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**A POLYMER BLEND OF POLYAMIDE AND  
HIGH IMPACT POLYSTYRENE**

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**A Thesis Submitted in Partial Fulfillment of the Requirements for the**

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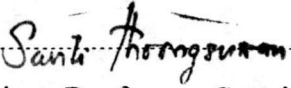
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พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

สรณิมชู้ หอนุญาสุทธิ : โพลีเมอร์ผสมระหว่างโพลิเอไมด์กับโพลิสไตรีน

(A POLYMER BLEND OF POLYAMIDE AND HIGH IMPACT POLYSTYRENE)

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การวิจัยนี้ศึกษาโพลีเมอร์ผสมระหว่าง โพลิเอไมด์ 6 (PA6) และโพลิสไตรีนชนิดทนแรง  
กระแทกสูง (HiPS) ที่อัตราส่วน 20/80 40/60 60/40 และ 80/20 PA6/HiPS ตามลำดับ นอกจากนี้ ยังศึกษา  
การปรับปรุงสมบัติโพลีเมอร์ผสมโดยเติมโคโพลิเมอร์ของสไตรีนเอทิลีนบิวทิลีนที่ต่อแขนงกับมาลิก  
แอนไฮไดรด์ (SEBS-g-MA) เป็นตัวช่วยให้เข้ากันที่ปริมาณ 2.5, 5, 7.5 และ 10 ส่วนในร้อยส่วนของโพลิ  
เมอร์ผสม การศึกษาด้านสมบัติเชิงกล โดยการดึง การกระแทก และ อุณหภูมิที่ทำให้โค้งผิดรูป พบว่าเมื่อ  
ใส่ SEBS-g-MA โพลีเมอร์ผสมที่อัตราส่วน 20/80 60/40 และ 80/20 PA6/HiPS มีความเหนียวดีขึ้น ยกเว้น  
ที่อัตราส่วน 40/60 PA6/HiPS ซึ่งความเหนียวด้อยลง อย่างไรก็ตาม สมบัติด้านเชิงกลของโพลีเมอร์ผสมที่  
ได้ยังคงต่ำกว่าโพลีเมอร์พื้นฐานทั้งสอง การศึกษาสมบัติเชิงความร้อน จากอุณหภูมิสภาพคล้ายแก้ว พบว่า  
โพลีเมอร์ผสมทั้งที่เติมและไม่เติม SEBS-g-MA เป็นโพลีเมอร์ผสมประเภทมีการเข้ากันได้บางส่วน การ  
ศึกษาระดับจุลภาค พบว่าการเติม SEBS-g-MA ช่วยให้การกระจายตัวและการแพร่ของวัฏภาคดีขึ้น  
สำหรับกรณี 40/60 PA6/HiPS มีการเปลี่ยนลักษณะของวัฏภาคกระจายตัวจากเดิมที่เป็นเส้นใยในกรณีไม่  
เติม SEBS-g-MA เป็นอนุภาคกระจายตัวในกรณีที่เติม SEBS-g-MA ซึ่งสอดคล้องกับการลดลงของความ  
เหนียวที่อัตราส่วนนี้ และแสดงให้เห็นว่าสถานะของโพลีเมอร์ผสมมีผลต่อสมบัติด้านเชิงกลของโพลีเมอร์  
ผสมที่ได้

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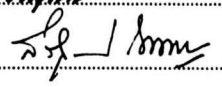
## C516957 : MAJOR CHEMICAL ENGINEERING

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This research aims to study a polymer blend between polyamide 6 (PA6) and high impact polystyrene at a blend ratios of 20/80, 40/60, 60/40 and 80/20 PA6/HiPS respectively. Maleated styrene-ethylene/butylene-styrene block copolymer (SEBS-g-MA) is added as a compatibilizer for the blend systems. The mechanical properties in terms of tensile properties, impact properties and the heat distortion temperature were investigated. The study shows that the addition of the SEBS-g-MA compatibilizer improves the toughness of almost all the polymer blends except the 40/60 PA6/HiPS. At such composition, the addition of the SEBS-g-MA shows an adverse effect in toughness. However, most of the mechanical properties of the polymer blends are still lower than both parent polymers. The thermal properties in terms of the glass transition and the melting point temperature were also studied. The results imply that uncompatibilized and compatibilized polymer blends are partially miscible. Microscopic study of the polymer blends shows that the addition of the compatibilizer improves the distribution and the dispersion of domain phase in the matrix. For 40/60 PA6/HiPS, the addition of the SEBS-g-MA compatibilizer changes from the fibril domain phase observed when SEBS-g-MA is not applied to a particle domain phase when SEBS-g-MA is applied. This change explains the reduction of the toughness at the 40/60 ratio. In addition, it shows the influence of the polymer blend morphology on the mechanical properties of the blends.

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## NOMENCLATURES

$\Delta G_m$	Gibbs' free energy of mixing
$\Delta H_2$	Heat of fusion of 100% Crystalline part
$\Delta H_m$	Enthalpy of mixing
$\chi_{12}$	Interaction Parameter of the blends
$\chi_{AB}$	Flory-Huggins interaction parameter
$\delta$	Phase angle
$\delta_1, \delta_2$	Solubility parameters of two homopolymers ; 1, 2
$\phi$	Phase volume fraction
$\phi_2$	Volume Fraction of Crystalline Part
$\gamma$	Shear rate
$\gamma_1, \gamma_2$	Degree of Polymerization
$\eta$	Melt viscosity
$\eta_d$	Viscosity of the matrix
$\eta_m$	Viscosity of the droplet
$\sigma$	Interfacial tension
$a$	Characteristic interfacial thickness;
$B$	The minor axis of the ellipsoidal deformed droplet in the shear field
$B_{12}$	Interaction energy density
$D$	Deformation of a droplet in the shear field
	Glass transition temperature of the mixture

$L$	The major axis of the ellipsoidal deformed droplet in the shear field
$P$	Viscosity ratio
$R$	Radius of the droplet
$T_g$	Glass-transition temperature
$T_{g,i}$	Glass transition temperature of the $i$ th component
$T_m$	Equilibrium melting temperature
$T_m^\circ$	Equilibrium temperature of Pure Component
$V_1, V_2$	Molar Volume of amorphous and Crystalline components in the shear field
$We$	Weber number
$W_i$	Weight fraction of the $i$ th component