

Using analytical chemistry in new ways:

Chemical profiling of explosives for criminal investigations and forensic intelligence

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Abstract

In a successful research collaboration that was initiated in 2009, the University of Amsterdam, TNO and the Netherlands Forensic Institute have developed a suite of analytical chemistry methods and approaches '*to go beyond*' the regular chemical analysis of explosives and post-explosion residues in forensic case work. Recently, also the analytical chemistry team of the VU joined this research endeavour. In this presentation chemical profiling of explosives as a means to support criminal investigation and law enforcement intelligence will be introduced. The wide range of analytical methods and strategies applied will be illustrated through various scientific and case work examples, including the latest results for characterization of illegal fireworks in the Netherlands. Based on the recent studies concerning the explosive erythritol tetranitrate (ETN), a nitrate ester that is gaining popularity due to the increased availability of its precursor erythritol, we will address the ultimate challenge in forensic explosives investigations, *i.e.* the accurate and detailed reconstruction of the production and origin of an energetic material found in an Improvised Explosive Device (IED) at the crime scene. In the absence of reference material and suspects such a reconstruction could provide valuable tactical leads to solve the crime and stop an explosive threat.

Keywords: Explosives; Chemical profiling; Forensic Analytical Chemistry; Forensic Intelligence;