POLYMER PROCESSING AND MODIFICATION BY IONIZING RADIATION

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Vinyl Acetate Polymerization by Radiation. The aim of this work is the synthesis and characterization of the poly(vinyl acetate) - PVAc by gamma radiation. The polymerizations of vinyl acetate were carried out using three techniques: in bulk, emulsion and solution, using a Gammacell-220 at different doses. From the PVAc characterization by infrared spectroscopy and other techniques, it was possible to verify that the polymers obtained in these studied cases actually correspond to poly(vinyl acetate) with a high degree of purity and good properties.

Radiation Effects on Polyamide 6.6 With or Without Fiber Glass Reinforcement and Acrylonitrile Butadiene Styrene - ABS. The aim of this work is to study the ionizing radiation effects on these polymers. These polymers were irradiated by 1.5MeV electron beam in different doses. The polymers were characterized by different methods. It was shown that for doses until 500kGy, at 22.6kGy/s dose rate, in the presence of air, the cross-linking process prevails for ABS and until 300kGy the cross-linking process prevails for polyamide 6.6.

Effects of Ionizing Radiation on Plastic Food Packaging Materials. The aim of this work is to examine the effects of ionizing irradiation on different commercial multilayer and monolayer Brazilian food packaging films. The films were irradiated with doses up to 130kGy. After irradiation, the changes were analyzed in molecular structure and color formation in irradiated material packaging films and the following packaging film properties: tensile strength, elongation and light transmittance in the near UV range.

Polymer Modifications by Electron and g - Irradiation. Natural and synthetic polymers undergo various processes, mainly cross-linking, when irradiated, resulting in modification of their physical, thermal, mechanical and optical properties diving at surgical gloves and biomaterials manufacture, radiosterilization of medical supplies and recycling. The experimental results have shown that ionizing radiation can be used as an alternative process for polymeric materials with various advantages when compared with the traditional chemical process, also leading to new industrial applications.

Improvement of the mechanical properties of post-consumed polymers by ionizing radiation. After recycling process, polymers lost some of their physical and mechanical properties. The objective of this work was to get back the lost mechanical properties of recycled polymers using ionizing radiation. One work, already finished, were Blends of PA 6 and HDPE, which were irradiated from 25 to 125kGy. Within this range of doses, improvements of the tensile strength of the irradiated blend were observed. Other micro structural aspects of these materials, were evaluated.

Production of Nanoparticles Platinum Catalysts by Radiation. The aim of this work was to produce nanoparticles Pt-Ru catalysts on carbon substrates by reduction process using gamma radiation.

Polymeric Matrix Composites by Electron Beam. The aim of this work is to investigate electron beam curable epoxy formulations to be used in filament winding processes to produce composite materials with similar or better properties than the ones thermally cured and to reduce the fabrication time-consuming.

Improvement of the Mechanical Properties of Carbon Fiber/Epoxy Composites Using Ionizing Radiation. The aim of this research work is to use ionizing radiation to improve the mechanical properties of the carbon/epoxy composites thermally cured (FIG.1). The effects of EB irradiation will be evaluated in two conditions: on the carbon fiber surface to improve the fiber-matrix adhesion and on the final obtained composite in order to complete the thermal cure process.

Heparinization of PVC surface. The PVC-co-DMAEMA-co-Heparin graft copolymer was obtained through the simultaneous irradiation (grafting, heparinization). The PVC film immersed in aqueous solutions containing 30% of DMAEMA, 25% of heparin sodium salt and 0.02molL^{-1} of isopropanol was irradiated by 5kGy. The surface morphological analysis (SEM) revealed the chemical addition of heparin. The antithrombogenic properties were evaluated "In vitro" through platelets adhesion test.

FIGURE 1 - Electron Beam Irradiation of epoxy resins.