

Structural and optical properties of lead-boro-tellurite glasses induced by Gamma-ray.

ABSTRACT

Spectrophotometric studies of lead borotellurite glasses were carried out before and after gamma irradiation exposure. The increasing peak on the TeO₄ bi-pyramidal arrangement and TeO₃₊₁ (or distorted TeO₄) is due to augmentation of irradiation dose which is attributed to an increase in degree of disorder of the amorphous phase. The structures of lead tellurate contain Pb₃TeO₆ consisting of TeO₃ trigonal pyramid connected by PbO₄ tetragonal forming a three-dimensional network. The decrease of glass rigidity is due to irradiation process which is supported by the XRD diffractograms results. The decreasing values of absorption edge indicate that red shift effect occur after irradiation processes. A shift in the optical absorption edge attributed to an increase of the conjugation length. The values of optical band gap, E_{opt} were calculated and found to be dependent on the glass composition and radiation exposure. Generally, an increase and decrease in Urbach's energy can be considered as being due to an increase in defects within glass network.

Keyword: Irradiation; Optical band gap; Tellurite glass; Urbach's energy.