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Experimental Measurement of Speeds of Sound in Liquid Carbon Monoxide and Development of High-Pressure, High-Temperature Equations of State JOSEPH ZAUG, JEFFREY CARTER, SORIN BASTEA, LAURENCE FRIED, Lawrence Livermore National Laboratory — We report the adiabatic sound speeds for liquid carbon monoxide along two isotherms, from 0.17 to 2.13 GPa at 297 K and from 0.31 to 3.2 GPa at 600 K. The carbon monoxide was confined in a resistively heated diamond-anvil cell and the sound speed measurements were conducted *in situ* using a recently reported variant of the photoacoustic light scattering effect. The measured sound speeds were then used to parameterize a polarized exponential-6 intermolecular potential for carbon monoxide. PρT thermodynamic states, sound speeds, and shock Hugoniots are calculated using the newly parameterized intermolecular potential and compared to previously reported experimental results. Additionally, we present an analytical equation of state for carbon monoxide that was generated by fitting to a grid of calculated PρT states over a range of 0.1-10 GPa and 150-2000 K. * This work was performed under the auspices of the U.S. Department of Energy jointly by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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