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Synthesis and Characterization of PP Films Rich in Primary Amines for Cell Cultures, by Gamma Radiation

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Development of biomaterials have been increased, due the necessity to find bio-inert materials able to present a specific cellular response. Biomaterials are very important for tissue engineering. They can be used as bridges to regenerate damaged tissue growth, as well as support for immobilized biomolecules (drugs, fungicides, enzymes, etc.). Polymer surface modification can be carry out by incorporating functional groups on polymeric materials for the appropriate cell adhesion. It is well known that hydrophobic polymeric surfaces cannot add cells, however, hydrophilic surfaces, mainly rich in nitrogen, facilitate the adherence. The amine functional groups (-NH2) are one of the most important for cells and protein adhesion.
Nowadays, the modification can carry out by physical or chemical methods. One of this methods is plasma surface modification, even though is the more common, the systems synthesized are partly soluble in water, besides the formation of a great amount of free radicals, which generate the incorporation of oxygen when is in contact with the air. To overcome this problem, the modified films were synthesized by gamma radiation in two step method. In this work, radiation grafting of acryloyl chloride onto polypropylene (PP) has been applied to insert carboxyl functionalities on PP; and then, the radiation grafted films were reacted with some diamines. Amine concentration was determined and after a period of time, the effect of aging on the amine functional groups was determined by derivatization with 4-trifluoromethyl benzaldehyde (TFBA), and subsequently characterized by XPS (N/N/C ratios), ATR-FTIR and contact angle.
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