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Evidence for Sublimation/Recondensation Controlling Ignition Time in HMX Thermal Explosions LAURA SMILOWITZ, BRYAN HENSON, LANL — Time to ignition for HMX based secondary high explosive formulations can be plotted linearly on a simple Arrhenius plot. The time to ignition is believed to be controlled by specific chemical decomposition steps with the rate limiting step being decomposition in the solid, accompanied by significant exothermicity. Subsequent exothermic chemistry involving gas phase products is also important. We have evidence for the diffusion of intact HMX molecules within hot HMX formulations. The sublimation and recondensation of HMX molecules carries significant enthalpy around a system, comparable to the enthalpy of reaction in the solid and gas phase, and can impact both the time and location of ignition. In this talk, we will present evidence that HMX sublimation and recondensation can control the time to ignition in a PBX 9501 thermal explosion.

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