

**MICROEMULSION FORMATION BY MIXED ANIONIC AND
CATIONIC SURFACTANTS**



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มณิสรา อุบลสุข: การเกิดไมโครอิมัลชันโดยการผสมระหว่างสารลดแรงตึงผิวชนิดแคทไอออนและชนิดแอนไอออน (Microemulsion Formation by Mixed Anionic and Cationic Surfactants) อ.ที่ปรึกษา : ศ.เดวิด เอ ซาบาตินิ และ ดร.บุญยรัชต์ กิติยานันท์ 66 หน้า ISBN 974-17-2286-9

สารผสมระหว่างสารลดแรงตึงผิวชนิดแคทไอออนและชนิดแอนไอออนมีการส่งเสริมการทำงานร่วมกันแต่มีข้อเสียคือโดยทั่วไปต้องเติมแอลกอฮอล์ในการเกิดไมโครอิมัลชันโดยการผสมระหว่างสารลดแรงตึงผิวชนิดแคทไอออน และชนิดแอนไอออนเพื่อป้องกันการตกตะกอนในงานวิจัยนี้ศึกษาบทบาทรูปร่างโมเลกุลของสารลดแรงตึงผิวในการผสมระหว่างสารลดแรงตึงผิวชนิดแคทไอออนและชนิดแอนไอออนโดยปราศจากแอลกอฮอล์ และเนื่องจากการผสมระหว่างสารลดแรงตึงผิวชนิดแคทไอออนและชนิดแอนไอออนตกตะกอนง่าย ดังนั้นจึงได้ทำการศึกษาแผนภาพแสดงการเปลี่ยนแปลงสถานะของตะกอน ลักษณะของไมโครอิมัลชันสำหรับระบบ SDS-DTAB, SDS-CTAB, SDS-DDAB, SDS-DTDACl, DTAB-AOT, DTAB-AMA, DTAB-AAY; และ DTAB-8390 ถูกศึกษาโดยใช้ปริมาณเท่ากันของน้ำและ hexane ที่อุณหภูมิ 25 องศาเซลเซียส สารผสมระหว่างสารลดแรงตึงผิวชนิดแคทไอออนและแอนไอออนซึ่งมีรูปร่างโมเลกุลแตกต่างกันสามารถป้องกันการตกตะกอนและทำให้เกิดไมโครอิมัลชันโดยปราศจากแอลกอฮอล์ได้ดังสมมติฐาน นอกจากนี้สัดส่วนของสารลดแรงตึงผิวชนิดแคทไอออนและชนิดแอนไอออนเข้าใกล้หนึ่งสำหรับสารลดแรงตึงผิวชนิดโมโนวาเลนซ์ เมื่อใช้น้ำมันที่มีความเป็นไฮโดรโฟบิกเพิ่มขึ้น จาก TCE เป็น hexane เป็น hexadecane มิดเดิลเฟสไมโครอิมัลชันสำหรับการผสมระหว่างสารลดแรงตึงผิวชนิดแคทไอออนและชนิดแอนไอออนชนิดไดวาเลนซ์และโมโนวาเลนซ์เกิดที่สัดส่วน 2:1 ของสารลดแรงตึงผิวชนิดแคทไอออนและชนิดแอนไอออน ซึ่งจากการศึกษานี้สามารถนำไปประยุกต์ใช้ในการเกิดไมโครอิมัลชันโดยการเลือกใช้รูปร่างของสารลดแรงตึงผิวให้เหมาะสม

ABSTRACT

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Anionic and cationic surfactant mixtures typically show synergistic behavior. For microemulsion formation, alcohol is normally added to the system as a cosurfactant in anionic and cationic surfactant mixtures to avoid precipitation or formation of other rigid surfactant structures. This research investigated the role of surfactant structure in formulating alcohol-free anionic and cationic microemulsions. Since anionic and cationic surfactant mixtures are easily precipitated, the precipitation phase diagram was also investigated. Microemulsion phase behavior was studied for SDS-DTAB, SDS-CTAB, SDS-DDAB, SDS-DTDACl, DTAB-AOT, DTAB-AMA, DTAB-AAY, and DTAB-Dowfax8390 systems in equal volumes of water and hexane at 25°C. As expected, anionic and cationic surfactant mixtures having asymmetric tails successfully avoided liquid crystal formation and formed an alcohol-free middle phase microemulsions. Furthermore, the molar ratio of cationic to anionic surfactant approached one for monovalent surfactants with increasing oil hydrophobicity (i.e. from TCE to hexane to hexadecane). For a mixed monovalent cationic and divalent anionic surfactant, the middle phase microemulsion was formed at a 2:1 mole ratio of cationic:anionic surfactant. This knowledge will be helpful in formulating microemulsions by manipulation of the surfactant structure of mixed anionic and cationic surfactants.

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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	ix
List of Figures	xi
CHAPTER	
I INTRODUCTION	1
II BACKGROUND AND LITERATURE SURVEY	3
2.1 Surfactants	3
2.2 Anionic and Cationic Surfactant Mixtures	4
2.3 Microemulsion Systems	10
2.4 Interfacial Tension	11
2.5 Solubilization Parameter	12
2.6 Microemulsion with Anionic and Cationic Surfactant Mixtures	14
III EXPERIMENTAL	17
3.1 Materials	17
3.2 Experimental	19
3.2.1 Precipitation Boundary	19
3.2.2 Microemulsion Formation	19
3.2.3 Measurement of Microemulsion Interfacial Tension	20

CHAPTER		PAGE
IV	RESULTS AND DISCUSSION	21
	4.1 Precipitation of Anionic and Cationic Surfactant Mixtures	21
	4.1.1 Precipitation Phase Boundaries	21
	4.1.2 Effect of Electrolyte	24
	4.2 Effect of Cationic Surfactant Structures in Microemulsion Formation by Mixed Surfactants.	26
	4.2.1 Microemulsion Phase Behavior of SDS-DTAB System	26
	4.2.2 Microemulsion Phase Behavior of SDS-CTAB System	29
	4.2.3 Microemulsion Phase Behavior of SDS-DDAB System	32
	4.2.4 Microemulsion Phase Behavior of SDS- DTDACl System	35
	4.3 Effect of Anionic Surfactant Structures in Microemulsion Formation by Mixed Surfactants	37
	4.3.1 Microemulsion Phase Behavior of DTAB-AOT System	37
	4.3.2 Microemulsion Phase Behavior of DTAB-AMA System	38
	4.3.3 Microemulsion Phase Behavior of DTAB-AA Y System	40
	4.3.4 Microemulsion Phase Behavior of DTAB- Dowfax8390 System	41
	4.4 Effect of Hydrophobicity of Oils in Anionic and Cationic Surfactant Mixture Microemulsion Formation	43
V	CONCLUSIONS AND RECOMMENDATIONS	45
	5.1 Conclusions	45

	PAGE
5.2 Recommendations	46
REFERENCES	47
APPENDICES	50
Appendix A	50
Appendix B	51
Appendix C	64
CURRICULUM VITAE	66

LIST OF TABLES

TABLE		PAGE
3.1	Chemical structure and molecular weight of the studied surfactants	18
3.2	Properties and chemical structure of the studied oils	19
4.1	Calculated crystallite sizes of the studied catalysts	29
A	Precipitation phase behavior at different cationic surfactant concentration ratio	46
B-1a	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of SDS-DTAB in hexane	47
B-1b	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of SDS-CTAB in hexane	48
B-1c	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of SDS-DDAB in hexane	49
B-1d	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of SDS-DTDACl in hexane	50
B-2a	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of DTAB-AOT in hexane	51
B-2b	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of DTAB-AMA in hexane	52
B-2c	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of DTAB-AAAY in hexane	53

TABLE		PAGE
B-2d	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of DTAB-Dowfax8390 in hexane	54
B-3a	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of DTAB-AAY in hexadecane	55
B-3b	Winsor type of microemulsion and phase volume at different cationic surfactant concentration ratio for microemulsion of DTAB-AAY in TCE	56
C	The interfacial tension between excess phase and microemulsion phase for varying cationic surfactant mole ratio scan at 0.05 M total surfactant concentration	60

LIST OF FIGURES

FIGURE		PAGE
2.1	Structure of surfactant molecule.	3
2.2	Schematic of the precipitation phase diagram in a mixture of an anionic and a cationic surfactant.	4
2.3	Schematic of the equilibrium in a micellar system containing anionic surfactant and cationic surfactant which is forming precipitate.	5
2.4	Schematic illustration of the progression of microemulsion phase equilibrium and interfacial tension from equal volume of an aqueous phase and an oil phase with varying variables.	11
2.5	Solubilization parameter as a function of salinity.	13
2.6	Schematic illustrating the conceptual of anionic and cationic surfactants interactions.	
4.1	Precipitation Phase Boundaries of no added salt systems: SDS-DPCl, SDS-CTAB, and SDS- DTDACl.	22
4.2	Comparison between precipitation phase diagrams of SDS-DPCL with no added salt and 0.15 M NaCl.	25
4.3	The interfacial tension between excess phase and microemulsion phase of SDS-DTAB system as a function of cationic surfactant fraction.	28
4.4	Volume fractions of SDS-CTAB system as a function of cationic surfactant fraction.	31
4.5	Oil and water solubilization parameters of SDS-CTAB system as a function of cationic surfactant fraction.	32
4.6	The interfacial tension between excess phase and microemulsion phase of SDS-DDAB system as a function of cationic surfactant fraction.	34

FIGURE		PAGE
4.7	The interfacial tension between excess phase and microemulsion phase of SDS-DTDACl system as a function of cationic surfactant fraction.	36
4.8	The interfacial tension between excess phase and microemulsion phase of DTAB-AOT system as a function of cationic surfactant fraction.	39
4.9	The interfacial tension between excess phase and microemulsion phase of DTAB-AMA system as a function of cationic surfactant fraction.	39
4.10	The interfacial tension between excess phase and microemulsion phase of DTAB-AAV system as function of cationic surfactant fraction.	40
4.11	The interfacial tension between excess phase and microemulsion phase of DTAB-Dowfax8390 system as function of cationic surfactant fraction.	42
4.12	Comparison the IFT values of each system for DTAB with various anionic surfactants, AOT, AAV, AMA, SDS, and Dowfax8390.	42
4.13	Effect of hydrophobicity of oils on DTAB-AAV systems.	44