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EFFECT OF ORGANOCLAY ON MORPHOLOGY DEVELOPMENT AND RHEOLOGICAL PROPERTIES OF DYNAMICALLY VULCANIZED NANOCOMPOSITES BASED PP/EPDM/ORGANOCLAY

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In this work the effect of presence of organoclay on morphology development and rheological properties of dynamically vulcanized polypropylene (PP)/ethylene-propylene-diene monomer (EPDM)/organoclay systems was studied. Three sets of samples with the same composition but varying in EPDM phase viscosity were considered. All nanocomposites were prepared by melt compounding of PP and EPDM with maleic anhydride grafted PP (PP-g-MA)/organoclay based masterbatch using a sulfur curing system in an internal mixer. The mixing torque-time plots were recorded for all samples during melt mixing. The presence of organoclay was found to reduce the mixing torque associated with the dynamically curing process. This was attributed to hindrance effect of organoclay on cured EPDM particles agglomeration. The X-ray diffraction (XRD) patterns indicated that in all nanocomposites, the first characteristic peak of organoclay (cloisite 15A) was disappeared that proposed a good dispersion of nanoclay into the systems was occurred. The results of melt linear viscoelastic measurements performed on the samples showed a pronounced low frequency non-terminal behavior for the vulcanizate samples as a result of agglomeration forming between the cured EPDM particles. The addition of organoclay in the vulcanizate samples was found to have a considerable enhancing effect on the frequency elastic response. However, this effect was not as strong as for PP/organoclay system. From these results it could be suggested that major part of organoclay tactoids or/and platelets are dispersed in the PP matrix and form a separate network due to nano-nano or nano-matrix interconnectivity and the rest located in the interface. Both of these processes could play an important role in reducing the extent of the cured EPDM agglomeration. This could be supported by Transmission Electron Microscopy (TEM) micrograph of samples.