

**ZEOLITE SYNTHESIS DIRECTLY FROM ALUMATRANE AND
SILATRANE VIA SOL-GEL PROCESS AND MICROWAVE TECHNIQUE**



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นาง มาธาวิ สารปัญญา: การสังเคราะห์ ซีโอไลท์ จากสารตั้งต้น อลูมาเทรน และ ไชลาเทรน ที่สังเคราะห์ได้ โดยผ่านกระบวนการโซล-เจล และการให้ความร้อนภายใต้ความดันโดยใช้ไมโครเวฟ เป็นแหล่งกำเนิดความร้อน (Zeolite Synthesis Directly from Alumatrane and Silatrane by Sol-Gel Process and Microwave Heating Technique) อ. ที่ปรึกษา: ผศ. ดร. สุจิตรา วงศ์เกษมจิตต์ และ ศ. ดร. เออร์โดแกน กุลาริ 192 หน้า ISBN 974-17-1367-3

รายงานวิจัยฉบับนี้ได้กล่าวถึงความสำเร็จในการสังเคราะห์ ซีโอไลท์ หรือ โครงสร้างผลึกของ อลูมิโนซิลิเกต จาก สารตั้งต้น อลูมาเทรน และ ไชลาเทรน โดยกระบวนการ โซล-เจล และการตกผลึกภายใต้อุณหภูมิและความดัน โดยในการทดลองนี้ ได้ใช้ คลื่นไมโครเวฟ เป็นแหล่งกำเนิดพลังงานความร้อน และใช้ สารละลายต่าง ของสารจำพวกโลหะแอลคาไลด์ เป็นตัวทำให้เกิดปฏิกิริยา ไฮโดรไลซิส ซึ่งอัตราการเกิดปฏิกิริยาโดยใช้สารละลาย จำพวกแอลคาไลด์ต่างนั้นจะเร็วกว่าประมาณสองเท่าของการใช้สารละลายจำพวกเกลือแอมโมเนียมที่ใช้ในการสังเคราะห์สารจำพวกซีโอไลท์ ในตัวกลางที่เป็นต่างแต่ละชนิดนั้นไม่เท่ากัน ในตัวกลางที่เป็นสารละลายต่างของโพแทสเซียม จะเกิดที่อุณหภูมิสูง และต้องการพลังงานที่สูงกว่าสารละลายต่างของโซเดียม และลิเทียม ตามลำดับ ผลึกที่ได้นั้นจะมีลักษณะรูปร่างที่สมบูรณ์และมีขนาดใกล้เคียงกัน การเปลี่ยนแปลงอัตราส่วนต่างๆ มีผลทั้งต่อ รูปร่าง ชนิด และขนาดของผลผลิตที่ได้ เช่น การเปลี่ยนแปลงชนิดของสารละลายต่าง มีผลต่อ ชนิด รูปร่าง อุณหภูมิ และ ระยะเวลาของการสร้างผลึกแต่ละชนิด หรือ การเปลี่ยนแปลงอัตราส่วนของ ซิลิกา และ อลูมินา ก็มีผลต่อทั้งชนิด และรูปร่างของผลึกที่ได้เช่นกัน การเปลี่ยนแปลงความเข้มข้นของสารละลายต่าง จะมีผลต่อระยะเวลาการเกิดผลึกและรูปร่างของผลึก ในขณะที่การเปลี่ยนแปลงอัตราส่วนของน้ำ จะมีผลต่อขนาดและรูปร่าง ซึ่งเกิดเนื่องมาจากผลของการเกิดจำนวนผลึกตัวล่อที่ลดลง อันเป็นผลจากการเจือจางของสารละลายทั้งหมดที่ใช้ในการสังเคราะห์

ABSTRACT

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Zeolites or crystalline aluminosilicate are successfully synthesized directly from alumatran and silatrane by sol-gel process using metal hydroxide: lithium, sodium or potassium hydroxide as hydrolytic agent and hydrothermal crystallization using microwave-heating technique. Hydrolysis rate in the sodium hydroxide system is approximately two times faster than that of sodium chloride system and crystallization occurred only in alkali base solution. For each metal hydroxide system, temperatures using for transforming to crystalline aluminosilicate are different. Potassium hydroxide system requires higher energy orderly as measured by DSC, and temperature than sodium and lithium hydroxide. Different hydrolytic agent resulted in different crystal, microwave heating temperature and time. Pure and nice crystal products are obtained with small particle size distribution. Varying Si:Al ratio mostly affected the type and morphology of synthesized product while varying metal hydroxide concentration mostly affected reaction time and crystal morphology. In case of lithium hydroxide, its concentration also influences on the type of synthesized product. Increasing water content ratio reduces the overall concentration and rate of nuclei generation.

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