**Study of rice husk silicate effects on the elastic, physical and structural properties of borotellurite glasses.**


ABSTRACT

Successful extraction of high purity $SiO_2$ (about 99%) from rice husk (waste) was achieved in this work using the cold acid leaching method. Glass series $[(TeO_2)0.7\ (B_2O_3)0.3]1\text{-}x\ (SiO_2)x$ were fabricated using the rice husk silicate (RHS) by melt-quenching method. The samples were subjected to X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR) characterization to study the structural nature of the glass system. Density and ultrasonic velocities were measured to obtain the elastic constants for the various silicate proportions in the glass using ultrasonic data obtained from non-destructive ultrasonic probing technique. The elastic moduli calculated from the obtained data were found to have increased with the addition of more RHS in the glass. Other parameters studied include the microhardness (H), Poisson's ratio (σ), softening temperature (ΘD) and fractal bond connectivity (d) and the fluctuation free volume (fugacity, fg). A very unusual occurrence was observed as microhardness value decreases in the glass system as more RHS ($SiO_2$) is introduced. The quality of the glass in terms of elastic behavior improved with addition of RHS in the borotellurite glass network.



**Keyword** : Rice husk silicate (RHS); Borotellurite; Elastic moduli; Ultrasonic.