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Determining the TNT equivalence of gram-sized explosive charges using shock-wave shadowgraphy and high-speed video recording MICHAEL HARGATHER, GARY SETTLES, Penn State University — Explosive materials are routinely characterized by their TNT equivalence. This can be determined by chemical composition calculations, measurements of shock wave overpressure, or measurements of the shock wave position vs. time. However, TNT equivalence is an imperfect criterion because it is only valid at a given radius from the explosion center (H. Kleine et al., *Shock Waves* 13(2):123-138, 2003). Here we use a large retroreflective shadowgraph system and a high-speed digital video camera to image the shock wave and record its location vs. time. Optical data obtained from different explosions can be combined to determine a characteristic shock wave x-t diagram, from which the overpressure and the TNT equivalent are determined at any radius. This method is applied to gram-sized triacetone triperoxide (TATP) charges. Such small charges can be used inexpensively and safely for explosives research.

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