Effect of Octadecylamine Modified Montmorillonite on the Properties of Styrene-Butadiene-Rubber

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Nanocomposites with macromolecular matrices offer the possibility to design of materials with very interesting properties. Clays are frequently used as fillers potentially forming nanostructures in the matrix. This study focused on an investigation of the effect of octadecylamine modified montmorillonite (OMMT) on the properties of styrene-butadiene-rubber (SBR). SBR/OMMT nanocomposites (2.5, 5, 10 and 15 phr organoclay) were prepared by a compounding procedure followed by a compression-molding of 160ºC. The optimum cure time was determined by rheometry. The mechanical, thermal and dynamomechanical properties of the composites were determined and the morphology was studied by the transmission electron microscopy (TEM). Clay is observed to disperse homogeneously in multiple thin layers and single platelets in the rubber matrix. Clay layers thickness was around 10-20 nm in the composites. At high OMMT contents, some aggregates were observed. OMMT addition to SBR had a positive effect on mechanical properties. Clay addition increased significantly both the strain at break and the stress at break in comparison to unfilled SBR. The reinforcing effect, estimated as the tensile modulus at 100 % elongation, increased with increasing clay loading. Thermal stability of SBR nanocomposites showed a slight decrease suggesting the partial degradation of the clay organic modifier. Glass transition temperature changes in relation to unfilled SBR were not observed in the nanocomposites.

Financial support was provided by Xunta de Galicia (Axudas do programa de consolidación Expte. 2007/0008_0).