Poster Presentations

[MS33-P03] High Pressure Neutron Diffraction: A gentler way to study explosives

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High pressure studies of Energetic materials are important in determining their properties at conditions approaching detonation. In this work the energetic materials hexanitrohexaazaisowurtzitane (CL-20) and triaminotrinitrobenzene (TATB) are studied at high pressure. Previous high pressure studies of these energetic materials[1,2] have relied on high intensity x-ray sources, while not carrying out full refinements of the patterns obtained. The results from high-pressure studies of the energetic material CL-20 using both synchrotron radiation and neutron sources are compared. These results are striking and show that in contrast to the severe radiation damage induced by the intense x-ray beam, there is no radiation damage observed in the neutron experiment. Rietveld refinement of the unit cell parameters allowed the derivation of an accurate equation of state for ε-CL-20 using the data obtained from the neutron study. TATB, an energetic material known to be susceptible to radiation damage, was also studied using high pressure neutron diffraction. No evidence of damage to the material was observed and again an equation of state was obtained. These studies highlight the advantages of studying radiation sensitive materials using neutrons.

[1] Gump, J. C.; Peiris, S. M., (2008), *J. Appl. Phys*. **104**, 083509
[2] Stevens, L. L., Velisavljevic, N., Hooks, D. E., Dattelbaum, D. M., (2007), *Propell. Explos. Pyrotech,*. **33***,* 286