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แมสสเปกโตรเมตรี

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จุฬาลงกรณ์มหาวิทยาลัย

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**DEVELOPMENT OF METHOD FOR ANALYZING ADDITIVES IN  
SYNTHETIC LUBRICANT BY MASS SPECTROMETRY TECHNIQUE**



**Mr. Pachen Chitchuechun**

**A Thesis Submitted in Partial Fulfillment of the Requirements**

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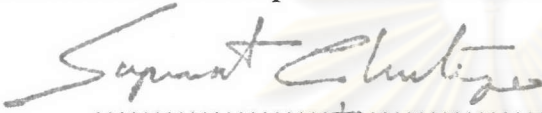
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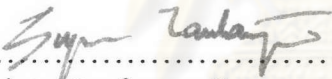
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พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

เผชิญ จิตเจือจุน : การพัฒนาวิธีการตรวจวิเคราะห์สารเคมีเพิ่มคุณภาพในน้ำมันหล่อลื่นสังเคราะห์โดยใช้เทคนิคแมสสเปกโทรเมตรี (DEVELOPMENT OF METHOD FOR ANALYZING ADDITIVES IN SYNTHETIC LUBRICANT BY MASS SPECTROMETRY TECHNIQUE.) อ.ที่ปรึกษา : ผศ.ดร.อมร เพชรสม, 262 หน้า ISBN 974-635-412-4

น้ำมันหล่อลื่นสังเคราะห์ (Exxon, Shell, BP, Castrol และ Mobil) มาสกัดสารเคมีเพิ่มคุณภาพในน้ำมันหล่อลื่นด้วยตัวทำละลายเมทานอล ได้สารสกัดเมทานอล นำสารสกัดที่ได้มาทำการแยกด้วยเทคนิคโครมาโทกราฟีโดยใช้ซิลิกาเจลเป็นตัวดูดซับ การหาสูตรโครงสร้างของสารเคมีเพิ่มคุณภาพอาศัยหลักฐานทางแมสสเปกโทรเมตรี สารเคมีเพิ่มคุณภาพที่ตรวจพบด้วยวิธีดังกล่าวคือสารประกอบ Phenolics, Alkylated diphenylamines, High molecular weight phenolics, Long chain esters, Diesters, Phthalate esters, Long chain carboxylic acids, Long chain alcohols. และ Phosphate esters นำหนักโมเลกุลของน้ำมันหล่อลื่นพื้นฐานถูกวิเคราะห์โดยใช้เทคนิค GPC-Evaporative Mass Detector



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ภาควิชา ..... สอนสาขาคณิตศาสตร์-โกลบอล  
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ลายมือชื่อนิสิต ..... *เจือจุน*  
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ลายมือชื่ออาจารย์ที่ปรึกษาร่วม ..... —

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KEY WORD: ADDITIVE/SYNTHETIC LUBRICANT/MASS SPECTROMETRY  
PACHEN CHITCHUECHUN : DEVELOPMENT OF METHOD FOR  
ANALYZING ADDITIVES IN SYNTHETIC LUBRICANT BY MASS  
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Additives in synthetic lubricants (Exxon, Shell, BP, Castrol and Mobil) were extracted with methanol. The crude MeOH extract was obtained. Column chromatography with a silica gel adsorbent was used for separating the additives in the crude MeOH extract. The structures of the additives were established by mass spectral evidence. By this method Phenolic compounds, Alkylated diphenylamines, High molecular weight phenolics, Long chain ester, Diester, Phthalate esters, Long chain carboxylic acids, Long chain alcohols, and Phosphate esters were identified. Molecular weight of base oil were analyzed by GPC-Evaporative Mass Detector technique.



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จุฬาลงกรณ์มหาวิทยาลัย

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ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

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## ABBREVIATIONS

ZnDTPs	=	Zinc dithiophosphates
°C	=	degree Celsius
Fig.	=	Figure
M <sub>w</sub>	=	Molecular weight
OCP	=	Olefin copolymers
VI	=	Viscosity Index
FT-IR	=	Fourier Transform-Infrared Spectrophotometer
GPC	=	Gel Permeable Chromatography
NMR	=	Nuclear Magnetic Resonance Spectrometer
GC-MS	=	Gas Chromatography Mass Spectrometer
GLC	=	Gas-Liquid Chromatography
EMD	=	Evaporative Mass Detector
TLC	=	Thin Layer Chromatography
CC	=	Column Chromatography
MeOH	=	Methanol
g	=	gram
V <sub>t</sub>	=	retention volume
ml	=	millilitre
ppm	=	part per million



Rt	=	Retention time
cm <sup>-1</sup>	=	Wavenumber unit
min	=	minute
s	=	strong (IR)
b	=	broad (IR)
m	=	medium (IR)
w	=	weak (IR)



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