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EVALUATION OF DEGRADATIVE PROCESSES ON LOW MOLAR MASS PET/ORGANOCLAY NANOCOMPOSITES PREPARED VIA MELT EXTRUSION

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Recently, polymer/layered silicate nanocomposites have attracted considerable attention in academic and industrial studies due to their unique properties compared with those of conventional composites such as flame resistence, low gas permeability, high modulus and thermal stability. Poly (ethylene terephthalate) is one of the most used polymer in world market due to its good properties such as mechanical and barrier. It finds extensive application especially in areas of engineering plastics, fibers and packaging. Mica-type layered silicates, especially montmorillonite (MMT) are most widely used to prepare nanocomposites. Usually, they must be organically modified to promote better interaction with the polymer source. Among the modifiers used, quaternary ammonium surfactants are the most common, due to their low cost and commercial availability it is possible prepare clays miscible with a broad range of polymer matrix. From an industrial point of view, preparation of thermoplastic nanocomposites by melt blending, using conventional plastic compounding tools is the best choice, due to its simple and versatile processing way. However, this method can cause thermal decomposition of commonly used alkylammonium ions in modified clays, furthering degradation of polymer matrix trough unwanted side reactions between the surfactant's decomposition products and the polymer. In addition, active sites on the edges and surfaces of clay platelets may also cause the polymer degradation during melting process, due the clay catalysis effects.

So, the aim of this work was to investigate the influence of montmorillonite organoclay addition on degradative processes of low molar mass PET. PET/Organoclay nanocomposites were prepared by melt compounding with 0, 1, 3 and 5% (wt.%) of organoclay content using a co-rotating twin screw extruder. The samples were characterized by X-ray diffraction (XRD), thermogravimetric analyses (TG), intrinsic viscosity (IV), capillary and parallel plates rheometry.

The results showed intercalation of the polymer chains into the galleries of the clay. However, the organoclay addition further PET degradation, as showed by the decrease of matrix molar mass and viscosity. This effect was increased with the organoclay content. Besides, the materials had a decrease in thermal stability, as showed by TG results.