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PII: S1359-8368(16)00049-4

DOI: 10.1016/j.compositesb.2015.12.040

Reference: JCOMB 3987

To appear in: *Composites Part B*

Received Date: 5 May 2015

Revised Date: 2 December 2015

Accepted Date: 26 December 2015

Please cite this article as: do Nascimento EM, Eiras D, Pessan LA, Effect of Thermal Treatment on Impact Resistance and Mechanical Properties of Polypropylene/Calcium Carbonate Nanocomposites, *Composites Part B* (2016), doi: 10.1016/j.compositesb.2015.12.040.

# Effect of Thermal Treatment on Impact Resistance and Mechanical Properties of Polypropylene/Calcium Carbonate Nanocomposites

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**Abstract**

Heat treatment was applied in polypropylene/calcium carbonate nanocomposite and its effects on the structure and impact resistance of the materials were studied. The nanocomposite was prepared by melt blending in a twin screw extruder and subsequently molded into tensile specimens by injection molding. Polypropylene and the nanocomposite were characterized through tensile and impact tests, wide angle x-ray diffraction (WAXD), transmission electron microscopy (TEM), differential scanning calorimetry (DSC) and dynamic mechanical thermal analysis (DMA). The results show an increase in impact strength of the nanocomposite after heat treatment which was accompanied by an increase in elastic modulus. DSC and WAXD results show an increase in the crystallinity of the polymer matrix of the nanocomposite but not in the neat polymer. Analysis of the morphology of PP and the nanocomposite PP/$CaCO_3$ revealed that the nanocomposite has a non-spherulitic morphology. Results from DMA indicate that thermal treatment affects the rigidity of the amorphous phase of polypropylene. A mechanism was proposed to