

Research Article

The effect of ethylene glycol on starch-g-PCL graft copolymer synthesis

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Abstract

The synthesis of the graft copolymer starch-g-PCL was carried out in a single phase, using molybdenum oxide as a catalyst, at a temperature of 150°C over a period of 24 h. Infrared spectroscopy and nuclear magnetic resonance analyses indicated that the graft copolymer was successfully synthesized, obtaining an 84% conversion yield. The introduction of ethylene glycol to the reaction influences the copolymer synthesis, affecting conversion yields and the physicochemical properties of the resultant copolymer. X-ray diffraction analysis indicates that the copolymer crystallinity decreases as ethylene glycol concentration increases. An investigation of the thermal properties of the graft copolymer suggested that the decomposition temperature of the copolymer, compared to that of the homopolymer, decreases with exposure to ethylene glycol. Scanning electron microscopy revealed the formation of clusters between the starch granules and the grafted copolymer due to the interaction of the hydroxyl groups of the starch and PCL.

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