

Low Temperature CO Oxidation by Reducible Metal Oxide Supported Silver Catalysts

Mr. Sompop Srivannavit

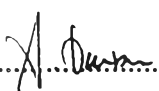
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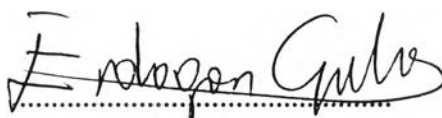
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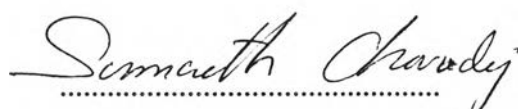
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ABSTRACT

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KEYWORDS : CARBON MONOXIDE, OXIDATION, LOW TEMPERATURE, REDUCIBLE METAL OXIDE, SILVER, MANGANESE, COBALT

SOMPOP SRIVANNAVIT : LOW TEMPERATURE CO OXIDATION BY REDUCIBLE METAL OXIDE SUPPORTED SILVER CATALYSTS. THESIS ADVISORS : PROF. ERDOGAN GULARI, Ph.D. AND PROF. SOMCHAI OSUWAN, Ph.D., 43 pp. ISBN 974-633-854-4

Highly active oxide catalysts have been developed for low temperature catalytic oxidation of carbon monoxide. Pure transition metal oxide catalysts (Ag, Mn, and Co) and composite catalysts of transition metal oxide (Mn-Co, Ag-Mn, Ag-Co, and Ag-Mn-Co) were synthesized by the coprecipitation method. These catalysts were subjected to various temperature and environmental conditions. XRD, BET, TGA and temperature for 50% conversion were used to identify active catalysts. This study found that Ag-Mn catalyst dried at 100°C was the most suitable due to high activity and long life. However, changes in the structure of the catalyst strongly correlated with the high deactivation.

บทคัดย่อ

สมภพ ศรีวรรณวิทย์ : ปฏิกริยาออกซิเดชันของคาร์บอนมอนอกไซด์ที่อุณหภูมิต่ำด้วยตัวเร่งปฏิกริยาโลหะเงินบนออกไซด์ของโลหะทรานสิชันที่สามารถถูกรีดิวส์ได้ (Low Temperature CO Oxidation by Reducible Metal Oxide Supported Silver Catalysts) อาจารย์ที่ปรึกษา : Prof. Erdogan Gulari และ ศ.ดร. สมชาย ใสสุวรรณ 43 หน้า ISBN 974-633-854-4

ตัวเร่งปฏิกริยาประเภทออกไซด์ของโลหะทรานสิชันที่มีประสิทธิภาพสูงได้ถูกเตรียมขึ้นมาเพื่อปฏิกริยาออกซิเดชันของคาร์บอนมอนอกไซด์ที่อุณหภูมิต่ำ ตัวเร่งปฏิกริยาดังกล่าวประกอบไปด้วย สารเชิงเดี่ยวของโลหะทรานสิชันออกไซด์ (เงิน, แมงกานีส และ โคบอลต์) และ สารประกอบเชิงร่วมของโลหะทรานสิชันออกไซด์ (แมงกานีส-โคบอลต์, เงิน-แมงกานีส, เงิน-โคบอลต์ และ เงิน-แมงกานีส-โคบอลต์) หลังจากเตรียมตัวเร่งปฏิกริยาโดยวิธีการตกผลึกร่วมแล้ว ตัวเร่งปฏิกริยาเหล่านี้ได้ผ่านการจัดสภาพโดยอาศัยอุณหภูมิและสภาพแวดล้อมต่างๆ

โดยอาศัยวิธี XRD, BET, TGA และการทดสอบทางปฏิกริยาออกซิเดชันเพื่อหาอุณหภูมิที่เปลี่ยนคาร์บอนมอนอกไซด์ไปเป็นคาร์บอนไดออกไซด์ได้ 50 เปอร์เซ็นต์ เราสามารถจำแนกความแตกต่างทางประสิทธิภาพ-ความว่องไวของตัวเร่งปฏิกริยาแต่ละตัวได้ ซึ่งในการทดสอบนี้ได้พบว่าตัวเร่งปฏิกริยาเงิน-แมงกานีสที่ผ่านการอบแห้งที่อุณหภูมิ 100 องศาเซลเซียสจัดได้ว่าเป็นตัวเร่งปฏิกริยาที่เหมาะสมที่สุด ดังจะเห็นได้จากการที่ตัวเร่งปฏิกริยานี้มีประสิทธิภาพ-ความว่องไวที่สูงที่สุดและมีอายุการใช้งานที่ยาวนานที่สุด แต่ถึงกระนั้นก็ตาม ตัวเร่งปฏิกริยาเงิน-แมงกานีสนี้ก็ยังมีอาการเสื่อมสภาพไปตามการใช้งานอันเนื่องมาจากการเปลี่ยนแปลงทางโครงสร้างของตัวเร่งปฏิกริยาขณะเกิดปฏิกริยา

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