

**COMPOUNDING OF POLY(LACTIC ACID) (PLA) FOR THE
DEVELOPMENT OF BIODEGRADABLE PLASTIC BAGS**



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ABSTRACT

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The present research focuses on the development of compounding of poly(lactic acid) (PLA) for plastic bags by exploring the additives to be chosen i.e., plasticizer: poly(butylene succinate adipate) (PBSA), glycerol, polyethylene glycol (PEG) 200, PEG 6,000, PEG 20,000, nucleating agent: talc, cloisite Na⁺, polyoxymethylene, succinic acid, filler: tapioca starch, compatibilizer: maleic anhydride, 3-glycidoxypropyltrimethoxysilane, methylenedi-p-phenyl diisocyanate (MDI) including an appropriate amount of additives to be added. To simplify the studies, the investigations of the PLA compounded are carried out by using differential scanning calorimeter (DSC) to clarify the glass transition, crystallization, and melting performance, using scanning electron microscope (SEM) to observe the compatibility, and using polarizing optical microscope to trace the crystallization.

บทคัดย่อ

เมื่อนี้ คณานันท์ : การพัฒนาสูตรการผลิตผลิตภัณฑ์พลาสติกชีวภาพ โดยกระบวนการขึ้นรูปพอลิแลคติกแอซิดเป็นถุงพลาสติก (Compounding of Poly(lactic acid) (PLA) for the Development of Biodegradable Plastic Bags) อ. ที่ปรึกษา : รองศาสตราจารย์ ดร. สุวบุญ จิรชาอุชัย 54 หน้า

งานวิจัยนี้มุ่งเน้นไปที่การพัฒนาสูตรการผลิตผลิตภัณฑ์พลาสติกชีวภาพ โดยกระบวนการขึ้นรูปพอลิแลคติกแอซิดเป็นถุงพลาสติก โดยวิธีการเติมสารเติมแต่งในปริมาณที่เหมาะสมลงไป ได้แก่ พลาสติกไซเซอร์: พอลิบิวทิลีนซัคซิเนตอะดิเพต กลีเซอรอล พอลิเอทิลีนไกลคอล (มวลโมเลกุล 200, 6,000 และ 20,000), สารก่อผลึก: ทัลก์ คอยล์ไซท์ โซเดียมพอลิออกซีเมทิลีน ซัคซินิกแอซิด, สารเติมเต็ม: แป้งมันสำปะหลัง, สารประสาน: มาเลอิกแอนไฮไดรด์ 3-ไกลซิดอกโพรพิลไตรเมทอโรกซีไซเลน เมทิลีนได-พารา-ฟีนิลไดไอโซไซยาเนต เครื่องดีเฟอเรนเชียลสแกนนิ่งแคลอริมิเตอร์เป็นเครื่องมือหลักที่ใช้ในการศึกษาสมบัติทางความร้อนของสารประกอบพอลิแลคติกแอซิด ซึ่งได้แก่ อุณหภูมิคล้ายแก้ว อุณหภูมิการเกิดผลึกและอุณหภูมิการหลอมเหลว กล้องจุลทรรศน์แบบส่องกราดถูกใช้ในการศึกษาความเข้ากันได้ระหว่างพอลิแลคติกแอซิดและแป้ง และกล้องจุลทรรศน์เพื่อดูแนวโน้มในการเกิดผลึก

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