TNT EQUIVALENCE: MEASURING, VALIDATING, AND APPENDING BINARY ENERGETICS TO THE LITERATURE

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Abstract: TNT equivalency is a standard used in the energetics field to measure and quantify the effects of energetic materials. Using these equivalencies, the safety factors for minimum distances and storage of explosives are able to be determined. Having a known TNT equivalency of energetic materials also helps estimate potential blast damage and risks for individuals. The TNT equivalencies for numerous energetic materials, such as binaries, have no published values. To determine TNT equivalence, three tests will be performed: 1) an air blast test will be used to measure air overpressure in the near and far field 2) a plate dent test will be used to find CJ pressure and 3) a five-pin fiber optic system will be used to measure the velocity of detonation. The data collection methods will be validated by testing with commonly published explosive equivalencies including Composition C-4 and Composition B. A new array of energetic TNT equivalence factors will also be tested where values have not been found in literature. Measurement of these equivalencies will give a known value for common explosives including Helix, Texpak, Tannerite, and Kinepak. This research will produce accurate TNT equivalency values for commonly used explosives and provide an inexpensive and repeatable method of determining TNT equivalence. These results will provide helpful insight for law enforcement and the military into the effects of different energetic materials. Standardizing these TNT equivalency values for energetic materials will ensure safe procedures that mitigate the potential risks and blast damage for the military and law enforcement when handling, storing, or detonating explosives.