

**A NOVEL LIPASE CATALYSIS SYSTEM FOR ESTERIFICATION
AND POLYESTERIFICATION**

Mr. Attapon Phraephrewngarm

**A Thesis Submitted in Partial Fulfillment of the Requirements
For the Degree of Master of Science
The Petroleum and Petrochemical College, Chulalongkorn University
in Academic Partnership with
The University of Michigan, The University of Oklahoma,
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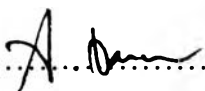
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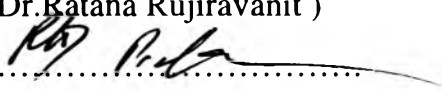
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By : Mr. Attapon Phraephrewngarm
Program : Polymer Science
Thesis Advisors : Professor Erdogan Gulari
Dr. Suwabun Chirachanchai
Dr. Ratana Rujiravanit
Dr. Rath Pichayakura

Accepted by the Petroleum and Petrochemical College, Chulalongkorn University, in partial fulfillment of the requirements for the Degree of Master of Science.


..... College Director
(Prof. Somchai Osuwan)

Thesis Committee:


.....
(Prof. Erdogan Gulari)

.....
(Dr. Suwabun Chirachanchai)

.....
(Dr. Ratana Rujiravanit)

.....
(Dr. Rath Pichayakura)

ABSTRACT

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DR. SUWABUN CHIRACHANCHAI, DR. RATANA
RUJIRAVANIT, AND DR. RATH PICHAYAKURA
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The rice bran lipase was extracted from the Thai rice bran in the condition of 1:3 W/V of rice bran to 10 mM calcium chloride in the stirrer system for 3 hours at 4°C. The obtained rice bran lipase shows specific activity about 70 mU/mg. By applying rice bran lipase as a catalyst in esterification of adipic acid and 1,4-butanediol in diisopropyl ether at 35°C for 24 hours, the molecular weight of oligoester for 1022 is obtained as determined by GPC technique. However, when the reaction proceeds for 2-7 days, the molecular weight is decreased to 233-398. The product shows an alternating ester with hydroxy-terminated chain as observed from the OH peak by FT-IR.

บทคัดย่อ

อรรถพล แพรพริ้วงาม : การใช้ไลเปสชนิดใหม่ในการสังเคราะห์เอสเทอร์และพอลิเอสเทอร์ (A Novel Lipase Catalysis System for Esterification and Polyesterification) อ.ที่ปรึกษา : ศ. เอโดแกน กุลารี่, ดร.สุวบุญ จิรชาญชัย, ดร.รัตนา รุจิรวนิช และ ดร.รัฐ พิษญาวงกูร 34 หน้า ISBN 974-331-918-2

ไลเปสจากรำข้าวไทยสามารถสกัดจากรำข้าวไทยโดยใช้อัตราส่วนของรำข้าว 1 ส่วนต่อสารละลายแคลเซียมคลอไรด์เข้มข้น 10 มิลลิโมลาร์ 3 ส่วนในระบบการกวนเป็นเวลา 3 ชั่วโมง ที่อุณหภูมิ 4 องศาเซลเซียส และไลเปสที่สามารถสกัดได้มีแอกติวิตีจำเพาะประมาณ 70 มิลลิวินิตต่อมิลลิกรัม ไลเปสจากรำข้าวที่สกัดได้ถูกนำไปศึกษาความสามารถในการเป็นตัวเร่งปฏิกิริยาในปฏิกิริยาการสังเคราะห์พอลิเอสเทอร์ระหว่าง กรดอะดิปิกและบิวเทนไดออล ในตัวทำละลายไดไอโซโพรพิลอีเทอร์ ที่อุณหภูมิ 35 องศาเซลเซียสเป็นเวลา 24 ชั่วโมง พบว่าเกิดผลิตภัณฑ์เอสเทอร์ที่มีมวลโมเลกุล 1022 โดยตรวจสอบได้จากการวิเคราะห์ด้วยเจลเพอมีเอชันโครมาโตกราฟี การศึกษาผลของเวลาในการทำปฏิกิริยาค่อมวลโมเลกุลของเอสเทอร์ พบว่าที่เวลา 2-7 วันผลิตภัณฑ์เอสเทอร์ที่มีมวลโมเลกุลลดลงเหลือประมาณ 233-398 จากการตรวจสอบโครงสร้างด้วยเทคนิคอินฟราเรดสเปกโตรสโคปีโดมิเตอร์ พบว่าผลิตภัณฑ์เอสเทอร์ที่ได้มีหมู่ไฮดรอกซิลเป็นหมู่ปิดท้ายสายพอลิเมอร์

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