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Ethane and Xenon mixing: density functional theory (DFT) simulations and experiments on Sandia's Z machine RUDOLPH MAGYAR, SETH ROOT, THOMAS MATTSSON, KYLE COCHRANE, Sandia National Laboratories — The combination of ethane and xenon is one of the simplest binary mixtures in which bond breaking is expected to play a role under shock conditions. At cryogenic conditions, xenon is often understood to mix with alkanes such as Ethane as if it were also an alkane, but this model is expected to break down at higher temperatures and pressures. To investigate the breakdown, we have performed density functional theory (DFT) calculations on several xenon/ethane mixtures. Additionally, we have performed shock compression experiments on Xenon-Ethane using the Sandia Z - accelerator. The DFT and experimental results are compared to hydrodynamic simulations using different mixing models in the equation of state. Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a wholly owned subsidiary of the Lockheed Martin company, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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