



Structural Study of PbO-PbF₂-B₂O₃ Glasses Doped with CoO through Optical and Magnetic properties

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ABSTRACT

PbO-PbF₂-B₂O₃ glasses containing different concentrations of CoO have been prepared. The glasses are characterized by XRD and differential thermal analysis. The results of IR, optical absorption, magnetic susceptibility and refractive index measurements have been analyzed in the light of different oxidation states of cobalt ion. The analysis shows that cobalt ions exist mainly in Co²⁺ state, occupy tetrahedral positions by majority of Co²⁺ ions at 0.2 mol% of CoO. However, if CoO is present in higher concentrations beyond 0.2 mol% in the glass matrix, they occupy more octahedral positions than the tetrahedral positions. The value of magnetic moment (evaluated from magnetic susceptibility) has been observed to drop to a value of $\mu_{3.94}$ B from 4.46 B and refractive index changed from 1.69 to 1.61 at higher concentration beyond 0.2 mol%. From these results it has been concluded that in this concentration range, cobalt ions exist mainly in divalent state.

Keywords: Glasses, Magnetic Susceptibility, Optical absorption and IR spectra.
