Properties of styrene butadiene rubber/recycled acrylonitrile-butadiene rubber (SBR/NBRr) blends: Effect of the addition of trans-polyoctylene rubber

Abstract

This study investigated polymer blends based on different ratios of styrene butadiene rubber (SBR) and recycled acrylonitrile butadiene rubber (NBRr) with and without trans-polyoctylenerubber (TOR) as a compatibilizer. Five compositions of SBR/NBRr/TOR were prepared; 95/5/5, 85/15/5, 75/25/5, 65/35/5, and 50/50/5. Rheological characteristics, tensile and physicalproperties, and the morphological behavior of compatibilized and uncompatibilized SBR/NBRr blends were determined. The rheological characteristics indicated that compatibilized SBR/NBRr blends had a shorter cure time (t_{90}) than uncompatibilized SBR/NBRr blends. The compatibilized SBR/NBRr blends showed lower minimum torque (M_L) when compared with as uncompatibilized SBR/NBRr blends, indicating that compatibilization improved the processability of the blends. However, the maximum torque (M_H) of compatibilized SBR/NBRr blends was higher than that of uncompatibilized SBR/NBRr blends. The incorporation of TOR improved the tensile strength, tensile modulus (M100), hardness, and crosslinked density of compatibilized SBR/NBRr blends. However, the elongations at break (E_b) and resilience of compatibilized SBR/NBRr blends were lower as compared to uncompatibilized SBR/NBRr blends. Scanning electron microscopy of the tensile fractured surfaces demonstrated that the addition of TOR in SBR/NBRr blends improved the adhesion between NBRr and the SBR matrix, thus improving the compatibility of SBR/NBRr blends.