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Energetic Co-Crystal of Trinitrophenol-Melamine

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Los Alamos National Laboratory — We hope to harness the field of energetic co-crystals for development of insensitive, high-performing explosives. As demonstrated by other groups, co-crystals of energetic materials are diverse in their resultant properties versus the native materials. Herein, we discuss the synthesis, characterization, scale-up and testing of energetic co-crystals of trinitrophenol (a.k.a 1,3,5-trihydroxy-2,4,6-trinitrobenzene) and melamine. Although melamine is not an energetic material, high nitrogen content and insensitivity can be of benefit in a co-crystal. Currently, trinitrophenol (TNPG) and melamine have been found to exist as a co-crystal in a 2:1 and 1:1 ratio. Characterization by NMR, IR, LC-MS, sensitivity, thermal stability, calorimetry and powder X-ray diffraction have all been used to characterize the individual compounds as well as the co-crystals developed. Performance testing of pressed co-crystals has been achieved on 1" (25.4 cm) diameter rate sticks.

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