Explosive materials characterisation by TNT equivalence

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Abstract: *Blast calculations compare explosives with the performance for an equivalent weight of TNT, their ratio is its TNT Equivalence (TNTe). Accuracy is key, as this determines safety and weapon performance. TNTe theories are Power Index, Hydrodynamic Work, Cooper's and Heat of Detonation. Gurney theory enables calculation of explosive energy imparted to casings. This paper assesses relationships between Gurney and TNTe theories, relationships found are compared with trials. Solutions link Hydrodynamic Work & Cooper's TNTe with Kamlet & Finger, Cooper and Koch's Gurney theories. Gurney Energy is shown as related to TNTe by Hydrodynamic Work (61%) and is a function of explosive density. Cooper's and Koch's Gurney theories have similar energy ratios and are a function of explosive density. Gurney Velocity and Detonation Velocity are shown as a function of charge densities and TNTe by Hydrodynamic Work. Cooper's TNTe theory is shown to be an approximation of TNTe by Hydrodynamic Work.*

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