

# **WATER STERILIZATION BY SUPPORTED SILVER CATALYST**

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**A Thesis Submitted in Partial Fulfillment of the Requirements  
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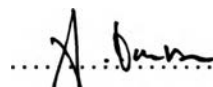
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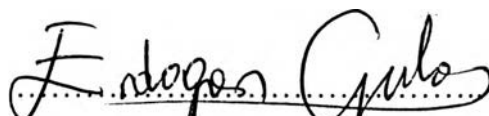
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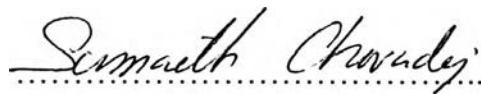
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## ABSTRACT

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Bacterial contamination in drinking water is responsible for the spread of many diseases, especially epidemics in tropical areas. Silver catalyst has several advantages over all chemical disinfectants used such as its simplicity and low operation cost. The objective of this study was to develop silver catalyst for disinfection. The thermal reduction method was used to prepare silver catalyst which is deposited on two different supports of alumina pellets (4.996 mm diameter) and sol-gel alumina powder (160-180  $\mu\text{m}$ ). Percentage of *E. coli* destruction increased remarkably with increasing in either silver loading or contact time. Under the same operating conditions, alumina powder could give higher efficiency of bacterial destruction than alumina pellets because of the higher surface area of the alumina powder. For greater than 90% of *E. coli* destruction, the optimum contact time was 24 seconds for 14.85% Ag/sol-gel alumina powder.

## บทคัดย่อ

มาลี ตันติคุณาภรณ์ : การศึกษาการใช้ตัวเร่งปฏิกิริยาโลหะเงินเพื่อฆ่าเชื้อโรคในน้ำ (Water Sterilization by Supported Silver Catalyst) อ. ที่ปรึกษา : ศ.ดร. เออโดแกน กุลารี่ (Prof. Dr. Erdogen Gulari) และ ดร. สุเมธ ชวเดช 52 หน้า ISBN 974-638-473-2

การปนเปื้อนของแบคทีเรียในน้ำดื่มเป็นสาเหตุหนึ่งของการระบาดของโรค โดยเฉพาะอย่างยิ่งโรคระบาดในเขตร้อน สารเร่งปฏิกิริยาโลหะเงินมีข้อดีเหนือกว่าสารเคมีฆ่าเชื้อโรคต่างๆ ได้แก่ ง่าย ไม่ยุ่งยาก และมีค่าใช้จ่ายต่ำ งานวิจัยนี้มีวัตถุประสงค์เพื่อพัฒนาสารเร่งปฏิกิริยาโลหะเงินในการฆ่าเชื้อโรคในน้ำ ตัวเร่งปฏิกิริยาโลหะเงินถูกเตรียมด้วยการรีดักชันแบบความร้อนโดยเกาะบนตัวรองรับ 2 ชนิดคือเม็ดอลูมินาที่มีเส้นผ่านศูนย์กลางประมาณ 5 มิลลิเมตรและผงอลูมินาขนาด 160-180 ไมโครเมตร จากการศึกษาพบว่า เปอร์เซ็นต์การทำลายเชื้ออีโคไล (*E. coli*) เพิ่มขึ้นอย่างเด่นชัด เมื่อปริมาณโลหะเงินและเวลาในการสัมผัสเพิ่มขึ้น นอกจากนี้พบว่าผงอลูมินาให้ประสิทธิภาพในการฆ่าเชื้ออีโคไลดีกว่าการใช้เม็ดอลูมินา ทั้งนี้เนื่องจากผงอลูมินามีพื้นที่ผิวสัมผัสมาก จากผลการทดลองพบว่าอีโคไลถูกทำลายมากกว่า 90 เปอร์เซ็นต์ เมื่อผ่านคอลัมน์ที่มีปริมาณโลหะเงิน 14.85 เปอร์เซ็นต์ซึ่งเกาะบนผงอลูมินา และใช้เวลาในการสัมผัส 24 วินาที

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