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Preparation and Characterization of PET/Organoclay Nanocomposites

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The aim of this work was the preparation of PET/organoclay nanocomposites by melt intercalation process, as well as to evaluate the effectiveness of a polyester ionomer as compatibilizing agent for this system. The materials were processed with one-step feeding in a twin-screw extruder having 3 and 5wt% of organoclay, without compatibilizer and with the compatibilizer/organoclay ratio of 1:1 and 3:1. The nanocomposites showed an intercalated structure with partial exfoliation, where the compatibilized samples presented better dispersion and higher extension of intercalation and/or partial exfoliation. In the melt state, the nanocomposites showed higher complex viscosity values presenting yield strength. It was also observed that the lower slope values and the higher absolute values of the G' and G'' at low frequencies, when comparing to those of pristine PET, imply a solid-like behavior indicating the formation of a percolated structure. The nanocomposites showed small changes in CO₂ solubility when compared to pure PET, however a significant CO₂ permeability reduction was found. The presence of the compatibilizer intensifies this effect, leading to reductions of approximately 50% in permeability. The nanocomposites also showed better lower water vapor permeability with reduction of up to 30% for the samples containing compatibilizer/clay ratio of 1:1 as compared to neat PET. Further increase in the compatibilizer amount resulted in a water vapor permeability increase, due probably to the higher interaction compatibilizer/water.