# Properties of styrene butadiene rubber (SBR) / recycled acrylonitrile butadiene rubber (NBRr) blends: The effects of carbon black/silica (CB/Sil) hybrid filler and silane coupling agent, Si69


## Abstract

The recycling or reuse of waste rubber by means of blending together with polymeric materials in addition of filler such as hybrid carbon black and silica (CB/Sil) to a polymer system can provides an opportunity to explore alternative product specifications. Therefore, in this work the investigation of recycled rubber blends based on styrene butadienerubber/recycled acrylonitrile butadiene rubber (SBR/NBRr) blends reinforced with 50/0, 40/10, 30/20, 20/30, 40/10, 0/50 phr of carbon black/silica (CB/Sil) hybrid filler treated with and without silane coupling agent (Si69) were determined. Cure characteristics, tensile properties, and morphological behavior of selected SBR/NBRr blends at a fix 85/15 blend ratio were evaluated. Results showed that, cure time $t_{90}$, minimum torque ($M_L$), and maximum torque ($M_H$) of CB/Sil hybrid fillers filled SBR/NBRr blends with and without Si69 increased as silica content increased. However, $t_{90}$ and $M_L$ of SBR/NBRr blends with Si69 were lower than without Si69 except for ($M_H$). The optimum scorch time ($t_{s2}$) of SBR/NBRr blends with and without Si69 was obtained at 30/20 phr of CB/Sil hybrid filler. However, $t_{s2}$ of SBR/NBRr blends with Si69 were longer than SBR/NBRr blends without Si69. The incorporation of Si69 has improved the tensile properties [(tensile strength, elongation at break ($E_b$), stress at 100% elongation (M100), and stress at 300% elongation (M300)] of CB/Sil hybrid fillers filled SBR/NBRr blends. These properties were influenced by the degree of crosslinked density as the silica content is increased. Scanning electron microscopy (SEM) of the tensile fracture surfaces indicated that, with the addition of Si69 improved the dispersion of hybrid fillers and NBRr in SBR/NBRr matrix.