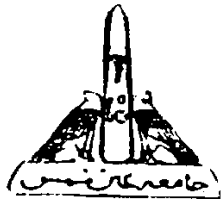

Effect Of Lead, Barium And Zinc Oxides On The Physical Properties Of BoroSilicate Glass

Thesis Submitted in Partial Fulfillment for the

Master Degree Of Science (Physics)

By

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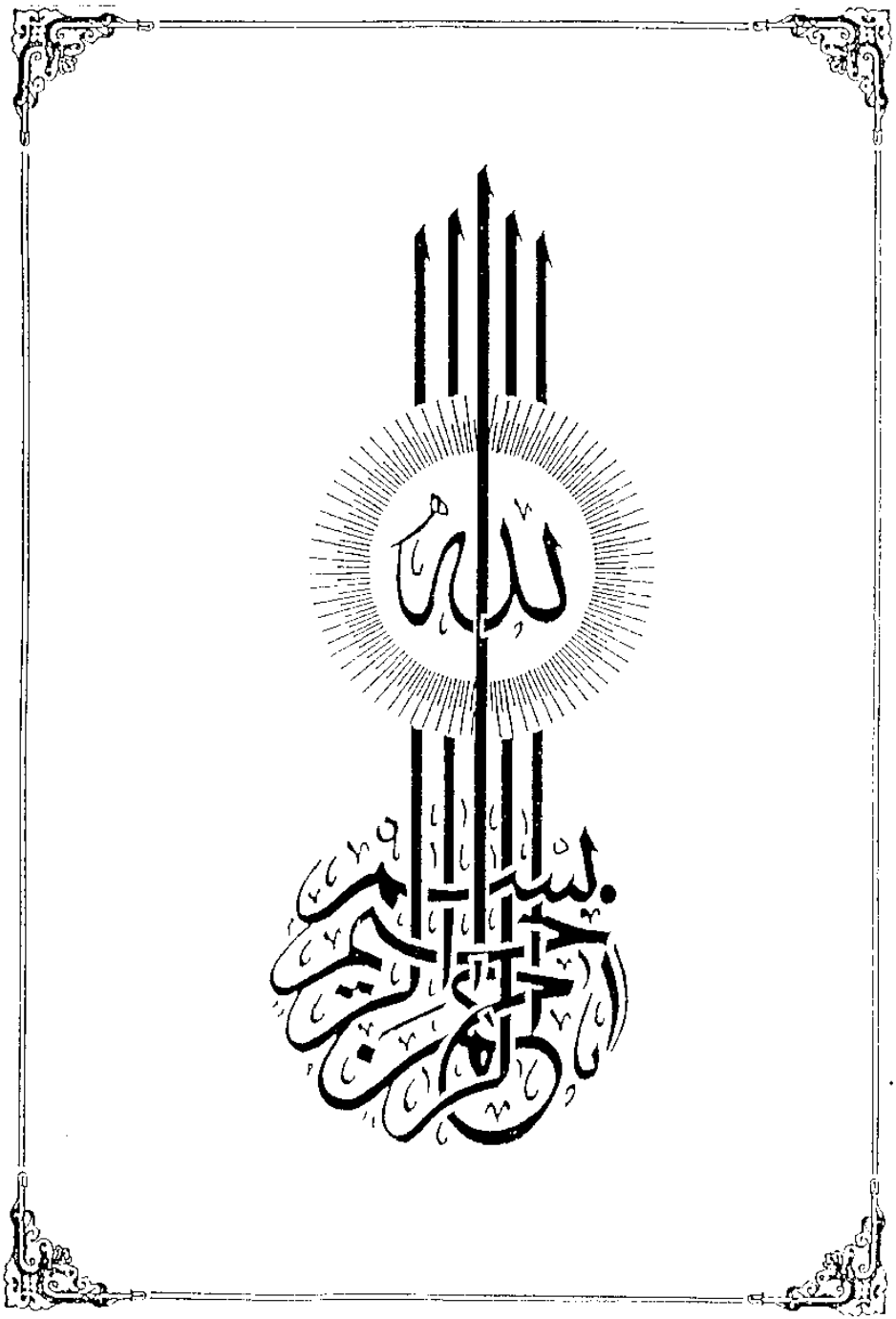

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ABSTRACT

Abstract

Ahmed Mohamed Al-Sayed Ali. Effect of Zinc, Barium, and lead Oxides On the Physical Properties Of The BoroSilicate Glass, Thesis submitted for degree of M.Sc. in physics.

Sample preparation:
33 mole% Li_2O + 33 mole% B_2O_3 + 34 mole% SiO_2, was prepared as a base; three series of samples were obtained by adding ZnO, BaO, and Pb_3O_4 to the base with concentrations 3, 6, 9, 12, and 15 mole%, where the number of samples was then sixteen.

Density, refractive index, differential scanning calorimeter (DSC), Dielectric properties, *dc* and *ac* electrical conductivities measurements were performed on these samples.

It was found that the addition of lead and barium oxides increases the density, molar volume, and refractive index; it also decreases the glass transition temperature T_g and the conductivities of the samples. Lead oxide affects the above properties very much more than barium oxide, except the molar volume.

Addition of zinc oxide increases the density and the refractive index; it also decreases the molar volume, glass transition temperature, and the electrical conductivity.

Electric moduli of all samples were fitted very good by the stretched exponential Kohlrousch-Williams-Watt (**KWW**) function; where the addition of lead and barium oxides decreased the β value, whereas the addition of zinc oxide kept the β value constant.

Keywords **:**Glass; Silicate glass; Borate glass; BoroSilicate glass; Alkali Silicate glass; Alkali Borate glass; Alkali BoroSilicate glass; Ionic glass; Relaxation process; Electric conductivity; Glass transition temperature; Electric modulus; Electric conductivity relaxation.

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