

**EFFECT OF COMPATIBILIZERS ON THE MECHANICAL
PROPERTIES OF HDPE/STARCH BLENDS**

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for the Degree of Master of Science
The Petroleum and Petrochemical College, Chulalongkorn University
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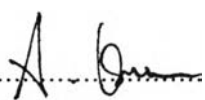
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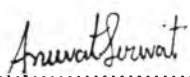
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ABSTRACT

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Nattapol Monthiankasem: Effect of compatibilizers on the mechanical properties of HDPE/starch blends. Thesis
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The effect of compatibilizers on the mechanical properties and water absorption of HDPE/tapioca starch blends were examined. Three different types of compatibilizer were used in this study: poly(ethylene-co-acrylic acid) (EAA), poly(ethylene-co-vinyl acetate) (EVA), and poly(ethylene-graft-maleic anhydride) (PE-g-MA). The mechanical properties and water absorption of the compatibilized blends were studied as functions of starch and compatibilizer content. The tensile strength, tensile modulus, and flexural strength of the blends were improved by using EAA or PE-g-MA as compatibilizer whereas the use of EVA or PE-g-MA improved the elongation at break of the blends. Compatibilizer contents greater than 10 wt% (based on starch) gave adverse effects on the mechanical properties of the blends. In addition, it was found that the presence of compatibilizers retarded the water absorption of the blends.

บทคัดย่อ

ณัฐพล มนต์เทียนเกษม : ผลกระทบของสารเสริมความเข้ากันได้ต่อสมบัติเชิงกลในพอลิเมอร์ผสมระหว่างพอลิเอทิลีนความหนาแน่นสูงและแป้ง (Effect of Compatibilizers on the Mechanical Properties of HDPE/Starch Blends) อ. ที่ปรึกษา : รศ. ดร. เดวิด ซี มาร์ติน (Assoc. Prof. David C. Martin) และ ดร. รัตนา รุจิรวนิช 80 หน้า ISBN 974-334-181-1

งานวิจัยนี้ได้ทำการศึกษาผลกระทบของสารเสริมความเข้ากันได้ที่มีต่อสมบัติเชิงกลและสมบัติการดูดซับน้ำของพอลิเมอร์ผสมระหว่างพอลิเอทิลีนความหนาแน่นสูงและแป้งมันสำปะหลัง โดยสารเสริมความเข้ากันได้ที่ใช้ได้แก่ พอลิเอทิลีนโคอะครีลิกเอซิด พอลิเอทิลีนโคไวนิลอะซิเตด และ พอลิเอทิลีนกราฟต์มาเลอิกแอนไฮไดรด์ ตัวแปรที่ใช้ในการศึกษานี้คือ ปริมาณแป้งมันสำปะหลัง และปริมาณสารเสริมความเข้ากันได้ ผลจากการศึกษาสมบัติเชิงกลพบว่า ค่าการทนต่อแรงดึง ค่าการทนต่อแรงกด และมอดูลัสของการดัดยัด ของพอลิเมอร์ผสมมีค่าเพิ่มขึ้นเมื่อใช้ พอลิเอทิลีนโคอะครีลิกเอซิด หรือ พอลิเอทิลีนกราฟต์มาเลอิกแอนไฮไดรด์ เป็นสารเสริมความเข้ากันได้ ในขณะที่ พอลิเอทิลีนโคไวนิลอะซิเตด หรือ พอลิเอทิลีนกราฟต์มาเลอิกแอนไฮไดรด์ สามารถปรับปรุง ค่าการยืดตัว ณ จุดขาด ของพอลิเมอร์ผสมได้ การเพิ่มปริมาณสารเสริมความเข้ากันได้เกินกว่าร้อยละ 10 โดยน้ำหนักของแป้งมันสำปะหลัง กลับทำให้สมบัติเชิงกลของพอลิเมอร์ผสมมีแนวโน้มลดลง นอกจากนี้การศึกษาศักยภาพการดูดซับน้ำ แสดงให้เห็นว่า การใช้สารเสริมความเข้ากันได้สามารถลดการดูดซับน้ำของพอลิเมอร์ผสมลงได้

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