

Effect of Gamma Irradiation on the Crystalline Structure of Poly(Vinylidene Fluoride)

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Abstract : The irradiation of polymeric materials has received much attention because it can produce diverse changes in chemical structure and physical properties. Thus, studying the chemical and structural changes of polymers is important in practice to achieve optimal conditions for the modification of polymers. The effect of gamma irradiation on the crystalline structure of poly(vinylidene fluoride) (PVDF) has been investigated using differential scanning calorimetry (DSC) and X-ray diffraction techniques (XRD). Gamma irradiation was carried out in atmosphere air with doses between 100 kGy at 3,000 kGy with a Co-60 source. In the melting thermogram of the samples irradiated can be seen a bimodal melting endotherm is detected with two melting temperature. The lower melting temperature is attributed to melting of crystals originally present and the higher melting peak due to melting of crystals reorganized upon heat treatment. These results are consistent with those obtained by XRD technique showing increasing crystallinity with increasing irradiation dose, although the melting latent heat is decreasing.

Keywords : differential scanning calorimetry, gamma irradiation, PVDF, X-ray diffraction technique

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020