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**ACTIVITY AND SELECTIVITY OF NICKEL SUPPORTED ON NATURAL
SILICATES FOR HYDROGENATION OF SOYBEAN OIL**

Miss Sonruporn Wongnonoi

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for the Degree of Master of Science in Petrochemistry and Polymer Science**

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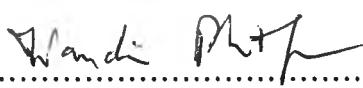
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..... Dean of Faculty of Science
(Associate Professor Wanchai Phothiphichitr, Ph.D.)

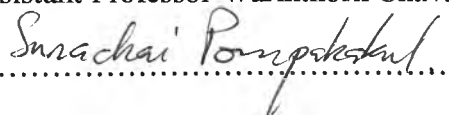
Thesis Committee


..... Chairman
(Professor Pattarapun Prasassarakich, Ph.D.)


..... Thesis Advisor
(Associate Professor Amorn Petsom, Ph.D.)


..... Member
(Associate Professor Sophon Roengsumran, Ph.D.)


..... Member
(Assistant Professor Warinthorn Chavasiri, Ph.D.)


..... Member
(Surachai Pornpakakul, Ph.D.)

สนฤพร วงศ์หน่อไฉ : แอกทิวิตีและความเลือกจำเพาะของนิกเกิลบนซิลิเกตธรรมชาติ
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งานวิจัยนี้เป็นการศึกษาแอกทิวิตีและความเลือกจำเพาะของตัวเร่งปฏิกิริยานิกเกิลบนซิลิเกตธรรมชาติสำหรับไฮโดรจิเนชันน้ำมันถั่วเหลืองโดยใช้ตัวเร่งปฏิกิริยา 10% นิกเกิลบนตัวรองรับบอลเคลย์ ไชนาเคลย์ ไดอะตอมไมด์ และคีเซลแก้ว โดยทำการศึกษาถึงผลของอุณหภูมิ ความดัน เวลา และความเข้มข้นของตัวเร่งปฏิกิริยาที่ใช้ในปฏิกิริยา

จากการศึกษา ที่ภาวะอุณหภูมิ 180 องศาเซลเซียส ความดันไฮโดรเจน 200 ปอนด์ต่อตารางนิ้ว เวลาในการเกิดปฏิกิริยา 3 ชั่วโมง ความเร็วรอบของการกวน 600 รอบต่อนาที และใช้ปริมาณของตัวเร่งปฏิกิริยา 0.05% นิกเกิลต่อน้ำหนักของน้ำมันถั่วเหลือง พบว่าตัวเร่งปฏิกิริยา 10% นิกเกิลบนตัวรองรับบอลเคลย์เป็นตัวเร่งปฏิกิริยาที่มีแอกทิวิตีมากที่สุด และตัวเร่งปฏิกิริยา 10% นิกเกิลบนตัวรองรับไชนาเคลย์เป็นตัวเร่งปฏิกิริยาที่มีความเลือกจำเพาะมากที่สุด ซึ่งภาวะที่เหมาะสมในการเกิดกรดโอลิก โดยใช้ตัวเร่งปฏิกิริยา 10% นิกเกิลบนตัวรองรับบอลเคลย์ คือ ที่อุณหภูมิ 150 องศาเซลเซียส ความดันไฮโดรเจน 150 ปอนด์ต่อตารางนิ้ว เวลาในการเกิดปฏิกิริยา 2 ชั่วโมง ความเร็วรอบของการกวน 600 รอบต่อนาที และใช้ปริมาณของตัวเร่งปฏิกิริยา 0.05% นิกเกิลต่อน้ำหนักของน้ำมันถั่วเหลือง ผลผลิตกรดที่ได้มีค่าไอโอดีน 108.60 และมีส่วนประกอบของกรดปามิติก 10.75%, กรดสเตียริก 16.11, กรดโอลิก 69.93% กรดลินอลิก 2.84% และกรดลิโนเลนิก 0.38% ของน้ำหนักของน้ำมันทั้งหมด ปฏิกิริยาไฮโดรจิเนชันที่ใช้ตัวเร่งปฏิกิริยา 10% นิกเกิลบนตัวรองรับบอลเคลย์ จะให้ปริมาณกรดโอลิกมากที่สุด เมื่อเปรียบเทียบกับผลผลิตกรดที่ได้จากตัวเร่งปฏิกิริยาอื่น ภายใต้ภาวะการทดลองเดียวกัน ดังนั้นในภาวะนี้ตัวเร่งปฏิกิริยาที่ประกอบด้วย 10% นิกเกิลบนตัวรองรับบอลเคลย์จึงมีแอกทิวิตีและความเลือกจำเพาะสูง ซึ่งความเลือกจำเพาะของปฏิกิริยาไฮโดรจิเนชันน้ำมันถั่วเหลืองไม่ได้ขึ้นอยู่กับตัวรองรับเท่านั้น ยังขึ้นอยู่กับภาวะที่ใช้ในการทำปฏิกิริยาด้วย

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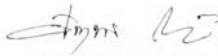
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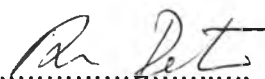
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SONRUPORN WONGNONOI: ACTIVITY AND SELECTIVITY OF
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The activity and selectivity for hydrogenation of soybean oil using nickel on natural silicates have been studied. The catalysts were 10%Ni on ball clay, china clay, diatomite and kieselghur. The effects of temperature, hydrogen pressure, reaction time, and concentration of catalyst on the hydrogenation process were studied.

The hydrogenation reaction was carried out at 180 °C, 200 psig. hydrogen pressure, 3 hours reaction time, 600 rpm. agitation speed, and catalyst concentration of 0.05% Ni by weight of oil. It was found that the 10%Ni on ball clay catalyst provided the highest activity while the 10%Ni on china clay catalyst provided the highest selectivity. The suitable conditions in the production of oleic acid using 10% Ni on ball clay catalyst was the reaction temperature at 150 °C, 150 psig. hydrogen pressure, 2 hours reaction time, 600 rpm. agitation speed, with catalyst concentration of 0.05% Ni by weight of oil. The hydrogenated oil, which obtained from this condition, had 108.60 of iodine value and consisted of 10.75% palmitic acid, 16.11% stearic acid, 69.93% oleic acid, 2.84% linoleic acid, and 0.38% linolenic acid by weight of oil. The hydrogenation reaction using 10%Ni on ball clay provided the highest amount of oleic acid in the hydrogenated products compared to other catalysts under the same condition. Therefore, the 10%Ni on ball clay catalyst had the best activity and selectivity at this condition. The selective hydrogenation of soybean oil was not only dependent on solid support, but it was also dependent on the reaction condition.

Department. Petrochemistry and Polymer Science. Student's signature..... 

Field of study. Petrochemistry and Polymer Science Advisor's signature..... 

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ABBREVIATIONS

°C	:	Degree Celcius
¹³ C-NMR	:	Carbon-13 Nuclear Magnetic Resonance
cm ⁻¹	:	Unit of wave number
cm ³	:	Cubic centimeter
FTIR	:	Fourier Transform Infrared Spectrophotometer
GC-MS	:	Gas Chromatography – Mass Spectrometer
I.V.	:	Iodine Value
Meq	:	Milimolequivalent
MHz	:	Megahertz
min.	:	Minute
ml.	:	Millilitre
ml/g	:	Millilitres per gram
Ni	:	Nickel
psi.	:	Pound per square inch
rpm.	:	Rounds per minute
rt.	:	Retention time
%wt	:	Percent by weight
w/v	:	Weight by volume