

**PARTIAL HYDROGENATION OF POLY-UNSATURATED FATTY ACID
METHYL ESTER FOR BIODIESEL UPGRADING USING
Pd/ACTIVATED CARBON**



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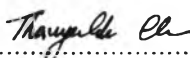
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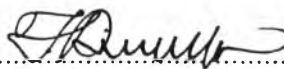
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ABSTRACT

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Nattapong Thachuangtumle: Partial Hydrogenation of Poly-Unsaturated Fatty Acid Methyl Ester for Biodiesel Upgrading Using Pd/Activated Carbon.

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Biodiesel, which is defined as fatty acid methyl ester (FAME), is derived from renewable biological sources. The advantages of biodiesel over petroleum diesel are the improvement in lubricity, higher flash point, lower toxicity, lower emissions of SO_x, CO, NO_x, and biodegradability. However, the use of biodiesel is limited by some of its characteristics, which are oxidative stability and cold flow properties. Therefore, partial hydrogenation was used to upgrade the properties of biodiesel, especially the oxidative stability. Pd supported on various types of activated carbon catalysts were prepared by impregnation. The reaction was carried out at 120°C, 4 bar, 500 rpm stirring rate, and 1.5 wt.% of catalyst compared to starting oil. The results showed that the Pd/granule activated carbon exhibited higher activity in term of partial hydrogenation than Pd/activated carbon (850µm) and Pd/carbon aerogel, respectively.

บทคัดย่อ

ณัฐพงศ์ ทำช่วงทำเล : กระบวนการเติมไฮโดรเจนบางส่วนของกรดไขมันชนิดไม่อิ่มตัวในน้ำมันไบโอดีเซลสำหรับการพัฒนาคุณภาพของเชื้อเพลิงไบโอดีเซลโดยใช้ตัวเร่งปฏิกิริยาพลาตตินัมบนคาร์บอน (Partial Hydrogenation of Poly-Unsaturated Fatty Acid Methyl Ester For Biodiesel Upgrading Using Pd/Activated Carbon) อ.ที่ปรึกษา : ผศ.ดร.อาภาณี เหลืองนฤมิตชัย และ ผศ.ดร.ธัญญลักษณ์ นายสุวรรณ

น้ำมันไบโอดีเซลหรือกรดไขมันเมทิลเอสเทอร์เป็นเชื้อเพลิงที่ผลิตทรัพยากรหมุนเวียนจากแหล่งธรรมชาติ ข้อดีของน้ำมันไบโอดีเซลสามารถช่วยปรับปรุงคุณสมบัติในการหล่อลื่น มีจุดวาบไฟที่สูง มีความเป็นพิษต่ำ อีกทั้งยังปล่อยก๊าซของคาร์บอนออกไซด์ของซัลเฟอร์ ไนโตรเจน และคาร์บอนในปริมาณที่ต่ำ อย่างไรก็ตาม น้ำมันไบโอดีเซลยังมีค่าเสถียรภาพต่อการเกิดปฏิกิริยาออกซิเดชันต่ำและมีคุณสมบัติของการไหลเทที่ไม่ดี ดังนั้นกระบวนการเติมไฮโดรเจนบางส่วนของกรดไขมันชนิดไม่อิ่มตัวในน้ำมันไบโอดีเซลจึงถูกใช้ในการพัฒนาคุณภาพของเชื้อเพลิงไบโอดีเซล โดยเฉพาะเพื่อปรับปรุงค่าเสถียรภาพต่อการเกิดปฏิกิริยาออกซิเดชัน ดังนั้นงานวิจัยนี้ใช้ตัวเร่งปฏิกิริยาพลาตตินัมบนคาร์บอนหลายชนิดที่เตรียมโดยวิธีการทำให้ชุ่มโดยศึกษากระบวนการไฮโดรจีเนชัน ภายใต้ความดัน 4 บาร์ อุณหภูมิ 120 องศาเซลเซียส อัตราการกวน 500 รอบต่อนาที และใช้ปริมาณตัวเร่งปฏิกิริยา 1.5 เปอร์เซ็นต์โดยน้ำหนักของน้ำมันไบโอดีเซล หลังจากการทดลองพบว่ากระบวนการเติมไฮโดรเจนบางส่วนโดยใช้พลาตตินัมบนคาร์บอนชนิดแห้ง เป็นตัวเร่งปฏิกิริยาที่ดีในเชิงของกระบวนการเติมไฮโดรเจนบางส่วนเมื่อเทียบกับพลาตตินัมบนคาร์บอนชนิดอื่นๆ

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