

## **142r A Morphological Investigation of Soot Coming from the Detonation of Munitions**

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The morphology of three different detonation soot samples along with other common soot materials such as carbon black, diesel soot and chimney soot was studied by elemental and proximate analysis, X-ray diffraction, particle size distribution and electron microscopy. The goal of this study was to better define the morphology of the detonation soot in order to better assess the interactions of this type of soot with explosive residues. The detonation soot samples were obtained by the detonation of artillery 155 mm projectiles filled with either pure TNT (2,4,6-trinitrotoluene) or Composition B, a military explosive based on a mixture of TNT and RDX (trimethyltrinitramine). The carbon content of the soot samples varied considerably depending on the feedstock composition. Detonation soot contains less carbon and more nitrogen than the other carbonaceous samples studied, due to the molecular structure of the energetic materials detonated such as TNT and RDX. The ash concentration was higher for detonation soot samples due to the high metal content coming from the projectiles shell and to the soil contamination which occurred during the detonation. By X-ray diffraction, diamond and graphite were found to be the major crystalline carbon forms in the detonation soot. The soot obtained by detonating TNT filled projectiles, along with carbon black, diesel soot and chimney soot have a pronounced graphitic structure. Two electron microscopy techniques were used in this study to visualise the primary particles and to try to explain the formation mechanism of detonation soot samples.