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**Temperature Measurements in Shocked Liquid Benzene and an Improved Benzene EOS** DAVID LACINA, Y.M. GUPTA, Washington State University — Time-resolved Raman spectroscopy measurements were used to determine temperatures in multiply-shocked liquid benzene to peak pressures of ∼19GPa. Experimentally determined temperatures were obtained using the ratio of anti-Stokes to Stokes scattering intensities for the 992cm$^{-1}$ vibrational mode. Our experimental results demonstrate that the calculated temperatures obtained using the current benzene equation of state (EOS) [S. Root, Ph.D. Thesis, WSU], though reasonable, are consistently lower than the measurements. To improve calculated temperatures, key thermodynamic parameters (e.g. the specific heat) in the current benzene EOS were varied to examine and understand the sensitivity of temperatures to those parameters. Specific heat variations, as expected, resulted in the largest change in the calculated temperatures. Building on the sensitivity studies, the benzene EOS was refined to produce a good agreement between the calculated temperatures and the measured temperatures in multiply-shocked benzene. The improved EOS resulted in a higher decomposition temperature for singly shocked liquid benzene.

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