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Effect of nonhydrostatic compression on the structural and chemical stability of FOX-7 crystals.[1] ZBIGNIEW DREGER, Naval Surface Warfare Center IHEODTD, YOGENDRA GUPTA, Washington State University — Nonhydrostatic compression conditions were imposed in diamond anvil cell (DAC) experiments on an insensitive energetic crystal – 1,1-diamino-2,2-dinitroethene (FOX-7) – to gain insight into the role of nonhydrostatic stresses on its structural and chemical stability. Samples of oriented single-crystals were subjected to compression with controlled amount of nonhydrostaticity. These conditions were achieved by *in-situ* monitoring of the nonhydrostaticity through the splitting of R1 and R2 fluorescence lines of oriented ruby single-crystals and by selecting appropriate pressure transmitting media (PTM). By changing PTM from hydrostatic to strongly nonhydrostatic compression, structural and chemical changes in FOX-7 crystals were examined using Raman spectra measurements for pressures up to 30 GPa. The results revealed that the transformation of wave-shaped layers to planar layers, the α'- ε transition observed under hydrostatic pressure at 4.5 GPa, was significantly affected by the imposed nonhydrostaticity. Both the onset and completion pressures for this transformation depended on the extent of the nonhydrostaticity and orientation of FOX-7 crystal with respect to the cell axis. Unlike hydrostatic compression, changes in the Raman spectra were not reversible upon release from nonhydrostatic compression. This finding shows that the high-pressure, ε-phase can be recovered as a metastable phase under ambient conditions.

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