

**RECOVERY OF SURFACTANTS FROM WATER USING MULTI-STAGE
FOAM FRACTIONATION: EFFECTS OF TAIL LENGTH, HEAD GROUP
AND SALINITY**



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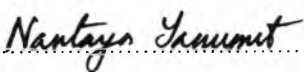
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บทคัดย่อ

กุลพร ฐญสินภัย: การนำสารลดแรงตึงผิวกลับมาใช้ใหม่โดยใช้ Multi-Stage Foam Fractionation Column โดยศึกษาอิทธิพลของความยาวของส่วนหางของสารลดแรงตึงผิว หัวของสารลดแรงตึงผิว และการเติมเกลือ (Recovery of Surfactants from Water Using Multi-Stage Foam Fractionation: Effects of Tail Length, Head Group, and Salinity) อ.ที่ปรึกษา: รศ.ดร. สุเมธ ชวเดช, รศ.ดร.จอห์น เอส โอเฮเวอร์ 74 หน้า

ปัจจุบันนี้ สารลดแรงตึงผิวถูกนำมาใช้ในอุตสาหกรรมต่างๆมากมาย เช่น อุตสาหกรรมการดูแลสุขภาพ อุตสาหกรรมอาหาร อุตสาหกรรมสิ่งทอ และโดยเฉพาะอย่างยิ่งกับกระบวนการแยกโดยใช้สารลดแรงตึงผิว ซึ่งทำให้มีการสูญเสียสารลดแรงตึงผิวจำนวนมากไปกับน้ำเสียที่ปล่อยทิ้งจากกระบวนการเหล่านั้น จึงมีความต้องการที่จะแยกสารลดแรงตึงผิวออกเพื่อนำกลับมาใช้ใหม่ด้วยเหตุผลด้านสิ่งแวดล้อมที่เข้มงวดขึ้นและมูลค่าของสารลดแรงตึงผิว ในงานวิจัยนี้ได้นำวิธีการทำให้เกิดฟองแบบลำดับส่วนมาใช้ในการนำสารลดแรงตึงผิวกลับมาใช้ใหม่ โดยศึกษาผลกระทบของความยาวของส่วนหางของสารลดแรงตึงผิว หัวของสารลดแรงตึงผิว และการเติมเกลือ ต่อประสิทธิภาพของหอลำดับส่วน สารลดแรงตึงผิวที่เลือกใช้ในงานวิจัยนี้มี 4 ชนิด คือ เฮกซะเดคซิลไตรเมทิลแอมโมเนียมโบรไมด์ เดคระเดคซิลไตรเมทิลแอมโมเนียมโบรไมด์ โดเดคซิลไตรเมทิลแอมโมเนียมโบรไมด์ และซีดิลฟิรดินีแอมโมเนียมโบรไมด์ สำหรับระบบการทำให้เกิดฟองแบบลำดับส่วนนี้ถูกทดลองที่ สภาวะคงที่ ความเข้มข้นของสารลดแรงตึงผิวคงที่ ที่ครึ่งหนึ่งของความเข้มข้นที่เกิดไมเซลล์ของแต่ละตัวและทดลองที่อุณหภูมิห้อง จากผลการทดลองพบว่าการเปลี่ยนแปลงของความยาวหางของสารลดแรงตึงผิว มีผลต่อความสามารถในการนำสารลดแรงตึงผิวกลับมาใช้และอัตราส่วนของสารลดแรงตึงผิวในโฟมเป็นอย่างมาก เมื่อเพิ่มความยาวหางของสารลดแรงตึงผิวส่งผลให้ความสามารถในการนำสารลดแรงตึงผิวกลับมาใช้ และอัตราส่วนของสารลดแรงตึงผิวในโฟมเพิ่มขึ้น ความสามารถในการนำสารลดแรงตึงผิวกลับมาใช้ลดลงเมื่อมีกลุ่ม ไพริดินที่ส่วนหัวของสารลดแรงตึงผิวแต่อัตราส่วนของสารลดแรงตึงผิวในโฟมจะเพิ่มขึ้น สำหรับผลกระทบของการเติมเกลือพบว่า เมื่อความเข้มข้นเกลือเพิ่มขึ้นความสามารถในการนำสารลดแรงตึงผิวกลับมาใช้ และอัตราส่วนของสารลดแรงตึงผิวในโฟมจะเพิ่มขึ้นจนถึงค่าหนึ่ง และจะลดลงเมื่อเพิ่มความเข้มข้นของเกลือ

ABSTRACT

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Surfactants are widely used in many industries such as healthcare, food processing, as well as several surfactant-based separation processes, and the effluent streams of these processes usually contain surfactants that need to be removed and recovered for both environmental and economic reasons. In this study, a multi-stage foam fractionation column with bubble-cap trays was used to recover surfactants and the effect of tail length and the head group of the surfactants hexadecyltrimethylammonium bromide (CTAB), tetradecyltrimethylammonium bromide (TTAB), dodecyltrimethylammonium bromide (DTAB) and hexadecylpyridinium bromide (CPB) and the effect of salinity were studied. The foam fractionation system was studied under steady state conditions and at a constant concentration of 0.5 times CMC of each surfactant at room temperature. Both surfactant recovery and enrichment ratio were strongly affected by the tail length of the surfactant and the salinity. The recovery and the enrichment ratio of the surfactant increased with increasing tail length of the surfactant. The surfactant recovery decreased in the presence of a pyridine group at the head group of the surfactant in contrast to the effect on the enrichment ratio. The surfactant recovery increased with increasing salt concentration. Beyond the optimum salinity, the surfactant recovery decreased with increasing NaCl concentration

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