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### **B160 Smokeless Powders Database at the National Center for Forensic Science**

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The goal of this presentation is to develop an internet-accessible database comprised of analytical data for smokeless powder samples of the commercially available single-base and double-base designations.

This presentation will impact the forensic science community by providing a demonstration of the database which contains several hundred records of smokeless powder samples which are currently, or were previously, available for purchase.

Smokeless powders are low-explosive propellants in military and civilian ammunition which are commonly used in pipe bombs and other improvised explosive devices. There are three types of smokeless powders, namely single-base, double-base, and triple-base. The smokeless powders are distinguishable based on their primary energetic materials. Single-base powders contain nitrocellulose as their primary energetic material; double-base powders contain nitroglycerin in addition to nitrocellulose, and triple-base powders contain nitroguanidine in addition to nitrocellulose and nitroglycerin. In each powder type, there are a number of additional constituents which function as plasticizers, stabilizers, opacifiers, flash suppressants, and deterrents. The smokeless powders are available in a variety of shapes, namely: ball, flattened ball, cylinder (tubular), disk, and lamel. Of the three types, single- and double-base powders are readily procured from sporting goods retailers.

In 2009, the National Center for Forensic Science (NCFS) in collaboration with the Explosives Committee of the Scientific/Technical Working Group for Fire and Explosions developed the smokeless powders database which consists of a compilation of data generated from the analysis of the commercially available smokeless powder samples using techniques such as stereomicroscopy, Fourier Transform Infrared (FTIR) spectroscopy, and Gas Chromatography/Mass Spectrometry (GC/MS). The database is comprised of smokeless powder data contributions from a number of sources including NCFS, the Federal Bureau of Investigation, and the Netherlands Forensic Institute. The database contains physical and chemical descriptions of the powders including powder morphology (shape), dimensions, distinguishing features, and the main chemical components for each sample record. The database is searchable by the physical and chemical parameters and returns a list of potential candidates including source information, micrographs of the powders and bulk sample containers, physical measurements, and GC/MS and Attenuated Total Reflectance (ATR)/FTIR data.

The National Institute of Justice recently awarded funds to NCFS for the purchase and analysis of smokeless powders and the subsequent upload of their analytical data. The newly acquired samples will also be distributed to a number of American Society of Crime Laboratory Directors-accredited laboratories as a reference collection. In addition, the explosives committee which oversees maintenance of the database is receptive to contributions of smokeless powder data from national and international sources. The database serves as a resource for law enforcement agencies and will aid in the characterization, classification, and comparison of smokeless powder samples.

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#### **Smokeless Powders Database, Single-Base, Double-Base**