

# FUNDAMENTALS OF XYLENE ADSORPTIVE SEPARATION



Mr. Thera Ngamkitidachakul

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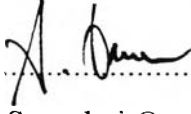
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**By** : Mr. Thera Ngamkitidachakul  
**Program** : Petrochemical Technology  
**Thesis Advisors** : Dr. Santi Kulprathipanja  
Dr. Pramoch Rangsunvigit

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..... College Director  
(Prof. Somchai Osuwan)

**Thesis Committee:**

  
.....  
(Dr. Santi Kulprathipanja)

  
.....  
(Dr. Pramoch Rangsunvigit)

  
.....  
(Assoc. Prof. Sumaeth Chavadej)

## บทคัดย่อ

ธีระ งามกิตติเดชากุล : หลักพื้นฐานในการแยกไซลีนโดยดูดซับ (Fundamentals of Xylene Adsorptive Separation) อ. ที่ปรึกษา : ดร. สันติ กุลประทีปปัญญา ดร. ปราโมช รังสรรค์  
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งานวิจัยนี้ศึกษาการดูดซับระหว่างพาราไซลีน เมตาไซลีน ออโทไซลีนและ เอทิลเบนซีนกับโทลูอินบนซีโอไลต์โพแทสเซียมแบเรียมเอ็กซ์และ โพแทสเซียมวายเป็นอุณหภูมิ 40 65 และ 90 องศาเซลเซียส ซีโอไลต์โพแทสเซียมแบเรียมเอ็กซ์ดูดซับพาราไซลีนมากกว่าสารอื่น และดูดซับออโทไซลีนน้อยที่สุดที่อัตราส่วนโมลของไซลีนต่อโทลูอินสูง อย่างไรก็ตามที่อัตราส่วนโมลของไซลีนต่อโทลูอินต่ำซีโอไลต์โพแทสเซียมแบเรียมเอ็กซ์ดูดซับออโทไซลีนมากที่สุด เนื่องจากลักษณะโมเลกุลของออโทไซลีนและอ์ฟฟินิตีระหว่างสารอะโรเมติกส์แต่ละตัวกับซีโอไลต์ ซีโอไลต์โพแทสเซียมวายดูดซับพาราไซลีนมากกว่าสารอื่น และดูดซับออโทไซลีนน้อยที่สุดที่อัตราส่วนโมลของไซลีนต่อโทลูอินสูง ที่อัตราส่วนโมลของไซลีนต่อโทลูอินต่ำซีโอไลต์โพแทสเซียมวายดูดซับ  $C_8$  อะโรเมติกส์ในจำนวนที่เท่ากัน ซีโอไลต์โพแทสเซียมวายมีความสามารถในการดูดซับมากกว่าซีโอไลต์โพแทสเซียมแบเรียมเอ็กซ์ เนื่องจากกระบวนการดูดซับเป็นกระบวนการคายความร้อนจึงทำให้ซีโอไลต์ดูดซับสารทุกชนิดน้อยลงเมื่ออุณหภูมิสูงขึ้น แต่เมื่อพิจารณาที่ความจุที่มากที่สุดของซีโอไลต์ทั้งสองอุณหภูมิมีผลเพียงเล็กน้อยต่อค่าซีเล็คติวิตีของพาราไซลีนเมื่อเทียบกับสาร  $C_8$  ตัวอื่นและโทลูอินบนทั้งสองซีโอไลต์ ซีโอไลต์โพแทสเซียมแบเรียมเอ็กซ์ และโพแทสเซียมวายชอบดูดซับพาราไซลีนมากกว่าโทลูอินขณะที่ดูดซับโทลูอินมากกว่าสาร  $C_8$  ตัวอื่น

**ABSTRACT**

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KEYWORD: Adsorption/ *KBaX* zeolite/ *KY* zeolite/ Zeolite/ Isotherm/

Faujasite

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Coadsorption of liquid *p*-xylene, *m*-xylene, *o*-xylene and ethylbenzene with toluene on the *KBaX* and *KY* zeolites was studied at 40, 65 and 90°C. The *KBaX* zeolite adsorbed *p*-xylene more than the other aromatics, and *o*-xylene was the least adsorbed species at high xylene/toluene mole ratios. However, at low xylene/toluene mole ratios, *o*-xylene was the most adsorbed aromatic. This may be due to the *o*-xylene molecular structure and affinity between each aromatic and the zeolite. The *KY* zeolite adsorbed *p*-xylene more than the other aromatics, and *o*-xylene was the least adsorbed aromatic at higher xylene/toluene mole ratios. At low xylene/toluene mole ratios, unlike the *KBaX* zeolite, the *KY* zeolite adsorbed about the same amount of the C<sub>8</sub> aromatics. The *KY* zeolite had an ability to adsorb more C<sub>8</sub> aromatics than the *KBaX* zeolite did. As the adsorption process is exothermic, the zeolites adsorbed all the species less at higher temperature. But, at the full capacity of both zeolites, temperature had very little effect on the selectivity of *p*-xylene relative to the other C<sub>8</sub> aromatics and toluene. The *KBaX* and *KY* zeolites selectively adsorbed *p*-xylene more than toluene while they adsorbed more toluene than the other C<sub>8</sub> aromatics.

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