ABSTRACT

Thermoplastic elastomers have been developed from the blends of NBR/SAN. Master batch method provides superior mechanical properties than the conventional preblend method. Moreover, the blends dynamically-vulcanized with sulfur-accelerator system exhibit better mechanical properties than those dynamically-vulcanized with dicumyl peroxide. The model waste nitrile rubber powder (w-NBR) prepared in the laboratory by ambient grinding of NBR vulcanizate could be utilized as partial replacement for the virgin NBR and the properties reach an optimum at 45% replacement and the blend is still reprocessable. Virgin NBR forms a coating over the w-NBR as found out from the TEM studies. From the MDR studies, it is found that migration of unreacted curatives from w-NBR to virgin NBR is not significant and incorporation of curatives is necessary for attainment of proper degree of crosslinking and optimum level of mechanical properties. However, filler present in w-NBR contributes to some extent to the reinforcement of the thermoplastic elastomeric blend. w-NBR reduces the die swell of the thermoplastic elastomeric blends due to the filler effect and improves the surface smoothness. Dynamically vulcanized 60/40, 70/30, and 80/20 NBR/scrap computer plastics blends behave as thermoplastic elastomers. Dynamically vulcanized NBR particles are dispersed in ABS matrix as revealed by AFM and TEM studies. Parallel plate rheometry studies reveal that the NBR/w-NBR/SAN and NBR/SCP blends are thermorheologically complex and their flow behavior obeys power-law model. These blends show deviation from Newtonian behavior with increasing temperature. The NBR/w-NBR/SAN and NBR/SCP blends show excellent swelling resistance to various solvents and IRM # 903 oil.

Key words: thermoplastic elastomers, dynamic vulcanization, ambient grinding, filler reinforcement, die swell, swelling resistance, reprocessing, AFM, TEM, ABS, NBR, SAN.