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Optical Emissions from Spherical Charges NICK GLUMAC, University of Illinois, ALLEN KUHL, Lawrence Livermore Natl Lab — We studied optical emissions from 100-g spherical charges. When the detonation products (DP) expand, they act like a spherical pistondriving a spherical blast wave into the atmosphere. Emissions from this blast wave come from: shock-heated air molecules, detonation-products molecules, combustion products molecules and carbon particles formed in the detonation wave. 6 HEs were studied. The HE powder was pressed in hemispherical molds then glued. A central booster of PBX-N5 and a RP-80 were used to detonate the charges. Experiments were conducted in air versus N2 to control combustion, and different pressures (1, 0.1 and 0.01 bars)to control emissions from the shock-heated air. Emission histories were measured with an Andor framing spectrometer. In the visible regime, emissions spectra were well fit by a Planckian functionthereby allowing us to compute the evolution of the Planckian temperature of the particular HE fireball. Planckian temperatures in the 1st peak correlate with the CJ temperature of the particular fireball. Planckian temperatures fall due to the adiabatic expansion of the fireball gases. The 2nd optical peak was caused by reheating of the fireball and carbon particles by the shock reflections from the chamber walls.

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