RHEOLOGICAL BEHAVIOR OF POLYPROPYLENE CONTAINING GROUND TIRE RUBBER

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Isotactic polypropylene (PP), due to its intrinsic properties such as high melt temperature, low density, and high chemical inertness, finds use in a wide range of application. Easy incorporation of high contents of fillers and reinforcing agents, and ability to produce blends with other polymers including rubbers makes PP versatile.

The large number of waste tire has become a significant problem with the increase in the number of automobiles each year. The technology for recycling of rubbers is complex and costly. Upon processing and molding the thermosets like rubbers are crosslinked, and therefore cannot be softened or remolded by repeated heating. The related ground tire rubber (GTR) is available in different fractions and is mostly used in less demanding applications. There is a great need to find some value-added applications for GTR products.

This work was undertaken to investigate GTR as a filler in PP. Blends based on PP and GTR behave like thermoplastic rubbers. These blends can be processed like PP. Rheological properties greatly influence the processing behavior. Therefore, the study of the rheological properties of their melts is important.

Commercial available PP (Russia) of different molecular weight was used in this study. Rubber powders were prepared from truck tire treads.

Rheological behavior of the blends was studied using capillary and parallel-plate rheometers. Measurements were carried out at 190^{o}C. MFI values were measured at 190 and 230^{o}C and three weights of 2.16, 5.00, and 10.00 kg.

Blends PP of different molecular weights and GTR were prepared. The flow properties and linear viscoelastic properties such as storage and loss moduli, loss tangent, complex viscosity of PP/GTR blends were determined as functions of GTR content. It is shown that the addition of about 10 wt. % GTR gives rise to the decreasing of viscosity of PP/GTR blends. This decreasing depends on molecular weight of PP. Thus, significant improvement in the flowability of PP/GTR blends depends on molecular weight of PP and content of GTR.