

Turkish Journal of Physics

Turkish Journal

of



Physics

Studies on Some Lithium-Borate Glasses Containing Iron and Copper

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Abstract: A lithium-borate-glass system containing iron and copper cations has been thoroughly investigated, in order to obtain information about the structural role of both the iron and copper in such glass hosts. The amorphous phase of the prepared glass samples was confirmed from their X-ray diffraction. From the infrared spectra it was concluded that the glass networks are highly deformed and boron appeared in both tri- and tetra-hedral coordination states as well as in some ring structure. As copper was introduced, replacing lithium, it acts as a network modifier only while the iron acts as network former (FeO_4). The molar magnetic susceptibility showed two maxima at 12.5 and 17.5 mol% copper oxide content, and a minimum at 15 mole%. Over the range of $\text{CuO}/\text{Li}_2\text{O}$ mixture fractions investigated, the density and the calculated molar volume values showed a gradual increase. We have attempted to correlate the molar volume values with the molar magnetic susceptibility of these glasses. All the obtained results were discussed on the basis of the glass structure and boron anomaly.

Key Words: Glass structure, Glass containing transition metal ions, Structure and physical properties of glass

Turk. J. Phys., **27**, (2003), 255-262.

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