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Characterization of Shock-dependent Reaction Rates in Non-ideal Perfluoropolyether-Aluminum Explosives DENNIS WILSON, JOHN GRANIER, RICHARD JOHNSON, Energetic Materials and Products, Inc., DONALD LITTRELL, Air Force Research Laboratory — Explosive formulations of perfluoropolyether (PFPE) and aluminum are highly non-ideal. They release energy via a fast self-oxidized combustion wave rather than a true self-sustaining detonation. Unlike high explosives, the reactions are shock dependent and can be overdriven to control energy release rate. Reaction rate experiments show that the velocity can vary from 1.25 to 3 km/s. This paper examines the effect of the initial shock conditions – shock strength, shock duration, and shock "planarity" – upon the reaction rate of the explosive. The following conditions were varied in a series of sixty-four (64) reaction rate experiments: PFPE-Al composition; the high explosive booster mass and geometry; shock attenuation; confinement; and rate stick diameter and length. Several experiments designed to isolate and quantify these dependencies are described and summarized.

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