

**EFFECT OF METALS LOADED ON ZEOLYTIC SUPPORTS
ON TIRE PYROLYSIS PRODUCTS:
Ru ON HMOR AND HZSM5**



Kittikom Kongkadee

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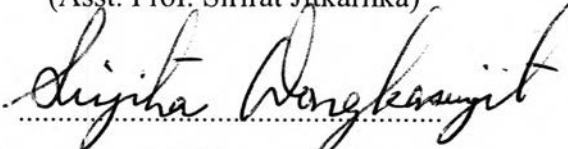
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Assoc. Prof. Sujitra Wongkasemjit

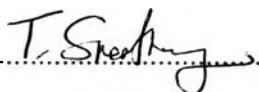
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..... College Director
(Assoc. Prof. Nantaya Yanumet)

Thesis Committee:


.....
(Asst. Prof. Sirirat Jitkarnka)


.....
(Assoc. Prof. Sujitra Wongkasemjit)


.....
(Dr. Thammanoon Sreethawong)


.....
(Dr. Suchada Butnark)

ABSTRACT

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The pyrolysis of waste tire has been studied in this research. The goals were to maximize the yield of light olefins (ethylene and propylene) in the gaseous product by varying the pyrolysis conditions and the amount of ruthenium metal loaded on the zeolytic support in order to investigate their effects on the quality and quantity of pyrolysis products. In this work, the pyrolysis was carried out in a bench-scale autoclave reactor at room temperature to a final temperature varied from 500-700°C, with a 10 °C/min heating rate in atmospheric pressure. The nitrogen flow rate was also controlled in order to vary the residence time of the reaction. The other parameters were kept constant. It was found that the shorter residence time, the higher the yield of light olefin was obtained. For the catalytic cases, the light olefin yield reached a maximum at 0.7% loading of ruthenium metal. Moreover, the bifunctional catalysts can reduce the oil yield and produce a higher amount of gas yield. In addition, all catalysts can reduce heavy fractions, such as HVGO and LVGO; therefore, they produced a higher quality gasoline and kerosene than the non-catalytic case.

บทคัดย่อ

นายกิตติคม คงคดี: ผลของการเติมโลหะบนตัวรองรับที่เป็นซีโอไลต์ต่อผลผลิตจากกระบวนการไพโรไลซิสยางรถยนต์: Ru บน HMOR และ HZSM5 (Effect of Metals Loaded on Zeolytic Supports on Tire Pyrolysis Products: Ru on HMOR and HZSM5) อ. ที่ปรึกษา: ผศ. ดร. สิริรัตน์ จิตการคำ และ รศ. ดร. สุจิตรา วงศ์เกษมจิตต์ 132 หน้า

งานวิจัยนี้เป็นงานวิจัยที่ศึกษาเกี่ยวกับกระบวนการไพโรไลซิสยางรถยนต์หมดสภาพ โดยมีเป้าหมายหลักคือ การเพิ่มผลผลิตของสารประกอบโอเลฟินส์เบา เช่น เอทิลีน และ โพรพิลีน ในผลิตภัณฑ์ที่เป็นก๊าซโดยการเปลี่ยนภาวะของกระบวนการไพโรไลซิส และปริมาณของโลหะรูทีเนียม (Ruthenium) ที่เติมบนตัวรองรับที่เป็นซีโอไลต์ (zeolite) เพื่อการตรวจสอบผลกระทบต่อคุณภาพและปริมาณของผลผลิตจากกระบวนการไพโรไลซิส ในงานวิจัยนี้กระบวนการไพโรไลซิสเกิดขึ้นในเครื่องปฏิกรณ์โดยการเพิ่มอุณหภูมิจากเริ่มต้นถึงอุณหภูมิสุดท้าย ที่ควบคุมให้อยู่ในช่วง 500 ถึง 700°C ด้วยอัตราเพิ่ม 10°C/นาที่จากอุณหภูมิห้อง ที่ความดันบรรยากาศ อัตราการไหลของก๊าซไนโตรเจนถูกควบคุมเพื่อปรับเปลี่ยนระยะเวลาการเกิดปฏิกิริยา ส่วนตัวแปรอื่น ๆ ถูกรักษาให้คงที่ไว้

จากการศึกษาพบว่า ปริมาณโอเลฟินส์เบาจะเพิ่มขึ้นเมื่อระยะเวลาการทำปฏิกิริยาขยับสั้นลง สำหรับกรณีที่มีตัวเร่งปฏิกิริยา ปริมาณโอเลฟินส์เบาถูกผลิตได้สูงสุดที่การเติมโลหะรูทีเนียมร้อยละ 0.7 ยิ่งไปกว่านั้น การใช้ตัวเร่งปฏิกิริยาที่มี 2 คุณสมบัติ (Bifunctional catalyst) ทำให้ปริมาณน้ำมันลดลงและส่งผลให้ผลิตภัณฑ์ก๊าซได้เพิ่มขึ้น นอกจากนี้ยังพบว่าการใช้ตัวเร่งปฏิกิริยาสามารถลดปริมาณของส่วนที่หนักในน้ำมัน เช่น น้ำมันก๊าซออยล์หนัก และ น้ำมันก๊าซออยล์เบา ดังนั้น คุณภาพของน้ำมันแก๊สโซลีน และน้ำมันก๊าดที่ได้ จึงดีกว่าในกรณีที่ไม่มีตัวเร่งปฏิกิริยาในระบบ

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