



## **Influence of Oil and Fillers on Properties of Thermoplastic Elastomer Based on Natural Rubber-Polyethylene Blends**

### **Abstract**

Thermoplastic elastomer based on natural rubber blended with two types of polyethylene (i.e., HDPE and LLDPE) was prepared. Two types of techniques were exploited: a simple blend and dynamic vulcanization technique. The simple blend technique of NR/PE blend at a blend ratio of 60/40 was studied. This is because at this blend ratio, co-continuous phase morphology of the blend was observed. Influence of various blend compatibilizers was then studied. We found that HRJ-10518 exhibited the most appropriate blend compatibilizer. It was later used throughout this work. Effect of types of process oils (i.e., white oil, paraffinic oil, naphthenic oil, epoxidized oil and plasticizer (dioctyl phthalate, DOP) on properties of the TPE was later investigated. It was found that white oil gave the TPE with superior properties. Influence of concentration of white oil on properties of the TPE was later studied. We found that increasing level of white oil caused decreasing trend of tensile strength, shear viscosity, and hardness but increasing elongation at break and elastomeric properties (based on tension set results). Two types of fillers (i.e., carbon black and silica) were used in the TPE based on OENR/HDPE and OENR/LLDPE blends. It was found that increasing loading level of fillers caused increasing level of tensile strength, shear viscosity, and hardness but decreasing elongation at break and elastomeric properties. Thermoplastic vulcanizates (TPVs) were later prepared based on NR/PE blend at a blend ratio of 60/40. Influence of vulcanization system was first investigated using various vulcanization systems: sulphur, peroxide, mixed system (sulphur and peroxide) and phenolic system using two types of phenolic resins (SP-1045 and HRJ-10518). We found that the phenolic system using HRJ-10518 provided the TPVs with the best properties. Influence of loading level of white oil and fillers (i.e., carbon black and silica) on properties of the TPVs was also studied. We found that the oil and fillers showed similar affect on the TPEs based on a simple blend technique.