

การใช้สารลดแรงตึงผิวเอกซิลเลตในอิมัลชันโคพอลิเมอร์เซชัน
ของเมทิลเมทาคริเลต-บิวทิลอะคริเลต

นางสาวหทัยรัตน์ อึ้งถาวรดี

ศูนย์วิทยทรัพยากร

จุฬาลงกรณ์มหาวิทยาลัย

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

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UTILIZATION OF ETHOXYLATE SURFACTANTS IN EMULSION
COPOLYMERIZATION OF METHYL METHACRYLATE-BUTYL ACRYLATE



Miss Hathairat Ungtaworndee

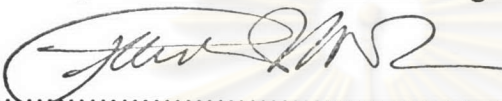
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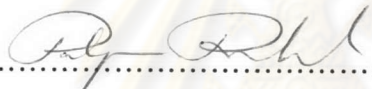
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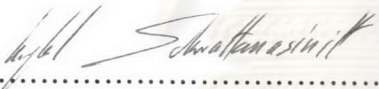
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การทดลองนี้ได้ศึกษาผลของการใช้สารลดแรงตึงผิวเอทอกซิลเลต 4 ชนิด (โนนิลฟีนอลเอทอกซิลเลต, โนนิลฟีนอลเอทอกซิลเลตซัลเฟต, แพนตีแอลกอฮอล์เอทอกซิลเลต และ แพนตีแอลกอฮอล์เอทอกซิลเลตซัลเฟต) ในอิมัลชันโคพอลิเมอร์ของเมทิลเมทาคริเลต-บิวทิลอะคริเลต สารลดแรงตึงผิวประเภทโนนิลฟีนอลถูกห้ามใช้ในประเทศแถบทวีปยุโรป เนื่องจากในกระบวนการย่อยสลายทางธรรมชาติของมันทำให้เกิดสารที่เป็นอันตรายต่อสิ่งมีชีวิตในน้ำ วัตถุประสงค์หลักของงานวิจัยนี้คือเพื่อศึกษาประสิทธิภาพของสารลดแรงตึงผิวประเภทแพนตีแอลกอฮอล์ซึ่งไม่มีความเป็นพิษต่อสิ่งแวดล้อมเพื่อนำมาใช้ทดแทนที่สารลดแรงตึงผิวประเภทโนนิลฟีนอล ผลการศึกษาพบว่าของสารลดแรงตึงผิวประเภทโนนิลฟีนอลและสารลดแรงตึงผิวประเภทแพนตีแอลกอฮอล์มีประสิทธิภาพไม่ต่างกัน แต่ประสิทธิภาพของสารลดแรงตึงผิวเอทอกซิลเลตชนิดไม่มีประจุและชนิดประจุลบต่างกัน โดยเฉพาะอย่างยิ่งที่เกี่ยวข้องกับความสามารถในการเกิดอิมัลชันของมอนอเมอร์ ลาเทกซ์ที่ได้จากการใช้สารลดแรงตึงผิวเอทอกซิลเลตซัลเฟตที่มีประจุลบจะมีเสถียรภาพและสามารถเกิดฟิล์มได้ดีกว่า จากการศึกษาความสัมพันธ์ระหว่างความเข้มข้นของสารลดแรงตึงผิวที่ใช้กับขนาดของอนุภาคของลาเทกซ์พบว่าเมื่อความเข้มข้นของสารลดแรงตึงผิวเพิ่มขึ้น ทำให้ขนาดของอนุภาคของลาเทกซ์เล็กลง ความหนืดและสมบัติโดยทั่วไปของลาเทกซ์เพิ่มขึ้น

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จุฬาลงกรณ์มหาวิทยาลัย

สาขาวิชา.....ปิโตรเคมีและวิทยาศาสตร์พอลิเมอร์.....ลายมือชื่อนิสิต.....หทัยรัตน์ อึ้งถาวรดี

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KEY WORD: ETHOXYLATE SURFACTANT/ EMULSION

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HATHAIRAT UNGTAWORNDÉE: UTILIZATION OF ETHOXYLATE SURFACTANTS IN EMULSION COPOLYMERIZATION OF METHYL METHACRYLATE-BUTYL ACRYLATE

THESIS ADVISOR: AST. PROF. MONGKOL SUKWATTANASINITT, Ph.D., 110pp. ISBN: 974-17-6034-5

This thesis focuses on the study of emulsion copolymerization of methyl methacrylate-butyl acrylate using four types of ethoxylate surfactants: nonylphenol ethoxylates, nonylphenol ethoxylate sulfates, fatty alcohol ethoxylates and fatty alcohol ethoxylate sulfates. The conventional nonylphenol type surfactants are currently banned in European countries because some of their degradation intermediates are toxic. The main objective of this research work was to evaluate the effectiveness of the more environmentally friendly fatty alcohol surfactants to be used in place of the nonylphenol surfactants. The study showed that there was no significant difference in their effectiveness between the nonylphenol and fatty alcohol series. There, however, considerable differences in their effectiveness between the nonionic ethoxylate and anionic ethoxylate sulfate surfactants especially for their emulsifying ability for the monomers. The use of the anionic ethoxylate sulfate surfactants provided the latex products with greater stability and better film formation. The study also revealed the relationship between the surfactant concentration and the latex particle size. Within a suitable range, the higher concentration of the surfactants gave the smaller latex particle which in turn increased the viscosity and general quality of the latex.

Field of study ^{Petrochemistry and polymer science}..... Student's signature *Hathairat Ungtaworndee*
 Academic year..... 2004..... Advisor's signature *Prof. Mongkol Sukwattanasinitt*

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List of Abbreviations

AI	Active ingredient of surfactant
a_s	Area occupied by an emulsifier in a saturated monolayer at the polymer-water interface
CMC	Critical Micelle Concentration
C_p	Monomer concentration within the latex particle
cP	Centipoint
EO	Ethylene oxide
FAE	Fatty alcohol ethoxylate
FAE-7	Fatty alcohol ethoxylate with EO number of 7
FAE-10	Fatty alcohol ethoxylate with EO number of 10
FAE-15	Fatty alcohol ethoxylate with EO number of 15
FAE-30	Fatty alcohol ethoxylate with EO number of 30
FAE-40	Fatty alcohol ethoxylate with EO number of 40
FAES	Fatty alcohol ethoxylate sulfate
FAES-4	Fatty alcohol ethoxylate sulfate with EO number of 4
FAES-12	Fatty alcohol ethoxylate sulfate with EO number of 12
FAES-30	Fatty alcohol ethoxylate sulfate with EO number of 30
FAES-40	Fatty alcohol ethoxylate sulfate with EO number of 40
GPC	Gel permeable chromatography
HLB	Hydrophile-lipophile balance
MFFT	Minimum Film Forming Temperature
MW	Molecular Weight
mN	milinewton
n	EO number
N_c	Concentration or number density of particles
NPE	Nonylphenol ethoxylate
NPE-4	Nonylphenol ethoxylate with EO number of 4
NPE-6	Nonylphenol ethoxylate with EO number of 6
NPE-9	Nonylphenol ethoxylate with EO number of 9
NPE-15	Nonylphenol ethoxylate with EO number of 15

List of Abbreviations (continued)

NPE-30	Nonylphenol ethoxylate with EO number of 30
NPE-40	Nonylphenol ethoxylate with EO number of 40
NPES	Nonylphenol ethoxylate sulfate
NPES-4	Nonylphenol ethoxylate sulfate with EO number of 4
NPES-10	Nonylphenol ethoxylate sulfate with EO number of 10
NPES-40	Nonylphenol ethoxylate sulfate with EO number of 40
%NV	%Nonvolatile
R _p	Rate of polymerization
S	Surfactant concentration
SD	Standard Deviation
σ	Surface tension



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