Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

New Imidazole-based High Nitrogen Energetic Materials G. KENNETH WINDLER, PHILIP LEONARD, Los Alamos National Laboratory, MAXWELL SCHULZE, Colorado State University, ERNEST HARTLINE, Los Alamos National Laboratory — Energetic materials derive their power from energy release, usually in the form of gaseous products. The type and quantity of these products contribute to performance and detonation parameters. In particular, high-nitrogen materials produce large quantities of elemental nitrogen, and can be tuned via molecular structure for suitability as propellants (gas generators) or explosives. In this work, the five-membered nitrogen heterocycle imidazole is used as a substrate for a variety of high-nitrogen materials. Substitution of the imidazole ring directly with nitro-, azido-, diazo-, and tetrazole moieties allows for tunable properties of the resultant energetic material. Properties can be further tailored by salt formation at the acidic proton(s) on the molecules. The various combinations of these derivatives are presented, along with the substitution effects on physical, chemical, and explosive properties.

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Date submitted: 24 Feb 2017 Electronic form version 1.4