

ระเบียบวิธีการสังเคราะห์ที่มีผลต่อตัวเร่งปฏิกิริยาโครงเมียม- ไทเทเนียมชิลิกาไอล์ต-1

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SYNTHESIS METHODOLOGY AFFECTING CHROMIUM-TITANIUM SILICALITE-1 CATALYST

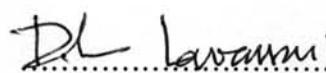
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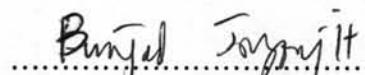
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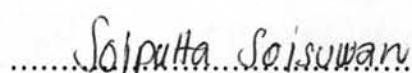
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เอนอร พรมเพชร : ระเบียบวิธีการสังเคราะห์ที่มีผลต่อตัวเร่งปฏิกิริยาโครเมียม-ไทเทเนียม ซิลิกาไอลิต์-1 (SYNTHESIS METHODOLOGY AFFECTING CHROMIUM-TITANIUM SILICALITE-1 CATALYST) อ. ที่ปรึกษา: รศ.ดร.ธราธร มงคลศรี, 111 หน้า.

งานวิจัยนี้ สืกษาระเบียบวิธีการสังเคราะห์(วิธีการเติมเกลือ โครเมียม)ที่มีผลต่อการสังเคราะห์ตัวเร่งปฏิกิริยาโครเมียม-ไทเทเนียมซิลิกาไอลิต์-1 ด้วยวิธีไฮโดรเทอร์มัล และสืกษาระเบียบ ของความแตกต่างของชนิดของเกลือ โครเมียม ($\text{Cr}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ และ CrO_3) วิเคราะห์ตัวเร่งปฏิกิริยาที่สังเคราะห์ได้ด้วยเทคนิค XRF XRD BET SEM FT-IR ESR และ NH_3 -TPD และทำการทดสอบความว่องไวของตัวเร่งปฏิกิริยาโดยใช้ปฏิกิริยาการออกซิไดซ์ 2-โพรพานอล ด้วยออกซิเจน ในวัสดุแก๊สในเครื่องปฏิกิริยแบบเบนดิ่งในช่วงอุณหภูมิ $100-500^\circ\text{C}$ ที่ความดันบรรยายกาศ องค์ประกอบของสารป้อนมีความเข้มข้นของ 2-โพรพานอลร้อยละ 5 และออกซิเจนร้อยละ 8 โดยปริมาตร การสืกษาพบว่าวิธีการเติมเกลือ โครเมียมและชนิดของเกลือ โครเมียมมีผลต่อปริมาณของ โครเมียมที่เข้าไปในโครงสร้างของ TS-1 ตัวเร่งปฏิกิริยาที่สังเคราะห์ได้มีรูปร่างแตกต่างกันแต่คล้าย ขั้งคงมีโครงสร้างแบบ MFI การวิเคราะห์ด้วยเทคนิค ESR พบร่วงปฏิกิริยาที่สังเคราะห์ได้ บางตัวมี Cr^{3+} ในรูปอออกทริออกซ์อนออกโครงสร้างของตัวเร่งปฏิกิริยา การวิเคราะห์ด้วย NH_3 -TPD พบร่วงปฏิกิริยาที่สังเคราะห์ได้มีตำแหน่งที่เป็นกรดที่มีความแรงแตกต่างกันอยู่ 2 กลุ่ม ด้วยกัน คือที่ช่วงอุณหภูมิ $137-149^\circ\text{C}$ และ $224-247^\circ\text{C}$ ความว่องไวของตัวเร่งปฏิกิริยาไม่เข้มข้นอยู่ กับปริมาณของ โครเมียมที่เข้าไป ดังนั้นความว่องไวของตัวเร่งปฏิกิริยาที่สังเคราะห์ได้ จึงคล้ายคลึง กับตัวเร่งปฏิกิริยา TS-1

ภาควิชา.....	วิศวกรรมเคมี.....	ลายมือชื่อนิสิต.....	๔๙๗๙.....	พงษ์พงษ์.....
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KEY WORD: CHROMIUM-TITANIUM SILICALITE-1, Cr-TS-1, TS-1

EM-ORN PHROMPHET: SYNTHESIS METHODOLOGY AFFECTING
CHROMIUM-TITANIUM SILICALITE-1 CATALYST. THESIS

ADVISOR: ASSOC.PROF. THARATHON MONGKHONSI, Ph.D. 111 pp.

This research focuses on the synthesis methodology (i.e. the chromium salt addition method) affecting the chromium-titanium silicalite-1 catalyst synthesized by hydrothermal method. The effect of using different kinds of chromium salt (i.e. $\text{Cr}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ and CrO_3) is also investigated. All synthesized catalysts are characterized using various techniques consisting of XRF XRD BET SEM FT-IR ESR and NH_3 -TPD. The catalytic behavior of the synthesized catalysts is tested by the gas phase oxidation of 2-propanol in a fixed bed reactor at the reaction temperature range 100-500 °C, atmospheric pressure. The composition of the feed is 5% 2-propanol, 8% oxygen by volume and balanced with argon. The results show that the chromium salt addition method and the kind of chromium salt affect the amount of chromium incorporated into TS-1 structure. Moreover, it is found that the synthesized catalysts have various shapes but their MFI structures are maintained. The ESR results indicate that some synthesized catalysts consist of Cr^{5+} bonded in octahedral form outside the framework structure. The NH_3 -TPD results report that the synthesized catalysts have two different types of acid strength, the weaker one desorbs NH_3 at 137-149°C and the stronger one desorbs NH_3 at 224-247°C. The catalytic behavior does not depend on the amount of incorporated chromium. Therefore, the catalytic activities over all synthesized catalysts and over TS-1 are similar.

Department.....Chemical Engineering... Student's signature.....Em-orn Phromphet.
Field of study....Chemical Engineering... Advisor's signature.....
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Finally, the author would like to dedicate the achievement of this work to her parents, who have always been the source of her support and encouragement.

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