

Study the Effect of Maleic Anhydride as Compatibilizing Agent on Filler-Rubber Interaction, Rheological and Mechanical Properties of NR/Nanoclay Platelet Nanocomposites[#]

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Abstract: Natural rubber (NR) was compounded with three levels of modified nanoclays, namely 1 CEC, 2 CEC, and 4 CEC cation exchange capacities at 5 phr filler content in terms of improving its properties. The aim of this work was to study the effect of maleic anhydride (MAH) used as compatibilizing agent on the filler-rubber interaction (bound rubber content, BRC), rheological, mechanical, and swelling properties. The results showed that, bound rubber content of unvulcanized rubber/MAH compounds increases with increasing the modification degree of clay as compared to those without MAH. This implies that filler-rubber interactions were achieved in the presence of MAH because of chemical and physical bond formations. The rheological data in terms of curing time, T_{C90} and maximum torque, M_{max} were determined. It was found that there is a long delayed onset of curing for approximately 7 min and a decrease of torque in the presence of MAH as compared to that of samples in absence of MAH. The chemical reaction of 2- mercapto benzothiazole (MBT) accelerator and MAH in NR matrix was studied by Fourier transform infrared spectroscopy (FTIR). The FTIR spectra confirmed the reaction between them. The tensile tests of the investigated vulcanizates NR/1CEC, NR/2CEC, and NR/4CEC without MAH showed higher tensile values, 15.70, 15.63 and 10.96 MPa, respectively at 5 phr of investigated filler loading as compared to that of neat NR, or samples with MAH. Furthermore, the swelling measurements for vulcanized NR rubber with/and without MAH were carried out in toluene. The results showed that samples without MAH improved the swelling behavior rather than those with MAH.

Keywords: *Natural rubber, nanoclay, maleic anhydride, bound rubber content, rheological data, tensile tests*

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