

**NEW HYBRID BIOFUEL USING PALM OIL/DIESEL ETHANOL BASED
REVERSE MICELLE MICROEMULSION**

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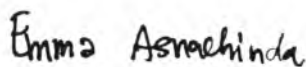
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ABSTRACT

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Biofuels are one of renewable fuels used in many vehicles and industries. Vegetable oils which are green and non-toxic nature derived from agricultural feedstock, have been used for biofuel's production for many years. Due to their high viscosity, the direct use of vegetable oil in diesel engines can lead to engine durability problems. Reverse micelle microemulsion as an alternative biofuel production has been intensively studied for formulating biofuel with desirable viscosity. This work aims to formulate microemulsion biofuels of palm oil/diesel blend and refined bleached deodorized palm oil (RBDPO)/diesel blend mixed with ethanol used as a viscosity reducer using three nonionic surfactant derived from renewable based feedstock (methyl oleate, Span 80 and palm oil methyl ester (PME)) and two cosurfactants (1-octanol and 2-ethyl-1-hexanol). Additionally, their fuel properties (i.e. kinematic viscosity, droplet size, turbidity, density and heat of combustion) were investigated and compared with standard of diesel No.2. The effects of nonionic surfactant and cosurfactant structures had no significant impact on phase behaviors of the microemulsion biofuels. For the results of kinematic viscosity measurements, microemulsion biofuels had higher kinematic viscosity than that of standard of No. 2 diesel. The formulation of microemulsion biofuel depends on raw material selection. The fuel properties of microemulsion biofuel can be desired and adjusted by microemulsion formulation with using a renewable based surfactant in the system offering attractive options environmentally for future biofuel production.

บทคัดย่อ

ยชาติ มานะผาติ : เชื้อเพลิงชีวภาพผสมใหม่ที่ผลิตด้วยวิธีการรีเวิร์สไมเซลล์ไมโครอิมัลชัน โดยใช้น้ำมันปาล์ม น้ำมันดีเซลและเอทานอล (New Hybrid Biofuel using Palm oil/Diesel Ethanol based Reverse Micelle Microemulsion) อ. ที่ปรึกษา : ดร.อัมพิกา เจริญแสง, ศาตราจารย์ดร. เดวิด เอ สะบาตินี 78 หน้า

เชื้อเพลิงชีวภาพเป็นหนึ่งในเชื้อเพลิงทดแทนที่ในใช้ในยานพาหนะและอุตสาหกรรม โดยน้ำมันพืชเป็นผลิตภัณฑ์ที่มาจากเกษตรซึ่งมีความสะอาด ปราศจากมลพิษ มีการนำมาผลิตเป็นเชื้อเพลิงชีวภาพมาหลายปี เนื่องจากการใช้น้ำมันพืชเป็นเชื้อเพลิงในเครื่องยนต์ดีเซลนั้นส่งผลกับเครื่องยนต์และทำให้ประสิทธิภาพของเครื่องยนต์ดีเซลนั้นลดลงเนื่องจากความหนืดของน้ำมันพืชมีค่าที่สูง วิธีการผลิตเชื้อเพลิงชีวภาพด้วยวิธีการไมโครอิมัลชันได้มีการศึกษาอย่างมากเพื่อให้ได้เชื้อเพลิงชีวภาพที่มีความหนืดที่เหมาะสม งานวิจัยนี้มีวัตถุประสงค์เพื่อผสมเชื้อเพลิงชีวภาพโดยใช้น้ำมันปาล์มผสมกับน้ำมันดีเซล และน้ำมันปาล์มบริสุทธิ์ที่ยังไม่แยกไขผสมกับน้ำมันดีเซลซึ่งมีเอทานอลเป็นสารช่วยลดความหนืดของเชื้อเพลิง โดยใช้สารลดแรงตึงผิวชนิดไม่มีขั้ว 3 ชนิด ได้แก่ เมทิลโอติเอค, สเปน 80 และ กรดไขมันของเมทิลเอสเทอร์ซึ่งผลิตจากน้ำมันปาล์ม และผสมกับสารลดแรงตึงผิวร่วม ได้แก่ ออกทานอลและเอทิลเฮกซานอล โดยผสมสารทั้งหมดให้เป็นเนื้อเดียวกันเพื่อศึกษาพฤติกรรมวิทยาของเชื้อเพลิงชีวภาพ นอกจากนี้ได้ศึกษาคูแอมบิตี ได้แก่ ความหนืดจลน์ ขนาดของหยดไมโครอิมัลชัน ความขุ่น ความหนาแน่น ค่าความร้อนและทำการเปรียบเทียบตามมาตรฐานของเชื้อเพลิงดีเซลประเภท 2 ผลของโครงสร้างของสารลดแรงตึงผิวชนิดไม่มีประจุและสารลดแรงตึงผิวร่วมไม่มีผลต่อพฤติกรรมการละลายที่เป็นเนื้อเดียวกันของเชื้อเพลิงชีวภาพ ส่วนผลการศึกษาความหนืดจลน์พบว่าเชื้อเพลิงชีวภาพจากไมโครอิมัลชันมีความหนืดสูงกว่ามาตรฐานของเชื้อเพลิงดีเซลประเภท 2 โดยสูตรของเชื้อเพลิงชีวภาพที่ผลิตด้วยวิธีการไมโครอิมัลชันขึ้นกับการเลือกสารที่นำมาผสม และคุณสมบัติของเชื้อเพลิงชีวภาพถูกปรับปรุงสูตรโดยใช้สารลดแรงตึงผิวเพื่อเป็นทางเลือกในการผลิตเชื้อเพลิงชีวภาพที่เป็นมิตรต่อสิ่งแวดล้อมต่อไปในอนาคต

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TABLE OF CONTENTS

	PAGE
Title Page	i
Abstract (in English)	iii
Abstract (in Thai)	iv
Acknowledgements	v
Table of Contents	vi
List of Tables	x
List of Figures	xiii
CHAPTER	
I INTRODUCTION	1
II THEORETICAL BACKGROUND AND LITERATURE REVIEW	3
2.1 Vegetable Oil	3
2.1.1 Palm Oil	4
2.1.2 Refined Bleached Deodorized Palm Oil (RBDPO)	5
2.2 Diesel	5
2.2.1 Types of Diesel	6
2.2.2 Standard Diesel Fuels	6
2.3 Biofuel	7
2.3.1 Demand & Supply of Biodiesel	7
2.4 Methods for Vegetable Oil Viscosity Reduction	8
2.4.1 Vegetable Oil/Diesel Blends	8
2.4.2 Pyrolysis	8
2.4.3 Transesterification	9
2.4.4 Microemulsion	9
2.5 Surfactant	10
2.6 Fish Diagram	11
2.7 Pseudo-ternary Phase Diagram	12

CHAPTER	PAGE
2.8 Fuel Properties	13
2.8.1 Kinematic Viscosity	13
2.8.2 Droplet Size	14
2.8.3 Cloud Point	15
2.8.4 Gross Heat of Combustion	15
2.9 Literature Review	17
2.10 Objective	20
2.11 Scope of Research	21
III EXPERIMENTAL	22
3.1 Materials	22
3.1.1 Surfactant	22
3.1.2 Cosurfactant	23
3.1.3 Palm Oil, RBDPO and Diesel	24
3.1.4 Ethanol	25
3.2 Experimental Methods	25
3.2.1 Microemulsion Preparation	25
3.2.2 Pseudo-ternary Phase Diagram	26
3.2.3 Fuel Properties Determination	26
IV RESULTS AND DISCUSSION	28
4.1 Phase Behavior Study	28
4.1.1 Effects of Surfactant's Structures	29
4.1.2 Effects of Cosurfactant's Structures	31
4.2 Effects of Types of Palm Oil	34
4.2.1 Amount of Surfactant Required to Formulate Single Phase Microemulsion Study	35

CHAPTER	PAGE
4.2.2 Amount of Surfactant with the Different Types of Cosurfactant Required to Formulate Single Phase Microemulsion Study	37
4.3 Fuel Properties Determination	39
4.3.1 Kinematic Viscosity Measurement	41
4.3.2 Droplet Size and Size Distribution	44
4.3.3 Turbidity	48
4.3.4 Cloud Point	52
4.3.5 Density	53
4.3.6 Heat of Combustion	53
4.4 Summarized Results	53
 V CONCLUSIONS AND RECOMMENDATIONS	 57
5.1 Conclusions	57
5.2 Recommendations	58
 REFERENCES	 59
 APPENDICES	 64
Appendix A Supplemental Materials for Phase Diagram	64
Appendix B Supplemental Materials for Effect of Oil Types on Amount of Surfactant to Formulate Single Phase Microemulsion Study	67
Appendix C Supplemental Materials for Viscosity Study	68
Appendix D Supplemental Materials for Microemulsion Droplet Size Study	71
Appendix E Supplemental Materials for Density Study	75
Appendix F HLB Calculation of Nonionic Surfactants	76

CHAPTER

PAGE

CURRICULUM VITAE

78

LIST OF TABLES

TABLE		PAGE
2.1	Properties and heat of combustion of vegetable oils and diesel	3
2.2	Fatty acid composition of palm oil	5
2.3	The standard properties of No.2 diesel and biodiesel fuel	16
3.1	Properties of the studied surfactants and cosurfactants	24
3.2	Fatty acid compositions of palm oil and RBDPO	24
4.1	Fatty acid compositions of palm oil and RBDPO	36
4.2	Composition of microemulsion biofuels in palm oil - olein system with 20 vol.% of ethanol used for fuel property determination	40
4.3	Composition of microemulsion biofuels in RBDPO's system with 20 vol.% of ethanol used for studied fuel properties determination	40
4.4	Comparision of the droplet size and distribution of microemulsion biofuels with palm oil/diesel blend (1:1 v/v) at room temperature ($25\pm 2^{\circ}\text{C}$)	45
4.5	Comparison the time that the sample of Span 80's systems with palm oil/diesel blend (1:1 v/v) and 20 vol.% ethanol was placed before measured droplet size and distribution at $25\pm 2^{\circ}\text{C}$	46
4.6	Comparing relation of droplet size with kinematic viscosity of palm oil/diesel blend (1:1 v/v) and 20 vol.% ethanol with surfactant/cosurfactant at molar ratio of 1:8 at $25\pm 2^{\circ}\text{C}$	48
4.7	Cloud point, density and heat of combustion of microemulsion biofuels compared with diesel and palm oil/diesel blend and 20 vol.% of ethanol	52

TABLE	PAGE
A1 Methyl oleate/1-octanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v)	64
A2 Methyl oleate/2-ethyl-1-hexanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v)	64
A3 Span 80/1-octanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v)	65
A4 Span 80/2-ethyl-1-hexanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v)	65
A5 Palm oil methyl ester (PME)/1-octanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v)	66
A6 Palm oil methyl ester (PME)/1-octanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v)	66
B1 Surfactant/cosurfactant 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol	67
B2 Surfactant/cosurfactant 1:8 mole ratio, RBDPO/diesel 1:1 (v/v) with 20 vol.% of ethanol	67
C1 Time for measured kinematic viscosity of microemulsion biofuels, surfactant/cosurfactant 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol	69
C2 Kinematic viscosity of microemulsion biofuels, surfactant/cosurfactant 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol	69
C3 Time for measured kinematic viscosity of microemulsion biofuels, surfactant/cosurfactant 1:8 mole ratio, RBDPO/diesel 1:1 (v/v) with 20 vol.% of ethanol	70
C4 Kinematic viscosity of microemulsion biofuels, surfactant/cosurfactant 1:8 mole ratio, RBDPO/diesel 1:1 (v/v) with 20 vol.% of ethanol	70

TABLE	PAGE
E1 Density of microemulsion biofuels, surfactant/cosurfactant 1:8 mole ratio, RBDPO/diesel 1:1 (v/v) with 20 vol.% of ethanol at room temperature (25°C)	75
F1 HLB_{AVG} calculation of mixed products	77

LIST OF FIGURES

FIGURE	PAGE
2.1 Palm fruits.	4
2.2 Demand and supply of biodiesel in the future.	8
2.3 Transesterification reaction between triglyceride and alcohol.	9
2.4 Surfactant's structure.	10
2.5 (a) normal micelle and (b) reverse micelle.	10
2.6 Structure of Span 80.	11
2.7 Fish diagram shows phase behavior with surfactant concentration and formulation hydrophobicity by salinity.	12
2.8 A sample of pseudo-ternary phase diagram.	13
2.9 Cannon-Fenske routine viscometer.	14
2.10 Schematic diagram of bomb calorimeter.	15
2.11 Comparison of the systems of C16-18 4PO-2EO-carboxylate at surfactant/1-Octanol ratio of 1-16 at 25 °C where the oil is canola oil/diesel ratio at 0-100, 25-75, 50-50, 75-25, and 100-0.	17
2.12 Structure of Brij 30.	19
2.13 Structure of AOT.	19
3.1 Structure of surfactants.	23
3.2 Structure of cosurfactants.	23
3.3 Experimental methods flow diagram.	25
4.1 The pseudo ternary phase diagram of microemulsion biofuel using methyl oleate/1-octanol as surfactants at 1:8 molar ratio with palm oil/diesel blend at a ratio of 1:1 (v/v).	28

FIGURE	PAGE
4.2 Pseudo ternary phase diagram of microemulsion biofuel systems using methyl oleate, Span 80 and PME as a surfactant at surfactant/1-octanol molar ratio of 1:8 with a palm oil/diesel at a ratio of 1:1 (v/v) at room temperature ($25\pm 2^\circ\text{C}$).	29
4.3 Pseudo ternary phase diagram of microemulsion biofuel systems using methyl oleate, Span 80 and PME as a surfactant at surfactant/2-Ethyl-1-hexanol molar ratio of 1:8 with a palm oil/diesel at ratio of 1:1 (v/v) at room temperature ($25\pm 2^\circ\text{C}$).	30
4.4 Pseudo ternary phase diagram of methyl oleate/1-octanol and methyl oleate/2-ethyl-1-hexanol at surfactant/cosurfactant molar ratio of 1:8 with a palm oil/diesel at ratio of 1:1 (v/v) at room temperature ($25\pm 2^\circ\text{C}$).	32
4.5 Ternary phase diagram of Span 80/1-octanol and Span 80/2-ethyl-1-hexanol at surfactant/cosurfactant molar ratio of 1:8 with a palm oil/diesel at ratio of 1:1 (v/v) at room temperature ($25\pm 2^\circ\text{C}$).	33
4.6 Ternary phase diagram of PME/1-octanol and PME/2-ethyl-1-hexanol at surfactant/cosurfactant molar ratio of 1:8 with a palm oil/diesel at ratio of 1:1 (v/v) at room temperature ($25\pm 2^\circ\text{C}$).	34
4.7 Minimum total surfactant concentration (%) to formulate single phase microemulsion versus types of surfactant and 1-octanol as a cosurfactant at a molar ratio of 1:8 compared with a palm oil/diesel and RBDPO/diesel blends at a ratio of 1:1 (v/v) with 20 vol.% of ethanol at room temperature ($25\pm 2^\circ\text{C}$).	35

FIGURE	PAGE
4.8 Minimum total surfactant concentration (%) to formulate single phase microemulsion versus types of surfactant and 2-ethyl-1-hexanol as a cosurfactant at a molar ratio of 1:8 compared with a palm oil/diesel and RBDPO/diesel blends at a ratio of 1:1 (v/v) with 20 vol.% of ethanol at room temperature ($25\pm 2^{\circ}\text{C}$).	36
4.9 Minimum total surfactant concentration (%) to formulate single phase microemulsion of methyl oleate systems versus types of cosurfactant at a molar ratio of 1:8 with a palm oil/diesel blends at a ratio of 1:1 (v/v) and 20 vol.% of ethanol at room temperature ($25\pm 2^{\circ}\text{C}$).	37
4.10 Minimum total surfactant concentration (%) to formulate single phase microemulsion of Span 80 systems versus types of cosurfactant at a molar ratio of 1:8 with a palm oil/diesel blends at a ratio of 1:1 (v/v) and 20 vol.% of ethanol at room temperature ($25\pm 2^{\circ}\text{C}$).	38
4.11 Minimum total surfactant concentration (%) to formulate single phase microemulsion of Span 80 systems versus types of cosurfactant at a molar ratio of 1:8 with a palm oil/diesel blends at a ratio of 1:1 (v/v) and 20 vol.% of ethanol at room temperature ($25\pm 2^{\circ}\text{C}$).	39
4.12 Kinematic viscosity (cSt) at 40°C versus types of surfactant and 1-octanol as a cosurfactant at a molar ratio of 1:8 compared with a palm oil/diesel and RBDPO/diesel blends at a ratio of 1:1 (v/v) with 20 vol.% of ethanol.	41

FIGURE	PAGE
4.13 Kinematic viscosity (cSt) at 40°C versus types of surfactant and 2-ethyl-1-hexanol as a cosurfactant at a molar ratio of 1:8 compared with a palm oil/diesel and RBDPO/diesel blends at a ratio of 1:1 (v/v) with 20 vol.% of ethanol.	42
4.14 Kinematic viscosity (cSt) at 40°C versus types of surfactant and cosurfactant at a molar ratio of 1:8 with a palm oil/diesel blends at a ratio of 1:1 (v/v) and 20 vol.% of ethanol.	43
4.15 Kinematic viscosity (cSt) at 40°C versus types of surfactant and cosurfactant at a molar ratio of 1:8 with a RBDPO/diesel blends at a ratio of 1:1 (v/v) and 20 vol.% of ethanol.	44
4.16 Phase behavior and turbidity varying surfactant concentration of methyl oleate/1-octanol with a palm oil/diesel blends at a ratio of 1:1 (v/v) and ethanol.	49
4.17 Phase behavior and turbidity compasion of Span 80/1-octanol system in RBDPO/diesel blend and palm oil/diesel blend at a ratio of 1:1 (v/v) with ethanol.	50
4.18 Precipitates of microemulsion biofuels within RBDPO's system after held at room temperature (25±2°C) for 48 hours.	51
4.19 Turbidity of all of palm oil/diesel blend with 20 vol.% of ethanol systems after held at room temperature (25±2°C) for 48 hours.	51
D1 Droplet size and size distribution of methyl oleate/1-octanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol.	71
D2 Droplet size and size distribution of methyl oleate/2-ethyl-1-hexanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol.	71

FIGURE	PAGE
D3 Droplet size and size distribution of Span 80/1-octanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol.	72
D4 Droplet size and size distribution of Span 80/2-ethyl-1-hexanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol.	72
D5 Droplet size and size distribution of palm oil methyl ester (PME)/1-octanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol.	73
D6 Droplet size and size distribution of palm oil methyl ester (PME)/2-ethyl-1-hexanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol.	73
D7 Droplet size and size distribution of Span 80/1-octanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol (measured after prepared immediately).	74
D8 Droplet size and size distribution of Span 80/2-ethyl-1-hexanol 1:8 mole ratio, palm oil/diesel 1:1 (v/v) with 20 vol.% of ethanol (measured after prepared immediately).	74