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**Shock-induced chemical reactions in organic materials and explosives** DANA DATTELBAUM, STEPHEN SHEFFIELD, SHAWN MCGRANE, PETER GOODWIN, Los Alamos National Laboratory, SHOCK AND DETONATION PHYSICS TEAM — Interrogating chemical reactions behind a shock front is immensely difficult and, as a result, the details of shock-induced chemistry remain poorly understood. Previous research has shown that dimerizations, polymerizations, ring-opening and decomposition reactions can occur under shock compression, depending on molecular structure. Questions regarding the thresholds for incipient reaction, the nature of first and subsequent reaction steps, and the influence of shock input conditions on reaction kinetics remain to be answered. Here, we have applied *in-situ* electromagnetic gauging at multiple Lagrangian positions to elucidate the evolution of multiple-wave structures associated with shock-induced reactions of several simple functional groups: carbon-carbon double (-C=C-) and triple bonds, and nitriles. The relative order of group reactivity under single shock conditions for these simple molecules is discussed. From measurements of the reactive flow, we have obtained detailed information about the temporal evolution of the waves, and global kinetic rates associated with transformation(s) between partially- and fully-reacted states. Near the reactive thresholds, evolution in particle velocities point to reaction timescales on the order of tens-to-hundreds of nanoseconds. We further compare evidence of reaction from gas gun-driven experiments to recent results using laser-driven shocks. Spectroscopic details will be presented from both types of experiments.

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