

**SELECTIVE HYDROGENATION OF 1-HEXYNE USING Pd-Mn ON  
ALUMINA CATALYSTS**

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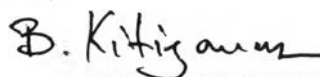
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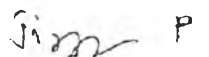
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## ABSTRACT

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Mixed C4 hydrocarbon is one of the product streams from the naphtha cracking processes. This stream contains vinylacetylene, butadiene, isobutylene, butyne, butene, butane, etc. The selective catalytic hydrogenation process is an alternative for mixed C4 hydrocarbons upgrading. In this research, 1-hexyne was chosen as a model compound for unsaturated mixed C4 hydrocarbons. The activity and selectivity of hydrogenation were investigated by using low loaded Pd (0.3 wt %) and Mn doped Pd on alumina catalysts. The atomic ratios of Pd/Mn were varied at 0.5, 0.75, 1.0, 1.5, 2.0, and 5.0. The experimental conditions were 40 °C and H<sub>2</sub> partial pressure of 1.5 bar. Temperature program reduction (TPR), hydrogen chemisorption and surface area analysis were applied for catalyst characterization. It is interesting to find that the activity was significantly improved when Mn was doped on the Pd/Al<sub>2</sub>O<sub>3</sub> catalysts (Pd/Mn ≤ 1). The selectivity of the Pd-Mn/Al<sub>2</sub>O<sub>3</sub> catalysts also increased from the Pd/Al<sub>2</sub>O<sub>3</sub> catalyst when Mn is added.

## บทคัดย่อ

ฉันทน์ กิจดิถานนท์ : ปฏิกริยาไฮโดรจิเนชันแบบเลือกเกิดของหนึ่งเฮกไซน์โดยใช้โลหะผสมแพลเลเดียม-แมงกานีสที่อยู่บนอะลูมินาเป็นตัวเร่งปฏิกริยา (Selective Hydrogenation of 1-Hexyne Using Pd-Mn on Alumina Catalysts) อ. ที่ปริกษา : ผศ. ดร. บุนยรัชต์ กิตยำนันท์ 66 หน้า

สารประกอบอินทรีย์จำพวกมิคซ์ซีทีเป็นผลิตภัณฑ์หนึ่งที่ได้จากกระบวนการแตกสลายเนฟทาในอุตสาหกรรมปิโตรเคมี ซึ่งประกอบด้วย ไวนิวอะเซทิวลิค, บิวทาไดอิน, ไอโซบิวทีลีน, บิวทีน, บิวเทน และอื่น ๆ กระบวนการไฮโดรจิเนชันแบบเลือกเกิดเป็นทางเลือกหนึ่งสำหรับการเพิ่มมูลค่าของสารประกอบอินทรีย์จำพวกมิคซ์ซีที เพื่อความสะดวกในการศึกษาปฏิกริยาไฮโดรจิเนชันแบบเลือกเกิด งานวิจัยนี้ได้เลือกหนึ่งเฮกไซน์เป็นสารประกอบต้นแบบแทนที่ไวนิวอะเซทิวลิคและหนึ่งบิวทาอิน ในงานวิจัยจะมุ่งศึกษาถึงความว่องไวและความเลือกเฉพาะกับผลิตภัณฑ์ที่ต้องการในปฏิกริยาไฮโดรจิเนชันของหนึ่งเฮกไซน์ โดยใช้ตัวเร่งปฏิกริยาที่เป็นโลหะแพลเลเดียม (0.3 % โดยน้ำหนัก) และโลหะผสมแพลเลเดียม-แมงกานีสที่อยู่บนอะลูมินา ภายใต้สภาวะความดันไฮโดรเจน 1.5 บาร์ และอุณหภูมิ 40 องศาเซลเซียส โดยอัตราส่วนโดยมวลของแพลเลเดียมต่อแมงกานีสที่ศึกษาจะประกอบไปด้วย 0.5, 0.75, 1.0, 1.5, 2.0 และ 5.0 วิเคราะห์ลักษณะของตัวเร่งปฏิกริยาโดยใช้ทีอาร์, ไฮโดรเจน เคมีซอพชั่น ซึ่งจากผลการทดลองแสดงให้เห็นว่าตัวเร่งปฏิกริยาโลหะผสมแพลเลเดียม-แมงกานีสที่อัตราส่วนโดยมวลของแพลเลเดียมต่อแมงกานีสน้อยกว่า 1.0 มีค่าความว่องไวที่ดีกว่าโลหะแพลเลเดียม โดยที่อัตราส่วนโดยมวลของแพลเลเดียมต่อแมงกานีสกับ 1.0 มีความว่องไวสูงสุด และความเลือกเฉพาะของเฮกซีนเพิ่มขึ้นจากของโลหะแพลลาเดียม

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