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Effect of gamma irradiation on the mechanical properties of PVC/ZnO polymer nanocomposite

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Polyvinyl Chloride (PVC) based nanocomposite with different weight ratios of Zinc oxide (ZnO) nanoparticles is prepared by using a gel-like technique. The weight-ratio of ZnO nanoparticles, in a range of 2.5 to 10 wt.%, is used to prepare nanocomposites in the Tetrahydrofuran (THF) solvent. The prepared samples are exposed to gamma (γ) radiation at different doses in a range of 5-40 kGy. The mechanical properties of irradiated samples are compared to that of un-irradiated samples. For un-irradiated samples, the elasticity is found to increase with the addition of ZnO nanoparticles. However, the plastic region of the stress-strain curve gets slightly affected on increasing the concentration of ZnO. Additionally, the elastic modulus is noticed to drop exponentially with ZnO concentration. For pure PVC, a slight dependence of stress-strain curves on the gamma irradiation doses has also been detected. Further, the gamma irradiation dose results in a detectable decrease of elastic modulus for pure and low weight-ratio ZnO nanoparticles. However, the irradiation dose does not have any effect on the elastic modulus for the 10 wt.%, which is the highest weight ratio used in this study.

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