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Thermal Stability of Solid and Molten Erythritol Tetranitrate (ETN) DANIEL MCDONALD, NICHOLAS LEASE, GEOFFREY BROWN, BRYCE TAPPAN, VIRGINIA MANNER, Los Alamos National Laboratory — Erythritol tetranitrate (ETN) is a melt-castable, solid explosive with significant performance, similar to the established nitrate ester, pentaerythritol tetranitrate (PETN). Recent advances in synthesis coupled with the ease of procurement of erythritol make ETN a readily made improvised explosive, although research and development of the material has advanced as well. Uses of ETN in its molten form include additive manufacturing and melt-casting of explosive parts, which could expand the capabilities of munitions manufacturing and research not previously available. Because of the increased use and development of ETN, we have recently begun studying its thermal stability in the molten state. We report here the thermal stability and impact sensitivity of ETN at elevated temperature, and discuss the decomposition characteristics of batches prepared with different methods and purity. Specifically, we will discuss thermal stability at varying temperatures using Automatic Pressure Tracking Adiabatic Calorimetry (APTAC), differential scanning calorimetry (DSC), along with drop-weight impact sensitivity in the molten state.

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