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Hugoniot based equation of state for solid polyurea and polyurea aerogel foams ADAM PACHECO, RICHARD GUSTAVSEN, TARIQ ASLAM, BRIAN BARTRAM, Los Alamos National Laboratory — The shock response of solid polyurea and polyurea aerogel foams were studied using gas-gun driven plate impact experiments. The materials reported on here are commercially available, brand named AIRLOY X103, and supplied by Aerogel Technologies, LLC. PolyUrea Solid, with nominal density 1.13 g/cm^3, and two aerogel foams, with nominal densities of 0.20 and 0.35 g/cm^3, were studied. Most experiments were of the multi-slug type in which a sample of each density was mounted on an oxygen free high conductivity copper or 6061 aluminum baseplate. In these experiments, shock velocity was measured and other shock states calculated by the impedance matching technique. Other experiments were of the front surface impact type in which the foam sample was mounted in the projectile and impacted a lithium fluoride window. Shock states were calculated using the measured particle velocity, the projectile velocity, and the lithium fluoride Hugoniot. Peak particle velocity obtained in the foam was > 4.3 km/s, and peak pressure in the solid was > 29 GPa. A break in the data for the solid above particle velocities of 2.0 km/s (~ 18 GPa) indicates a probable decomposition reaction. A p-α model with Mie-Grueneisen form for the solid reasonably replicates the data.

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