

การนำกลับมาใช้ใหม่ของน้ำมันหล่อลื่นใช้แล้ว



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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาดมหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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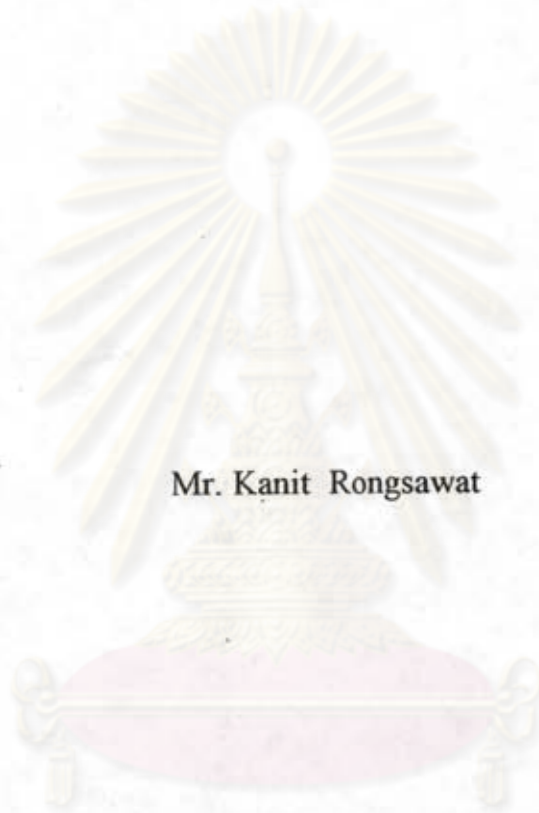
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RECLAIMING OF USED LUBRICATING OIL



Mr. Kanit Rongsawat

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย


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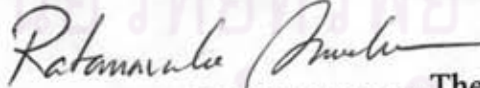
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พิมพ์ด้วยกระดาษพิมพ์ดีดที่วิทยาลัยพยาบาลตำรวจในกรอบสี่เหลี่ยมนี้เพียงฉบับเดียว

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การปรับปรุงคุณภาพของน้ำมันหล่อลื่นใช้แล้วให้มีสมบัติที่สามารถนำไปใช้ใหม่ได้ โดยผ่านกรรมวิธี 2 กรรมวิธี คือ กรรมวิธีที่หนึ่ง น้ำมันใช้แล้วผ่านกรรมวิธีบำบัดทางกายภาพและทางเคมี โดยใช้กรดซัลฟิวริกและฟูลเลอร์เอิร์ทในปริมาณ 10 เปอร์เซ็นต์โดยปริมาตรและ 10 เปอร์เซ็นต์โดยน้ำหนักตามลำดับเป็นสารฟอกสีและกำจัดองค์ประกอบต่าง ๆ ที่ไม่เสถียร ตลอดจนสิ่งเจือปนอื่น ๆ ที่ทำให้น้ำมันเสื่อมสภาพ กรรมวิธีที่สองเป็นวิธีบำบัดด้วยไฮโดรเจน ตัวเร่งปฏิกิริยาที่ใช้มี 3 ชนิด ได้แก่ ตัวเร่งปฏิกิริยาแรมนี่-นิกเกิล ตัวเร่งปฏิกิริยานิกเกิลออกไซด์โมลิบดีนัมไดออกไซด์บนตัวรองรับอลูมินาและตัวเร่งปฏิกิริยานิกเกิลออกไซด์ทั้งสแตนไดรอกไซด์บนตัวรองรับอลูมินา ตัวเร่งปฏิกิริยาแรมนี่-นิกเกิลมีราคาถูก สามารถใช้บำบัดน้ำมันได้ดีและสามารถแยกออกจากน้ำมันได้ง่าย ความเข้มข้นของตัวเร่งปฏิกิริยาและเวลาในการบำบัดที่เหมาะสมคือ 4 เปอร์เซ็นต์และ 6 ชั่วโมง ตามลำดับ น้ำมันที่ได้จากกรรมวิธีดังกล่าวมีคุณภาพที่ดี โดยเฉพาะอย่างยิ่งในการลดลงของปริมาณซัลเฟอร์และค่าดัชนีความหนืดของน้ำมันที่มีค่าเพิ่มขึ้น



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Used lubricating oil can be recycled by means of physical and chemical treatment method, and the catalytic hydrogenation method. The first route was to improve oil quality by using concentrated sulfuric acid (10% vol.), and fuller's earth (10% wt.). These substances were effective in decolorization and in removal of some undesirable materials. Another way in improving of oil properties was catalytic hydrogenation by using various catalysts such as Raney nickel, nickel oxide/molybdenum trioxide/alumina, and nickel oxide/tungsten trioxide/alumina catalysts. These catalysts showed their excellent activities in hydrogenation of used oil. Raney nickel was the one that gave more convenient in practice, not only in its reasonable cost in use, but also easily in separation. The optimum conditions in hydrogenation by using Raney nickel catalyst were at the catalyst concentration of 4% and 6 hours of reaction time.

Oil obtained from the process had good properties especially in lowering sulfur content and in increasing viscosity index.

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ABBREVIATIONS

AGMA	=	American Gear Manufacturers Association
BS	=	Bright Stock
Ca	=	Aromatic Carbon
Cp	=	Paraffinic Carbon
Cn	=	Naphthenic Carbon
cSt	=	Centistokes
DTA	=	Differential Thermal Analysis
ISO VG	=	International Standard Organization Viscosity Grade
N	=	Neutral
Ni/Mo	=	NiO/MoO ₃ /Al ₂ O ₃
Ni/W	=	NiO/WO ₃ /Al ₂ O ₃
PAHs	=	Polycyclic Aromatic Hydrocarbons
PCBs	=	Polychlorinated Biphenyls
PCTs	=	Polychlorinated Terphenyls
psi	=	pounds-force per square inch
psig	=	pounds-force per square inch gage
R-Ni	=	Raney Nickel
rpm	=	rounds per minute
SUS	=	Saybolt Universal Seconds
TG	=	Thermal Gravimetry
VI	=	Viscosity Index