rate was 250°C, 0.5 h and 100 ml/min/g. of catalysts, respectively. Moreover, it was clearly seen that regeneration with oxychlorination treatment can restore Pt redispersion as close as that of the fresh catalysts.

บทคัดย่อ

คณพร เลิศกิจเจริญวงศ์ : รีเจนเนอเรชันของตัวเร่งปฏิกิริยาแพลตินัม/โพแทสเซียมซีโอไลต์แอลซึ่งใช้สำหรับปฏิกิริยาอะโรมาไทเซชันของนอร์มัล-ออกเทน (Regeneration of Pt/KL Catalysts utilized for *n*-Octanes Aromatization) อ. ที่ปรึกษา : ศ.ดร. แดเนียล อี ริชส์โก ศ.ดร. สมชาย โอสุวรรณ และ รศ.ดร. ชีรศักดิ์ ฤกษ์สมบูรณ์ 50 หน้า ISBN 974-17-2279-6

ปฏิกิริยาอะโรมาไทเซชันเป็นปฏิกิริยาสำคัญปฏิกิริยาหนึ่งในการผลิตสารอะโรมาติกส์ ตัวเร่งปฏิกิริยาแพลตินัมบนซีโอไลต์แอล (Pt/KL) ซึ่งเตรียมโดยวิธีระเหิดสารประกอบโลหะแพลตินัมเข้าไปยังโพรงของซีโอไลต์ (vapor phase impregnation) ได้รับการยอมรับว่าเป็นตัวเร่งปฏิกิริยาที่มีประสิทธิภาพสำหรับปฏิกิริยาอะโรมาไทเซชันของนอร์มัล-ออกเทน อย่างไรก็ตามในระหว่างการเกิดปฏิกิริยา ความว่องไวในการทำปฏิกิริยาลดลงเนื่องจากการเกิดโค้ก ดังนั้นจึงต้องเร่งตัวเร่งปฏิกิริยาเพื่อคืนสภาพความว่องไวในการทำปฏิกิริยา งานวิจัยนี้จึงมีจุดประสงค์เพื่อศึกษาผลกระทบของความเร็วยุทธศาสตร์, อุณหภูมิ และเวลาที่ใช้ในการปรับสภาพด้วยวิธีโค้กออกซิเดชันในอากาศ เพื่อหาสภาวะการปรับสภาพที่เหมาะสมของตัวเร่งปฏิกิริยาดังกล่าว นอกจากนี้ยังได้มีการศึกษาการทำออกซิคลอรีเนชัน (Oxychlorination Treatment) เพื่อคืนการกระจายอนุภาคแพลตินัมหลังจากการปรับสภาพในอากาศ ผลการศึกษาพบว่าสภาวะอุณหภูมิ, เวลาที่ใช้ และความเร็วยุทธศาสตร์ที่เหมาะสมคือ 250 เซลเซียส, 0.5 ชั่วโมง และ 100 มิลลิลิตร/นาฬิกา/กรัมของตัวเร่งปฏิกิริยาตามลำดับ นอกจากนี้ได้พบว่าการปรับสภาพที่มีการทำออกซิคลอรีเนชันสามารถคืนการกระจายอนุภาคแพลตินัมได้ใกล้เคียงกับการกระจายอนุภาคแพลตินัมของตัวเร่งปฏิกิริยาใหม่

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ABBREVIATIONS

Pt/KL	Platinum supported on KL zeolite
VPI	Vapor-phase impregnation
DRIFTS	Diffuse Reflectance Infrared Fourier Transform Spectroscopy of Adsorbed CO
TPO	Temperature programmed oxidation
GC	Gas chromatograph
WHSV	Weigh hourly space velocity
TOS	Time on stream
B	Benzene
EB	Ethylbenzene
OX	<i>o</i> -Xylene
PX	<i>p</i> -Xylene
MX	<i>m</i> -Xylene
C ₈ Arom	C ₈ aromatics
Arom	Aromatics
Regen@250 C	Pt/KL catalyst regenerated at regeneration temperature of 250°C
Regen@2 h	Pt/KL catalyst regenerated for 2 h
Regen@100ml/min/g	Pt/KL catalyst regenerated in air flow rate of 100ml/min/g.