

**ETHYLENE EPOXIDATION IN A LOW-TEMPERATURE PARALLEL
PLATE DIELECTRIC BARRIER DISCHARGE SYSTEM WITH TWO
DIELECTRIC LAYERS OF Ag CATALYST: EFFECTS OF CALCINATION
TEMPERATURE AND OPERATING CONDITIONS**

Satita Sotananan

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By: Satita Sotananan

Program: Petrochemical Technology

Thesis Advisors: Prof. Sumaeth Chavadej

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..... College Dean
(Asst. Prof. Pomthong Malakul)

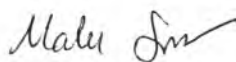
Thesis Committee:



.....
(Prof. Sumaeth Chavadej)



.....
(Asst. Prof. Siriporn Jongpatiwut)



.....
(Asst. Prof. Malee Santikunaporn)

ABSTRACT

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In this research work, ethylene oxide production performance under a low-temperature parallel plate dielectric barrier discharge (DBD) system with two dielectric glass plates and the upper glass plate coated with 0.1 wt% Ag catalyst calcined at different temperatures was investigated. Under optimum conditions (an applied voltage of 19 kV, an input frequency of 500 Hz, a total feed flow rate of 50 cm³/min, a gap distance of 0.7 cm, and a N₂O:C₂H₄ feed molar ratio of 0.17:1), the highest EO selectivity of 48.9% and the highest EO yield of 8.6% were achieved at a calcination temperature of 550 °C. The use of N₂O as oxygen source provided comparatively better ethylene epoxidation performance than O₂ under their own optimum conditions.

บทคัดย่อ

สาธิตา โสธนนันทน์ : ปฏิกริยาอีพ็อกซิเดชันของเอทิลีนภายใต้ระบบพลาสมาอุณหภูมิ
ต่ำชนิดไดอิเล็กทริกแบร์ริเออิดิสชาร์จโดยใช้แผ่นไดอิเล็กทริกสองแผ่นและตัวเร่งปฏิกิริยาชนิดซิล
เวอร์: ผลของอุณหภูมิที่ใช้ในการเผาไหม้ให้เป็นเถ้าและภาวะที่ใช้ในการดำเนินการ (Ethylene
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ในงานวิจัยนี้ ปฏิกริยาอีพ็อกซิเดชันของเอทิลีนได้ถูกสำรวจภายใต้ระบบพลาสมา
อุณหภูมิต่ำชนิดไดอิเล็กทริกแบร์ริเออิดิสชาร์จพร้อมทั้งการเคลือบบนผิวตัวรองรับแผ่นกระจก
ด้านบนด้วยตัวเร่งปฏิกิริยาชนิดซิลเวอร์ในปริมาณร้อยละ 0.1 โดยน้ำหนัก ภายใต้สภาวะที่
เหมาะสมที่สุด (ความต่างศักย์ไฟฟ้า 19 กิโลโวลต์ ความถี่ไฟฟ้า 500 เฮิร์ตซ์ อัตราการไหลของสาร
ตั้งต้น 50 ลูกบาศก์เซนติเมตรต่อนาที ระยะทางของช่องว่าง เท่ากับ 0.7 เซนติเมตร และอัตราส่วน
โดยโมลของก๊าซไนตรัสออกไซด์ต่อเอทิลีน 0.17:1) การเลือกเกิดของเอทิลีนออกไซด์มีค่ามาก
ที่สุดเป็น 48.9 เปอร์เซ็นต์ และ ค่าปริมาณผลได้สูงสุดของเอทิลีนออกไซด์เป็น 8.6 เปอร์เซ็นต์
เกิดขึ้นเมื่อใช้อุณหภูมิในการเผาไหม้ให้เป็นเถ้าที่ 550 องศาเซลเซียส และนอกจากนี้เมื่อ
เปรียบเทียบผลของการใช้แหล่งกำเนิดออกซิเจนที่แตกต่างกันแล้วนั้นพบว่า ภายใต้ภาวะที่
เหมาะสมของมันเอง การใช้ก๊าซไนตรัสออกไซด์เป็นแหล่งกำเนิดก๊าซออกซิเจนก่อให้เกิด
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