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**PERFORMANCE OF ION-EXCHANGED ZEOLITE AND METALLOSILICATE  
CATALYSTS ON NITRIC OXIDE DECOMPOSITION**

**Mr. Wittaya Engopasanan**

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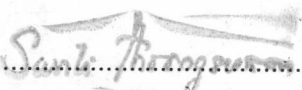
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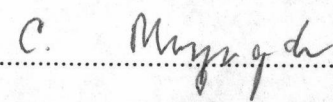
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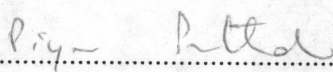
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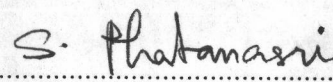
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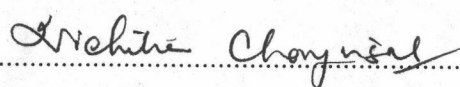
  
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WITTAYA ENGOPASANAN : PERFORMANCE OF ION-EXCHANGED ZEOLITE AND METALLOSILICATE CATALYSTS ON NITRIC OXIDE DECOMPOSITION, THESIS ADVISOR : PROF. PIYASAN PRASERTHDAM, Dr. Ing., THESIS CO-ADVISOR : DR. SUPHOT PHATANASRI, Dr. Eng. 172 pp. ISBN 974-584-929-4

In this study, the decomposition of NO over metal ion-exchanged zeolite and metallosilicate catalysts was investigated. NO in an atmosphere containing propane and large excess of O<sub>2</sub> was selectively reduced using ZSM-5, Cu-silicate and Fe-silicate catalysts. H-form, Cu/H-form, and Pt/H-forms of all the three catalysts were used in the experiments. Experimental results revealed that the catalytic activity for the decomposition of NO was in the following order: H-form > Cu/H-form > Pt/H-form. The results also indicated that the catalytic activity for the combustion of propane of Pt/H-form was the highest followed by H-form and Cu/H-form. For the ZSM-5 catalysts, the amount of Cu ion that can be exchanged was affected by time, temperature, and pH. It was observed that at the same pH value, the amount of Cu in Na-ZSM-5 and NH<sub>4</sub>-ZSM-5 was approximately the same and higher than that of H-ZSM-5. The catalytic activity of Cu ion-exchanged ZSM-5 catalysts for the decomposition of NO was found to be dependent on the forms of ZSM-5 used in the copper ion exchange process. Maximum conversion of each catalyst was observed during the temperature of 300-450 °C. It was demonstrated, using NH<sub>4</sub>-ZSM-5, H-ZSM-5, Na-ZSM-5, and Cu ion-exchanged catalysts, that the absence of oxygen increased the temperature for the maximum conversion of NO. The activities for NO + C<sub>3</sub>H<sub>8</sub> reaction on Cu ion-exchanged ZSM-5 catalysts were affected by remaining cations, i.e., Na<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, and H<sup>+</sup> in absence of O<sub>2</sub>. The Cu/NH<sub>4</sub>-ZSM-5 catalyst having NH<sub>4</sub><sup>+</sup> ion exhibited the highest activity for this reaction condition. On the other hand, the activities for the NO + C<sub>3</sub>H<sub>8</sub> + O<sub>2</sub> system on Cu ion-exchanged ZSM-5 catalysts depended on copper content of catalysts.

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ลายมือชื่อนิสิต..... วิทยา เสงี่ยมภาสัชชชท์

ลายมือชื่ออาจารย์ที่ปรึกษา.....

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....



พิมพ์ต้นฉบับบทความวิจัยวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

วิทยา เอ็งโกลาสนันท์ : ประสิทธิภาพของตัวเร่งปฏิกิริยาซีโอไลต์แบบแลกเปลี่ยนไอออน และตัวเร่งปฏิกิริยาโลหะซิลิเกตต่อการสลายตัวของแก๊สไนตริกออกไซด์ (PERFORMANCE OF ION-EXCHANGED ZEOLITE AND METALLOSILICATE CATALYSTS ON NITRIC OXIDE DECOMPOSITION) อ. ที่ปรึกษา : ศาสตราจารย์ ดร. ปิยะสาร ประเสริฐธรรม, อ. ที่ปรึกษาร่วม : อ. ดร. สุพจน์ พัฒนะศรี, 172 หน้า. ISBN 974-584-929-4

ในการศึกษานี้ได้ทำการวิจัยการสลายตัวของแก๊สไนตริกออกไซด์บนตัวเร่งปฏิกิริยาซีโอไลต์แบบแลกเปลี่ยนไอออนโลหะ (metal ion-exchanged zeolite) และ โลหะซิลิเกต (metallo-silicate) แก๊สไนตริกออกไซด์ได้ถูกรีดิวซ์แบบเลือกเกิดในบรรยากาศที่มีแก๊สโพเพนและแก๊สออกซิเจน โดยใช้ตัวเร่งปฏิกิริยา ZSM-5, ทองแดง-ซิลิเกต และ เหล็ก-ซิลิเกต ไฮโดรเจน-ฟอร์ม, ทองแดง/ไฮโดรเจน-ฟอร์ม, และ แพลทินัม/ไฮโดรเจน-ฟอร์ม ของตัวเร่งปฏิกิริยาทั้งสามแบบได้ถูกใช้ในการทดลอง ผลการทดลองแสดงให้เห็นว่า ความว่องไวในการเร่งปฏิกิริยาสำหรับการสลายตัวของแก๊สไนตริกออกไซด์ เป็นตามลำดับดังนี้ ไฮโดรเจน-ฟอร์ม > ทองแดง/ไฮโดรเจน-ฟอร์ม > แพลทินัม/ไฮโดรเจน-ฟอร์ม ผลการทดลองได้แสดงความว่องไวในการเร่งปฏิกิริยาสำหรับการเผาไหม้ของแก๊สโพเพนของ แพลทินัม/ไฮโดรเจน - ฟอร์ม เป็นตัวสูงสุด ตามด้วย ไฮโดรเจน-ฟอร์ม, และ ทองแดง/ไฮโดรเจน-ฟอร์ม สำหรับตัวเร่งปฏิกิริยา ZSM-5 ปริมาณของทองแดงที่สามารถแลกเปลี่ยนได้ ขึ้นอยู่กับผลของ เวลา, อุณหภูมิ, และ พีเอช พบว่าที่ค่าพีเอชเดียวกันปริมาณทองแดงใน Na-ZSM-5 และ NH<sub>4</sub>-ZSM-5 มีค่าใกล้เคียงกันและสูงกว่า H-ZSM-5 ความว่องไวในการเร่งปฏิกิริยาของตัวเร่งปฏิกิริยา ZSM-5 แบบแลกเปลี่ยนไอออนทองแดง สำหรับการสลายตัวของ แก๊สไนตริกออกไซด์ได้พบว่าขึ้นอยู่กับฟอร์มของ ZSM-5 ที่ในกระบวนการแลกเปลี่ยนไอออนของทองแดง การเปลี่ยนแปลงสูงสุด (maximum conversion) ของแต่ละตัวเร่งปฏิกิริยาสังเกตได้อยู่ระหว่างช่วงอุณหภูมิ 300-450 °C จากการใช้ตัวเร่งปฏิกิริยา NH<sub>4</sub>-ZSM-5, H-ZSM-5, Na-ZSM-5 และ ตัวเร่งปฏิกิริยา ZSM-5 แบบแลกเปลี่ยนไอออนทองแดง ได้แสดงว่าในภาวะไม่มีออกซิเจนทำให้อุณหภูมิของการเปลี่ยนแปลงสูงสุดของแก๊สไนตริกออกไซด์จะเพิ่มขึ้น ความว่องไวสำหรับปฏิกิริยาแก๊สไนตริกออกไซด์ + แก๊สโพเพน บนตัวเร่งปฏิกิริยา ZSM-5 แบบแลกเปลี่ยนไอออนทองแดง ได้รับผลจากแคดไอออนที่คงเหลือได้แก่ Na<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, และ H<sup>+</sup> ภายใต้ภาวะที่ไม่มี แก๊สออกซิเจน ตัวเร่งปฏิกิริยา Cu/NH<sub>4</sub>-ZSM-5 ที่มีไอออน NH<sub>4</sub><sup>+</sup> เป็นไอออนที่คงเหลือแสดงความว่องไวในการเร่งปฏิกิริยาสูงสุด ในทางตรงกันข้ามความว่องไวในการเร่งปฏิกิริยาสำหรับระบบแก๊ส ไนตริกออกไซด์ + โพเพน + ออกซิเจน บนตัวเร่งปฏิกิริยา ZSM-5 แบบแลกเปลี่ยนไอออนทองแดง ขึ้นอยู่กับปริมาณของทองแดงของตัวเร่งปฏิกิริยา

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ลายมือชื่อนิสิต ..... วิทยา เอ็งโกลาสนันท์  
ลายมือชื่ออาจารย์ที่ปรึกษา .....  
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม .....

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