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Phase Diagram of RDX Crystals at High Pressures and Temperatures ZBIGNIEW DREGER, YOGENDRA GUPTA, Washington State University — A knowledge of the RDX phase diagram is important for understanding shock-induced decomposition of RDX. Vibrational spectroscopy and optical imaging in a diamond anvil cell were used to examine the RDX behavior at high pressures and temperatures. Interplay between three solid (α, γ, ε), liquid, and decomposed phases was examined in experiments on single crystals at pressures up to 12.0 GPa and temperatures to 600 K. Several distinct pressure regions were found in the RDX response at elevated temperatures. The boundaries between the α, γ, and ε phases were determined with a triple point at 3.7 GPa and $\sim$ 466 K. The $\alpha - \gamma$ phase transition was confirmed to be reversible and to occur at the same pressure 3.7 GPa, regardless of temperature. The ε-phase was found to exist only in a narrow range of pressures, from 2.8 to 6.0 GPa. Below and above these pressures, α- or γ-RDX crystals decompose or melt instead of transforming to ε-RDX. Both the $\alpha - \varepsilon$ and $\gamma - \varepsilon$ transitions were irreversible at the phase boundaries. Decomposition kinetics of both the ε and γ phases were found to have a positive volumes of activation. Work supported by ONR and DOE/NNSA.

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