

**EFFECT OF PORE SIZE ON CATIONIC SURFACTANT  
ADSORPTION ISOTHERMS OF MOLECULAR SIEVE MCM-41**



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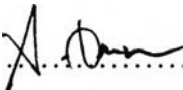
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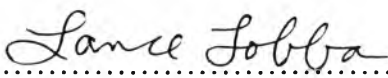
**Thesis Title** : Effect of Pore Size on Cationic Surfactant Adsorption  
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**Thesis Advisors** : Assoc. Prof. Lance L. Lobban  
Assoc. Prof. Sumaeth Chavadej


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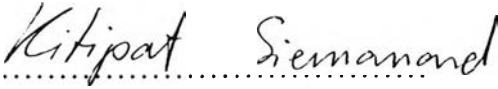
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## ABSTRACT

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KEY WORDS : Adsorption/Adsorption Isotherm/ MCM-41

Jintana Junsirivilaigul: Effect of Pore Size on Cationic Surfactant Adsorption Isotherms of Molecular Sieve MCM-41. Thesis Advisors : Assoc. Prof. Lance L. Lobban and Assoc. Prof. Sumaeth Chavadej 62 pp ISBN 974-331-893-3

The new family of silica-based mesoporous materials designated as MCM-41 is known to be formed using organic- guest species to act as void filters, structure – directing agents and templates. In this study, MCM-41 materials samples of various pore dimensions (21A<sup>o</sup>, 26A<sup>o</sup>, 36A<sup>o</sup>) were synthesized. The studies of adsorption isotherms of quaternary ammonium cationic surfactants with different chain length (C8, C12, C16 ammonium salts) on the MCM-41 with different pore sizes were carried out to determine the effects of the pore size and the chain length on adsorption. The adsorbed amounts at saturation level decreased with increasing the tail length of the surfactant molecule as well as decreasing the pore size. The results indicated that the adsorption ability of surfactant depended on the pore size distribution of the molecular sieve MCM-41. The C8 surfactant, having the shortest tail length adsorbed more than the other two surfactants and the C16 surfactant, having the longest tail length adsorbed the least.

## บทคัดย่อ

จินตนา จันทร์ศิริวิไลกุล : ผลของขนาดรูพรุนของตัวดูดซับโมเลกุลาร์ซีฟ เอ็มซีเอ็ม 41 ที่มีต่อผลต่อไอโซเทอมของสารลดแรงตึงผิว (EFFECT OF PORE SIZE ON CATIONIC SURFACTANT ADSORPTION ISOTHERMS OF MOLECULAR SIEVE MCM-41) อ. ที่ปรึกษา: รศ. แลนซ์ แอล ลีอบบอด และ รศ. สุเมธ ชวเดช 62 หน้า ISBN 974-331-893-3

โมเลกุลาร์ซีฟ เอ็มซีเอ็ม 41 มีซิลิกาเป็นส่วนประกอบพื้นฐาน และส่วนประกอบทางเคมีเพื่อสร้างลักษณะรูพรุนและโครงสร้างภายใน การศึกษาได้มีการสังเคราะห์ เอ็มซีเอ็ม 41 ที่มีขนาดรูพรุนแตกต่างกัน คือ 21, 26, 36 อังสตรอม เพื่อนำมาเปรียบเทียบผลไอโซเทอมของการดูดซับโดยใช้สารลดแรงตึงผิวแบบประจุบวก (Cationic surfactant) 3 ชนิด ที่มีความยาวโซ่คาร์บอนต่าง ๆ กัน ได้แก่  $C_8$ ,  $C_{12}$ ,  $C_{16}$  แอมโมเนียมซอลต์ (ammonium salt) เป็นตัวดูดซับบนพื้นผิวของเอ็มซีเอ็ม 41 ที่ขนาดรูพรุนแตกต่างกัน พบว่าปริมาณการดูดซับของเอ็มซีเอ็ม 41 ลดลงเมื่อเพิ่มความยาวโซ่คาร์บอนของสารลดแรงตึงผิว และให้ผลเช่นเดียวกันเมื่อลดขนาดของรูพรุน แสดงให้เห็นถึงความสามารถในการดูดซับสารลดแรงตึงผิวของโมเลกุลาร์ซีฟ เอ็มซีเอ็ม 41 ขึ้นอยู่กับขนาดของรูพรุน นอกจากนี้ยังพบว่าสารลดแรงตึงผิวที่มีความยาวโซ่คาร์บอนสั้นที่สุด ( $C_8$  ammonium salt) ถูกดูดซับมากที่สุด ในขณะที่สารลดแรงตึงผิวที่มีความยาวโซ่คาร์บอนยาวที่สุด ( $C_{16}$  ammonium salt) ถูกดูดซับน้อยที่สุด

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