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นายชยพร พงศ์ถนอมศักดิ์

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จุฬาลงกรณ์มหาวิทยาลัย

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**SYNTHESIS OF NITRATE COMPOUNDS FROM VEGETABLE OILS
AS CETANE IMPROVER**

Mr. Chayaporn Pongthanomsak

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

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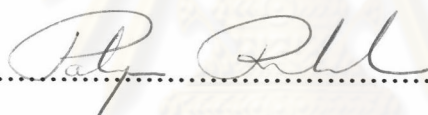
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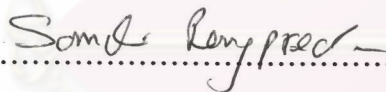
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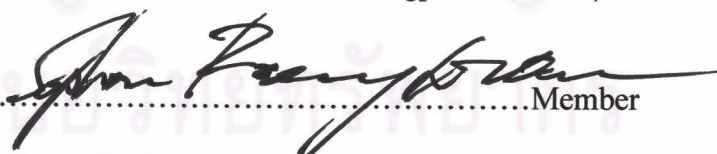
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ชยพร พงศ์ณอมศักดิ์ : การสังเคราะห์สารประกอบไนเทรตจากน้ำมันพืชเพื่อเป็นสารเพิ่ม
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งานวิจัยนี้เป็นการสังเคราะห์สารประกอบไนเทรตจากน้ำมันปาล์มและน้ำมันถั่วเหลือง
เพื่อใช้เป็นสารเพิ่มค่าซีเทนในน้ำมันดีเซล ได้พิสูจน์เอกลักษณ์สารประกอบไนเทรตที่ได้โดยเทคนิค
ทางสเปกโทรสโกปี ได้แก่ อินฟราเรดสเปกโทรสโกปี และนิวเคลียร์แมกเนติกเรโซแนนซ์สเปกโทรส
โกปี สารประกอบไนเทรตที่สังเคราะห์ได้สามารถละลายในน้ำมันดีเซลพื้นฐานได้ง่ายและมีประ
สิทธิภาพในการเพิ่มค่าซีเทน จากการตรวจสอบค่าซีเทนพบว่า สารเหล่านี้ให้ค่าเลขซีเทนเพิ่มขึ้น
ประมาณ 0.3, 0.7, 1.4, 2.6, 3.6 และ 4.4 หน่วย สำหรับสารประกอบไนเทรตจากน้ำมันปาล์ม
และ 0.4, 1.0, 2.2, 4.0, 5.5 และ 6.8 หน่วย สำหรับสารประกอบไนเทรตจากน้ำมันถั่วเหลือง ที่
ความเข้มข้น 0.05, 0.10, 0.25, 0.50, 0.75 และ 1.00 เปอร์เซ็นต์โดยน้ำหนักตามลำดับ เทียบกับ
ค่าซีเทนของน้ำมันดีเซลพื้นฐาน สารประกอบไนเทรตที่สังเคราะห์ได้มีแนวโน้มที่ให้ค่าซีเทนเพิ่มขึ้น
และสามารถเป็นได้ทั้งไบโอดีเซลและสารเพิ่มค่าซีเทนในผลิตภัณฑ์เดียวกัน

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In this work, the nitrate compounds of palm oil and soybean oil were synthesized and evaluated as cetane improvers for use in diesel fuel. The nitrate compounds were identified by spectroscopic techniques, such as infrared spectroscopy and nuclear magnetic resonance spectroscopy. The nitrate compounds could be easily blended with base diesel fuel and were effective as cetane improvers. They were effective in increasing cetane number to 0.3, 0.7, 1.4, 2.6, 3.6 and 4.4 units for palm oil nitrate and 0.4, 1.0, 2.2, 4.0, 5.5 and 6.8 units for soybean oil nitrate at concentrations of 0.05%, 0.10%, 0.25%, 0.50%, 0.75% and 1.00% by weight, respectively, as compared with base diesel fuel. These nitrate compounds could be acted as both biodiesel and cetane improvers in a single product.

ศูนย์วิทยพัทยากร
จุฬาลงกรณ์มหาวิทยาลัย

Field of study. Petrochemistry and Polymerscience. Student's signature. *Chayaporn Pongthanomsak*
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ABBREVIATIONS

ASTM	=	American Society for Testing and Materials
API	=	American Petroleum Institute
CCI	=	Calculated Cetane Index
$^{13}\text{C-NMR}$	=	Carbon-13 Nuclear Magnetic Resonance
cSt	=	Centistroke
CFR	=	Cooperative Fuel Research Council
$^{\circ}\text{C}$	=	Degree Celcius
$^{\circ}\text{F}$	=	Degree Fahrenheit
$^1\text{H-NMR}$	=	Proton Nuclear Magnetic Resonance
ml	=	Milliliter
Sp.Gr.	=	Specific Gravity
rpm	=	Round per minute
cm^{-1}	=	Unit of wave number
%wt	=	Percent by weight
%yield	=	Percent yield
POME	=	Palm oil methyl ester
PON	=	Palm Oil Nitrate
MON	=	Methyl Oleate Nitrate
SOME	=	Soybean Oil Methyl Ester
SON	=	Soybean Oil Nitrate
EHN	=	2-Ethylhexyl Nitrate