Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Shock Compression of Cryogenic Noble Gas Mixtures: Xenon – Krypton SETH ROOT, RUDOLPH MAGYAR, RAYMOND LEMKE, THOMAS MATTSSON, Sandia National Laboratories — In past work, we have examined the multi-Mbar response of cryogenically cooled liquid xenon and liquid krypton measuring their Hugoniots to 8 Mbar. These results were utilized in the development of new EOS models for Xe and Kr to use in high energy density physics applications. The previous work demonstrated the usefulness of integrating high accuracy shock compression experiments with DFT to generate the basis for equation of state (EOS) models. In many physics applications, such as Z-pinch experiments, gas mixtures are used instead. However, we do not have reliable experimental data on these mixtures to provide informed decisions about the EOS models or mixture rules. To improve our understanding of mixtures at extreme conditions, we performed dynamic compression experiments using Sandia's Z – facility on a 70/30 molar ratio Kr/Xe cryogenically cooled liquid mixture. We measured the Hugoniot state and reshock state of the liquid mixture to several Mbar. The experimental data validated the DFT simulations for identical molar ratio mixtures. The combined experimental and DFT results are used to assess the EOS models and test the mixture rules. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Securities Administration under Contract No. DE-AC04-94AL85000.

Seth Root
Sandia National Laboratories

Date submitted: 21 Feb 2013 Electronic form version 1.4