C_8 AROMATICS ADSORPTION: EFFECTS OF ZEOLITE ACIDITY

Ms. Suwanna Limsamutchaikul

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By:	Ms. Suwanna Limsamutchaikul
Program:	Petrochemical Technology
Thesis Advisors:	Dr. Santi Kulprathipanja
	Asst. Prof. Pramoch Rangsunvigit
	Asst. Prof. Pomthong Malakul

Accepted by the Petroleum and Petrochemical College, Chulalongkorn University, in partial fullfilment of the requirement for the Degree of Master of Science.

K. Bunyakiat

..... College Director

(Assoc. Prof. Kunchana Bunyakiat)

Thesis Committee:

Santi Kulprathipanja

(Dr. Santi Kulprathipanja)

Pramoch R.

(Asst. Prof. Pramoch Rangsunvigit)

(Asst. Prof. Pomthong Malakul)

Boonyarach Kitiyanan

(Dr. Boonyarach Kitiyanan)

Kitipat Siemanond

(Dr. Kitipat Siemanond)

บทคัดย่อ

สุวรรณา ลิ้มสมุทรชัยกุล: การศึกษาผลของค่าความเป็นกรดของซีโอไลท์ต่อการดูดซับของสารอะโรมาติกคาร์บอน 8 อะตอม (C_8 Aromatics Adsorption: Effects of Zeolite acidity) อ.ที่ปรึกษา: ดร.สันติ กุลประทีปัญญา ผศ.ดร. ปราโมช รังสรรค์วิจิตร ผศ.ดร. ปมทอง มาลากุล ณ อยุธยา 67 หน้า ISBN 974-17-2307-5

เทคนิคที่ดีที่สุดในการแยกพาราไซลีนออกจากสารผสมอะโรมาติกคาร์บอน 8 อะตอม คือเทคนิคการดูดซับด้วยซีโอไลท์ ดังนั้นการเข้าใจในปัจจัยที่มีผลต่อการแยกพาราไซลีนโดยใช้เทคนิคการดูดซับจึงมีความสำคัญ ในงานวิจัยนี้ศึกษาถึงผลของความเป็นกรดของซีโอไลท์ต่อการดูดซับสารอะโรมาติกคาร์บอน 8 อะตอม ความเป็นกรดของซีโอไลท์ถูกปรับเปลี่ยนโดยการแลกเปลี่ยนกับโลหะประจุบวกหมู่สอง ซึ่งได้แก่ แมกนีเซียม แคลเซียม สตรอนเซียม และแบเรียม โดยทั่วไปแล้วเมื่อประจุบวกขนาดใหญ่ขึ้น ค่าความเป็นกรดจะลดลง ผลการทดลองจากทั้งเทคนิคพัลซ์เทส และเบรคทรูพบว่า เมื่อค่าความเป็นกรดของซีโอไลท์เพิ่มขึ้น ค่าซีเล็กติวิตี้ของพาราไซลีนจะลดลงจนถึงจุดหนึ่ง ค่าซีเล็กติวิตี้จะไม่ขึ้นกับค่าความเป็นกรดอีกต่อไป ผลของขนาดของประจุบวกมีความสำคัญมากกว่า ดังนั้นในการศึกษากลไกของการดูดซับของสารอะโรมาติกบนซีโอไลท์จึงต้องคำนึงถึงผลของค่าความเป็นกรดของซีโอไลท์ ขนาดประจุบวก และชนิดของซีโอไลท์

ABSTRACT

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The most attractive industrial technique for the separation of *p*-xylene is selective adsorption with zeolites. An understanding of parameters that influence the effectiveness of the separation is needed in order to achieve the best *p*-xylene separation. In this work, roles of zeolite acidity on liquid-phase adsorption of C_8 aromatics and *p*-xylene selectivity on *2.0X, 2.5X* and *Y* zeolites were investigated at a constant temperature and pressure. Besides zeolite inherited acidity, acidity was also modified by exchanged di-valence cations, *Mg*, *Ca*, *Sr*, and *Ba*. Higher ionic radius exchanged cations are known to have lower acidity. The results from Pulse Test and Breakthrough techniques indicated that while the selectivity of *p*-xylene with respect to some C_8 aromatics decreased with the increase of zeolite acidity, there was a turning point where the effects of an exchanged cation size were more pronounced than those of the acidity. The effects of zeolite acidity, cation size and zeolite type must be taken into consideration for *p*-xylene selectivity.

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