

**THE EFFECT OF CLOUD POINT ON THE FOAMING OF  
NONIONIC/ANIONIC SURFACTANT MIXTURES**

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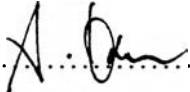
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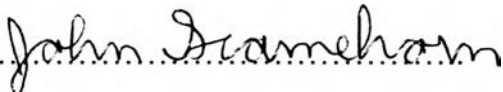
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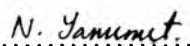
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## ABSTRACT

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Foaming properties of mixed nonionic-anionic surfactant systems below and above the cloud point are described. The systems under study are nonyl phenoxy poly(ethyleneoxy) ethanol (NP(EO)<sub>n</sub>, n = 8, 9, and 10) – sodium dodecyl sulfate (SDS). The cloud point of the mixed systems with and without the addition of electrolyte, NaCl, was determined. The standard Ross-Miles test method and shake test method were used to study the foaming properties of the surfactant mixture systems. No significant change in foamability and foam stability of the mixtures was observed below the cloud point. However, the phase transformation of mixed nonionic-anionic micelles at the cloud point changed the foaming behavior of the solutions resulting in dramatic decrease in foam stability. Foamability also decreased to a very low level at all concentrations above the cloud point. Similar changes were observed around the cloud point of systems both with and without electrolyte. The increase in the mole ratio of SDS in the mixtures led to a substantial increase in the foamability, but it drastically decreased above the cloud point. The results show that the clouding phenomenon of the mixtures both in the presence and absence of electrolyte plays a predominant role in the foaming properties of the nonionic-anionic surfactant mixtures. Both the Ross-Miles and the shake

test methods give the same trend of foamability and foam stability with respect to temperature, concentration, and surfactant structure.

## บทคัดย่อ

ลินาภรณ์ จงไพบุลย์กิจ: ผลกระทบของความชุ่มต่อการเกิดฟองของสารละลายผสมของสารลดแรงตึงผิวชนิดไม่มีประจุกับชนิดมีประจุลบ (The Effect of Cloud Point on the Foaming of Nonionic/Anionic Surfactant Mixtures) อาจารย์ที่ปรึกษา: ศ. จอห์น เอฟ สเตมาซอร์น และ ดร. นันทยา ขานูเมศ 60 หน้า ISBN 974-334-128-5

งานวิจัยนี้ศึกษาคุณสมบัติของฟองของสารละลายผสมระหว่างสารลดแรงตึงผิวชนิดไม่มีประจุกับชนิดมีประจุลบในช่วงอุณหภูมิต่ำและเหนืออุณหภูมิขุ่น ระบบผสมระหว่าง โนนิวฟินอกซีพอลิ เอทรีลีนอ็อกซี เอทานอล ที่มีค่าเฉลี่ยของเอทรีลีนออกไซด์ เท่ากับ 8, 9, 10 โมล ต่อหนึ่งโมลของ โนนิวฟินอกซ์โซเดียมโคเคซิลซัลเฟต ได้นำมาใช้เพื่อศึกษา อุณหภูมิขุ่นของระบบผสมที่มีการเติมและไม่เติมสารนำไฟฟ้า, โซเดียมคลอไรด์, ศึกษาคุณสมบัติของฟองในระบบผสมด้วยวิธีรอสไมล์ซึ่งเป็นวิธีมาตรฐานเอสทีเอ็มและวิธีเขย่า ผลการศึกษาพบว่าที่อุณหภูมิต่ำกว่าอุณหภูมิขุ่น ความสูงของฟองและความเสถียรของฟองในสารละลายผสมเปลี่ยนแปลงไม่มากนัก อย่างไรก็ตาม ณ ที่อุณหภูมิขุ่น การเปลี่ยนแปลงวัฏภาค (phase transformation) ของไมเซลล์ (micelle) ของสารละลายผสมทำให้คุณสมบัติของฟองของสารละลายผสมเปลี่ยนแปลงส่งผลให้ความเสถียรของฟองลดลงอย่างเห็นได้ชัด และที่เหนืออุณหภูมิขุ่น ความสามารถเกิดฟองลดลงถึงระดับต่ำมากที่สุดที่ทุกความเข้มข้น การเปลี่ยนแปลงของระบบที่มีและไม่มีสารนำไฟฟ้าเป็นไปในแนวทางเดียวกัน การเพิ่มสัดส่วนโมลของโซเดียมโคเคซิลซัลเฟตทำให้ความสามารถเกิดฟองของสารเพิ่มขึ้นด้วย แต่ลดลงอย่างรวดเร็วที่อุณหภูมิเหนืออุณหภูมิขุ่น ผลการทดลองพบว่า ปฏิกิริยาการขุ่นของสารละลายผสมทั้งที่มีและไม่มีสารนำไฟฟ้ามีบทบาทสำคัญต่อคุณสมบัติของฟองในสารละลายผสม ทั้งวิธีรอสไมล์และวิธีเขย่าให้แนวโน้มของค่าความสามารถเกิดฟองและความเสถียรของฟองของสารลดแรงตึงผิวเหมือนกันโดยมีการแปรผันตามอุณหภูมิ, ความเข้มข้น และโครงสร้างของสารลดแรงตึงผิวไปในทางเดียวกัน

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