

# OILY SOIL DETERGENCY WITH DIFFERENT SURFACTANT SYSTEMS

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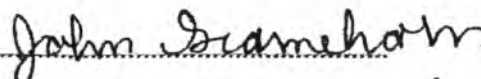
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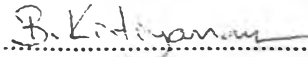
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**ABSTRACT**

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Oleic acid based nonionic gemini surfactants with 20 and 30 polyoxyethylene headgroups (FE-1020E, FE-1030E), methyl ester sulfonates, anionic surfactants (MES) with different alkyl chain lengths ( $C_{14}$ ,  $C_{16}$  and  $C_{18}$ ), and methyl ester ethoxylates, nonionic surfactants (MEE) with different ethylene oxide groups (8EO, 14EO and 18EO), were used in this oily detergency study. The aim of this research was to investigate the detergency performance of single and mixed surfactant systems by using palm oil as a model oily soil. According to the results, MEE-8EO showed the highest oil removal greater than 54% as compared to 38% for the commercial liquid detergency. Moreover, it was confirmed that the lowest oil re-deposition value corresponded to the highest oil removal. However, in the mixed surfactant systems (MEE/ MES, and Gemini/MES) were not suitable for use as a detergent solution when compared with the single surfactant systems, in terms of oil removal and re-deposition.

## บทคัดย่อ

ภควดี อภัยเทพพานิช : การกำจัดคราบน้ำมันภายใต้ระบบลดแรงตึงผิวต่างๆ (Oily Soil Detergency with Different Surfactant Systems) อ. ที่ปรึกษา: ศ.ดร. สุเมธ ชวเดช และ ศ.ดร. จอห์น เอฟ สกามีฮอร์น 110 หน้า

สารลดแรงตึงผิวเจมิโนชนิดไม่มีประจุ มีขนาดพอลิออกซิเอทิลีน 20 และ 30 หมู่, สารลดแรงตึงผิวเมทิลเอสเทอร์ซัลโฟเนท มีจำนวนคาร์บอน 14, 16 และ 18 คาร์บอน และสารลดแรงตึงผิวเมทิลเอสเทอร์เอทอกซิเลท มีหมู่เอทิลีนออกไซด์ 8, 14 และ 18 หมู่ ถูกนำมาศึกษาประสิทธิภาพในการกำจัดคราบน้ำมัน ดังนั้นวัตถุประสงค์หลักของงานวิจัยนี้ คือ ศึกษาประสิทธิภาพทางการชำระล้างของสารลดแรงตึงผิวทั้งระบบเดี่ยวและระบบผสม โดยใช้น้ำมันปาล์มเป็นต้นแบบของคราบน้ำมัน จากผลการทดลองแสดงให้เห็นว่า เมทิลเอสเทอร์เอทอกซิเลทที่มีหมู่เอทิลีนออกไซด์ 8 หมู่ มีประสิทธิภาพในการกำจัดคราบน้ำมันสูงสุด ยิ่งไปกว่านั้นสารลดแรงตึงผิวชนิดนี้ยังมีประสิทธิภาพดีที่สุดในการป้องกันการกลับมาเกาะใหม่ของคราบน้ำมันบนผิวผ้า และเมื่อทำการเปรียบเทียบประสิทธิภาพของสารลดแรงตึงผิวระหว่างระบบเดี่ยวและระบบผสม ในแง่ของการกำจัดและป้องกันการกลับมาเกาะใหม่ของคราบน้ำมัน พบว่าการใช้สารลดแรงตึงผิวระบบเดี่ยวยังมีประสิทธิภาพดีกว่า

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## ABBREVIATIONS

FE-1020E	Oleic acid based nonionic gemini surfactants with 20 polyoxyethylene headgroups
FE-1030E	Oleic acid based nonionic gemini surfactants with 30 polyoxyethylene headgroups
SME	Alphasulfonated methyl ester
MES	Methyl ester sulfonates anionic surfactants
MES-14C	Methyl ester sulfonates anionic surfactants with 14 carbon atoms in alkyl chain length
MES-16C	Methyl ester sulfonates anionic surfactants with 16 carbon atoms in alkyl chain length
MES-18C	Methyl ester sulfonates anionic surfactants with 18 carbon atoms in alkyl chain length
MEE	Methyl ester ethoxylates nonionic surfactants
MEE-8EO	Methyl ester ethoxylates nonionic surfactants with 8 polyoxyethylene headgroups
MEE-14EO	Methyl ester ethoxylates nonionic surfactants with 14 polyoxyethylene headgroups
MEE-18EO	Methyl ester ethoxylates nonionic surfactants with 18 polyoxyethylene headgroups
LAS	Linear alkylbenzene sulfonate
EO	alcohol ethoxylates
C <sub>20</sub>	Concentration which the surface (or interfacial) tension of the pure solvent has been decreased about 20 dyn/cm by adsorption of the surfactant
C	Carbon
HLB	Hydrophilic-lypophilic balance
IFT	Interfacial tension (mN/m)
O/W	Oil-in-water microemulsion
W/O	Water-in-oil microemulsion

**ABBREVIATIONS (Cont.)**

PIT	Phase inversion temperature
CMC	Critical Micellization Concentrations



**LIST OF SYMBOLS**

$\theta$	Contact angle (degree)
$\rho$	Density (g/mL)
$d$	Diameter (mm)
$\gamma_{OB}$	Interfacial tension at the liquid soil-bath interface (mN/m)
$\gamma_{OS}$	Interfacial tension at the liquid soil-substrate interface (mN/m)
$\gamma_{SB}$	Interfacial tension at the substrate-bath interface (mN/m)