Abstract Submitted
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Mechanisms of pressurization and insensitivity in TATB BRYAN HENSON, LAURA SMILOWITZ, Los Alamos National Laboratory — We have studied thermal ignition and subsequent internal deflagration in explosive formulations based on 1,3,5-triamino-2,4,6-trinitrobenzene (TATB) with the goal of understanding the underlying mechanisms which combine to either enable or preclude the deflagration to detonation transition (DDT). We measure spatially resolved temperature, density change using new dynamic x-ray radiography techniques, and pressure inferred from observations of case deformation and direct measurement during ignition and burning in samples of variable initial density. We compare these observations with previous measurements on formulations of the more sensitive explosive octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX). TATB deflagration is characterized by a measured ignition temperate approximately half that of HMX and very low pressures and rates of deflagration compared to HMX. Very stable and slow laminar internal burning is observed at lower densities as well as cracking, deconsolidation and a transition to faster deflagration rates under some conditions. We examine mechanism of pressure generation in the context of the combustion chemistry of TATB and discuss possible explanations of the lower observed rates and pressures when compared to HMX.

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