Gamma-Irradiated Gelatin-Based Films Modified by HEMA for Medical Application

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ABSTRACT

The present article describes the synthesis and characterization of bi-component polymer systems based on gelatin films incorporated with 2-hydroxyethyl methacrylate (HEMA) monomer, developed for medical application. Gelatin films were prepared by the addition of HEMA of different concentrations (0–30 wt.%) and irradiated with various radiation doses (0–5 kGy). Tensile strength and tear strength of the irradiated gelatin films were found to increase with increasing HEMA up to 20 wt.% as well as radiation doses (1 kGy) as optimized. The maximum tensile and tear strengths of irradiated gelatin films with HEMA were found to be 79.1 MPa and 83.2 N/mm, respectively, at the optimum conditions, and these values were about double that of a reference film prepared without additives. In addition, morphological analysis was done by scanning electron microscopy (SEM) and showed how HEMA cemented and was covered with gelatin in the blend. Thermomechanical analysis was carried out to investigate the shifting of glass transition temperature (T_g) towards higher temperature due to HEMA addition, and the effect of this film was tested on the human body in order to determine whether it can be applied for medical purposes.

KEYWORDS: Gelatin, HEMA, Radiation, Tensile properties, TMA

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