

Abstract Submitted
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Isothermal Pressurizations and Glass Transition Dynamics in the Intermediate Glass-Forming Liquid Glycerol¹

WILLIAM OLIVER, University of Arkansas, Department of Physics, TITUS MORRIS, Michigan State University, Department of Physics and Astronomy, TIM RANSOM, University of Arkansas, Department of Physics — Brillouin scattering data along both a 75 ° C and 100 ° C isotherm to pressures as high 6 GPa are reported for glycerol an intermediate strength glass forming liquid. This represents the highest pressure data of any type reported for glycerol, and enables us to probe directly the alpha relaxation process at these high pressures. Acoustic mode frequencies and linewidths are obtained from fits to the spectra. These frequency shifts and linewidths are fit for each isotherm with an iterative technique in which parameters are adjusted until self consistency is obtained. The Tait equation of state along with a complex expression for the dynamical longitudinal modulus, $M(\omega)$, and quantitative models for other physical quantities such as the adiabatic index are used in our analysis. A Cole-Davidson function is used to model the dynamical modulus, and self-consistent fits indicate that the stretching parameter, β , is pressure independent with a value of 0.37 consistent with other low pressure acoustic results in the literature. Final values for the pressure dependent dynamical longitudinal modulus and relaxation time are obtained. In contrast to the results of recent pressure-dependent dielectric studies, there does not appear to be a second process that obscures the alpha process.

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