

SL 9.8

Miscibility and Mechanical Behavior of SAN/NBR Blends

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Aiming the development of high toughness polymer materials, blends of poly(styrene-co-acrylonitrile) (SAN) and poly(butadiene-co-acrylonitrile) (NBR) rubbers, with contents of acrylonitrile (AN) varying from 21 to 45%, were prepared by casting, coprecipitation and monoscrew extrusion followed by injection molding. SAN/NBR blends, prepared in the compositions (w/w) 90/10, 80/20, 70/30, 60/40, and 50/50, were characterized by differential scanning calorimetry (DSC) and Izod impact tests. The DSC analyses showed that blends with 33% AN NBR prepared by casting, and with 39% AN NBR prepared by co-precipitation, are partially miscible at 60/40, 70/30 e 80/20 (SAN/NBR) compositions and immiscible for the 50/50 compositions. On the other hand, 90/10 SAN/NBR systems are totally miscible. The blends with 45% AN NBR prepared by co-precipitation showed partial miscibility to 50/50, 60/40, 70/30 and 90/10 compositions and total miscibility to 80/20 composition. The NBR addition results in a significant increase in the impact resistance, strongly influenced by blend composition and NBR AN content. The best result of impact resistance - 75.20 ± 8.60 (kJ/m²) - was obtained for SAN/NBR 50/50, using 45% AN NBR. This value is 15.7 times bigger than that for pure SAN - 4.79 ± 0.67 (kJ/m²).