



Dosimetric Evaluation And Radiation Induced Structural Change In Polymer Based Radiochromic Film

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ABSTRACT

Polyvinyl-alcohol based reactive yellow 145-A films (PVA-Y) were irradiated by Cs¹³⁷ γ -source in the range of 200 Gy-10⁵ Gy. The effects of gamma irradiation on optical and mechanical properties of PVA-Y were studied using spectrophotometry and x-ray diffraction (XRD) technique to check its feasibility in radiation processing. The found values of the λ_{max} and the molar extinction coefficient of the dye were 418 nm and 78 Lgm⁻¹mm⁻¹ respectively. Parameters such as effect of dye concentration and pH values, Electrical Conductivity, % decoloration, Strain, % crystallinity, crystallinity Index (C.I.) and crystallite size (d) have been selected for the dosimetric and mechanical strength evaluation. Linearity between specific absorbance and absorbed dose showed that PVA-Y films can be best chemical dosimeter in two different ranges i.e., 200 Gy-1 kGy and 10 kGy-100 kGy. At high dose 80-100 kGy of gamma irradiation, change in mechanical strength was found due to decrease in crystallinity, crystallite size and increase in strain values.

Keywords: Polyvinyl Alcohol, Reactive Yellow 145-A, gamma irradiation, Specific Absorbance, XRD, Crystallinity.
