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High pressure structural parameters and equation of state of osmium to 207 GPa[1] CHRISTOPHER PERREAULT, University of Alabama at Birmingham, NENAD VELISAVLJEVIC, Los Alamos National Laboratory, YOGESH VOHRA, University of Alabama at Birmingham — The most incompressible transition metal osmium (Os) has been studied under high pressure. There is significant interest in Os because of the structural anomalies attributed to topological transitions in the Fermi surface for valence electrons in the hexagonal close-packed phase. We report on measurements of structural parameters and equation of state on Os metal to a pressure of 207 GPa at ambient temperature using platinum as a pressure standard. We obtained angle-dispersive X-ray diffraction data at a synchrotron source with closely spaced pressure intervals to observe any discontinuities or anomalies in the axial c/a ratio at high pressures. Rietveld refinements of X-ray diffraction data show a slowly varying axial ratio (c/a) with a broad minimum at 75 GPa. Our data do not provide any evidence of anomalous behavior in the c/a ratio in Os at 25 or 150 GPa as have been reported in previous studies. Our experimental results are in agreement with theoretical calculations that do not predict any anomalous behavior in c/a ratio in Os under extreme conditions. We present an equation of state for Os to 207 GPa (V/V0 = 0.761) at ambient temperature and compare our results with the previously published data.

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