

THERMAL STABILITY AND PHYSICAL PROPERTIES OF PbO-B₂O₃-TeO₂ GLASS SYSTEM

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ABSTRACT

The effect of composition on the thermal stability and structural of the PbO-B₂O₃-TeO₂ glass has been studied. Homogeneous ternary (TeO₂)_y [(PbO)_x (B₂O₃)_{1-x}]_{1-y} glass system (x = 0.0 - 0.50 and y = 0.7) was prepared using a conventional melt-quenching method. The density, the molar volume, XRD, and the glass transition temperatures of prepared samples have been found to be compositional dependent. The increase of density and decrease of molar volume narrate with the high dense of PbO which relate to the constitution of the glass rather than the type of structural unit. The XRD result shows the partially crystalline precipitation and fit the partially crystalline state as the amount of PbO increases. From isothermal measurement, a criterion of Hruby's value (KH) has been used to evaluate glass stability. Ultimately, it is observed that the thermal stability of lead-boro tellurite glass can be improved by increasing PbO in the glass composition. Nevertheless, the increasing amount of PbO also indicates the escalating of glass system rigidity. Raman spectrum indicates decreasing of O-Te-O and B-O-B bending shoulder at approximately 450 cm⁻¹ which ascribes the splitting of O-Te-O and B-O-B bonds and hence, the bridging oxygen's (BOs) were converted into NBOs.

Keywords: Raman spectra; Hruby's value; partially crystalline glass

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