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An Explosive Database

Bomb scene investigators are getting a big assist from the field of forensic sciences through a project that ultimately will help them pinpoint not only the manufacturer of an explosive but also the country where it was made.

Housed at the National Institute of Justice's National Center for Forensic Science at the University of Central Florida in Orlando, the project is headed by Jehuda Yinon, Ph.D., a visiting professor from the Weizmann Institute of Science in Rehovot, Israel. The goal of the project is to create a database of explosives—a database detailed enough for law enforcement agencies to identify the manufacturer as well as the country where the explosive was manufactured.

Yinon says the underlying science for the project is based on processes already found in crime laboratories, primarily liquid chromatography and mass spectrometry, which are used to characterize organic compounds, such as in the analysis of ink. By knowing the chemical compounds of various inks and knowing the different chemicals each manufacturer uses from year to year, forensic scientists can determine whether questioned documents are valid or when they were created. The technique has been used in major tax fraud investigations that require the authentication of receipts and documents.

The explosives database will function in the same way. Each type of explosive, whether it is TNT, C4, nitroglycerin, RDX, HMX, or PETN, will be chemically analyzed and the results compiled in a database. Forensic scientists will then be able to compare explosives associated with terrorists and bomb scene debris containing explosives residues with samples in the database to determine the type of explosive and its content and the manufacturer and country of origin.

"If you know this information you can narrow down the investigation," Yinon says. "What we have found in our preliminary investigation—and we started with the most commonly used military explosive, which is TNT—

is that TNT comes from different sources and has small amounts of by-products and impurities in it. The manufacture of TNT involves several solvents and other chemicals, which are reagents in the manufacturing process. In each country, those solvents and chemicals have different impurities and by-products as a result of the manufacturing process. Explosives also have additives, which are put in on purpose. Dyes, for example. One manufacturer can decide the explosive should be yellow. Another wants it to be red or black. What we are trying to do is find a way, by using such processes as liquid chromatography and mass spectrometry, to determine those small impurities, by-products, and additives and connect them to a manufacturer."

When a full analysis of TNT is completed, Yinon says, the project will focus on other types of explosives. He estimates that a comprehensive database is at least 3 years away. When completed, the project may also prove useful to environmental agencies as explosives are toxic compounds requiring special disposal methods. Environmental agencies could use the database to identify illegal dumping of explosives, which are hazardous materials.

For more information regarding the explosives database, contact Jehuda Yinon, 407-823-6469, or e-mail jjinon@mail.ucf.edu.



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