

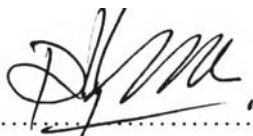
**THE EFFECT OF METAL TYPE ON PARTIAL HYDROGENATION OF
POLYUNSATURATED FAMES FOR BIODIESEL UPGRADING**

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A Thesis Submitted in Partial Fulfillment of the Requirements
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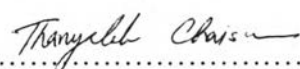
Thesis Title: The Effect of Metal Type on Partial Hydrogenation of Polyunsaturated FAMES for Biodiesel Upgrading
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ABSTRACT

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Biodiesel or fatty acid methyl ester (FAME) is considered one of the most promising alternative fuels. It has a higher cetane number than diesel; however, there are some problems related to oxidative stability and the cold flow properties. These properties depend on the degree of unsaturation in the FAME chains. Therefore, the quality of biodiesel can be improved by partial hydrogenation. The main objectives of this work were to study the effect of metal type; Pd, Pt, and Ni, and also study the effect of sulfur compound on different metal types in the partial hydrogenation of soybean oil based-biodiesel. The catalytic activity of all catalysts dropped after adding additional sulfur. The highest catalytic activity of hydrogenated biodiesel both before and after adding additional sulfur was represented by Pd/SiO₂. However, the highest sulfur tolerance was exhibited by Pt/SiO₂ (37.05 % loss activity). The results indicated that partial hydrogenation reaction was the efficient method to improve the biodiesel properties by increasing the oxidative stability.

บทคัดย่อ

ชัชชญา รัชรัตนานน : ผลของชนิดตัวเร่งปฏิกิริยาต่อปฏิกิริยาไฮโดรจีเนชันบางส่วนของเมทิลเอสเทอร์ชนิดไม่อิ่มตัวที่มีพันธะคู่หลายตำแหน่งเพื่อการพัฒนาคุณภาพไบโอดีเซล (The Effect of Metal Type on Partial Hydrogenation of Polyunsaturated FAMES for Biodiesel Upgrading) อ. ที่ปรึกษา : รศ.ดร. อาภาณี เหลืองนฤมิตชัย 74 หน้า

ไบโอดีเซลหรือเมทิลเอสเทอร์ชนิดไม่อิ่มตัวที่มีพันธะคู่หลายตำแหน่งเป็นหนึ่งในพลังงานทางเลือกที่น่าสนใจซึ่งมีค่าซีเทนสูงกว่าน้ำมันดีเซล แต่อย่างไรก็ตามไบโอดีเซลยังคงประสบปัญหาเรื่องความเสถียรต่อปฏิกิริยาออกซิเดชันและคุณสมบัติการไหลเทซึ่งคุณสมบัติเหล่านี้แปรผันตามระดับความไม่อิ่มตัวของเมทิลเอสเทอร์ ดังนั้นคุณภาพของไบโอดีเซลสามารถปรับปรุงโดยปฏิกิริยาไฮโดรจีเนชันบางส่วน จุดประสงค์หลักของงานวิจัยนี้คือศึกษาผลของชนิดตัวเร่งปฏิกิริยาแพลลาเดียม แพลทินัมและนิกเกิล นอกเหนือจากนั้นยังได้ศึกษาผลของสารประกอบกำมะถันต่อชนิดตัวเร่งปฏิกิริยาแต่ละชนิดในปฏิกิริยาไฮโดรจีเนชันบางส่วนอีกด้วย หลังจากการศึกษาพบว่าความสามารถในการเร่งปฏิกิริยาลดลงเมื่อมีการเจือปนของสารประกอบกำมะถันและตัวเร่งปฏิกิริยาที่มีประสิทธิภาพมากที่สุดในปฏิกิริยาไฮโดรจีเนชันบางส่วนทั้งก่อนและหลังการเจือปนสารประกอบกำมะถันคือตัวเร่งปฏิกิริยาแพลลาเดียม อย่างไรก็ตามตัวเร่งปฏิกิริยาที่สามารถทนต่อการเจือปนสารประกอบกำมะถันในปฏิกิริยานี้ได้มากที่สุดคือตัวเร่งปฏิกิริยาแพลทินัมซึ่งมีความว่องไวในการทำปฏิกิริยาลดลงร้อยละ 37.05 จากผลการศึกษานี้ได้ชี้ให้เห็นว่าปฏิกิริยาไฮโดรจีเนชันบางส่วนมีศักยภาพในการปรับปรุงคุณสมบัติของไบโอดีเซล โดยเฉพาะอย่างยิ่งความเสถียรต่อปฏิกิริยาออกซิเดชัน

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