Abstract

The development of new materials is very important today to the society in which we live, whether for economic, environmental or productive. Experiments to obtain nanocomposites with new physical and chemical properties is a research area in continuous growth. Silver nanoparticles are of particular interest because of its bactericidal properties and multiple applications can be deployed with this unique feature but is very unusual use silver nanoparticles as reinforcement in a polymer. Therefore the aim of this project is to determine how efficient are the silver nanoparticles when they act as reinforcing a polymer matrix such as polypropylene, one of the most used polymers today.

This research project was developed nanocomposites (polypropylene - silver nanoparticles) with different percentages of silver nitrate and load (3, 5 and 10 wt%), using mixed media a single screw extruder and Brabender type mixer. Silver nanoparticles were prepared under mild conditions by poly(ethylene glicol) (PEG) at 80ºC. The thermal properties of the nanocomposites were determined by differential scanning calorimetry (DSC), while the mechanical properties (stress and elongation) were determined by the universal machine. The impact resistance also was determinated through a impactometer using the Gardner method. To determine morphological properties such as shape, size and arrangement of the visible features of the nanocomposite was used polarized light microscopy (PLM), the microstructure of the silver nanoparticles was observed by atomic force microscopy (AFM) and was used x-ray diffraction (DRX) of $10 < 2\theta < 30$ ° to identify the presence of the β form in the materials.

The nanocomposites obtained showed an increase in some properties such as elasticity with respect to the polypropylene, being affected impact resistance. There was found that single screw extruder its a good way to mix the nanocomposites but it has some leakage of silver nanoparticles when the extruder is operating. The β form was found in some materials.