



## Structural Study of PbO-PbF<sub>2</sub>-B<sub>2</sub>O<sub>3</sub> glass system doped with MnO through Spectroscopic and Magnetic Properties

P. Bhavani<sup>1</sup>, T.V. Nagalakshmi<sup>2</sup>, A.W. Iqbal<sup>3</sup> and K.A. Emmanuel<sup>4\*</sup>

1. Department of Chemistry, SRKR Engineering College, Bhimavaram-534 204, A.P., India.

2. Department of Chemistry, PPD College of Engineering, Nunna -520 008, A.P., India.

3. Department of Physics, S V P College of Engineering, Visakhapatnam-530 001, A.P., India.

4. Department of Chemistry, Sir C R Reddy Autonomous College, Eluru-534 007, A.P., India.

Email: [kaekola@gmail.com](mailto:kaekola@gmail.com)

Received on 13<sup>th</sup> March and finalized on 16<sup>th</sup> March 2013.

---

### ABSTRACT

Borate glasses (PbO-PbF<sub>2</sub>-B<sub>2</sub>O<sub>3</sub>) doped with varying concentrations of MnO have been prepared by quenching and annealing techniques. These glasses are categorized by XRD, SEM and differential thermal analysis. The analysis of these studies has been done in the light of different oxidation states of Mn ion with air of the data on IR optical absorption and magnetic susceptibility measurements. It shows that Mn ion chiefly exists in Mn<sup>2+</sup> state occupying tetrahedral positions. In the state of Mn<sup>3+</sup> state at 0.1 and 0.2 mol% concentrations they occupy octahedral positions when MnO is present at 0.3 mol% concentration the stability of the glass is improved. The Mn ions enter into the glass matrix as Mn<sup>2+</sup> state only and occupy tetrahedral positions. The presence of MnO at 0.3 mol% in the glass system (i) makes Hruby's parameter have a very good value of 0.53 and (ii) the value of magnetic moment (evaluated from magnetic susceptibility) has been raised to maximum value of 5.7 μ<sub>B</sub>. These results prove that, at 0.3mol% conc. Mn ions exist mainly in divalent state and occupy tetrahedral sites in the glass network.

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

---