Abstract

This work was initiated to develop a novel reclaiming process by using a cheap renewable resource material by a simple method at near ambient temperature to improve the quality of the reclaim rubber. The whole thesis reports the findings of the investigations on reclaiming of rubber, assessment of the extent of reclaiming and evaluation of their properties by mixing with some fresh elastomers. The results have been compared with the commercial reclaim rubber.

Reclaiming was carried out by milling the vulcanized rubber in presence of a renewable resource material (RRM) and its reclaiming activity was compared with that of a synthetic chemical, diallyl disulfide (DADS), which is the major constituent of RRM. Simultaneously reclaiming of vulcanized rubber was also carried out by refluxing with RRM and DADS in toluene. The extent of reclaiming after heat treatment by refluxing in toluene at 110^0C was also estimated by determination of various types of sulfur present in the sample, retention of tensile properties of the reclaim rubber and molecular weight of the toluene soluble rubber which completely went into solution due to reclaiming by heat treatment. RRM was extracted from a vegetable product and its percentage of organic matter was measured. Assessment of reclaim rubber was carried out by measurement of sol content, molecular weight of sol content and Mooney viscosity of reclaim rubber. Here NR, SBR and NR-PBR blend system was taken. Based on this result a mechanism of reclaiming is also proposed.

Reclaim rubbers were evaluated for their compounding behavior in NR, SBR, and NR-PBR blend. The vulcanizate properties viz. modulus, tensile strength, elongation at break and hardness were measured for the reclaim rubbers as blends with three different elastomeric systems (NR, SBR and NR-PBR blend) before and after aging. Compatibility of reclaim rubber with virgin elastomers was also studied by scanning electron microscope. Effect of carbon black on properties of virgin rubber-reclaim rubber blend was also studied. As reclaim rubber is scorchy some prevulcanization inhibitor was added to the virgin rubber-reclaim rubber blend to increase the scorch time. The performances of test reclaim of NR-PBR blend system were compared with those of a commercial reclaim rubber.

It has been found from the results of investigations that reclaim rubber thus obtained has shown lower Mooney viscosity providing easy incorporation and uniform dispersion in the blends with other rubbers. The reclaim rubber has shown lower optimum cure time compared to virgin rubber. Tensile properties of test reclaim and virgin rubber blend are comparable with those of a commercial reclaim and virgin rubber blend. Test reclaim shows better antiaging property than commercial reclaim rubber.