B165 Interlaboratory Validation Studies of ICP-AES and ICP-MS Methods for Elemental Analysis of Bullet Lead Alloys

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Attendees of this presentation will learn the relative merits and limitations of using ICP-AES and ICP-MS methods in a forensic laboratory for the sourcing of bullet lead.

Practical information which will assist forensic laboratories in determining the feasibility of utilizing ICP-AES and ICP-MS for elemental analysis of bullet lead in their laboratories; results of interlaboratory validation studies will help support the legal admissibility of these methods for bullet lead comparisons.

Elemental composition of the lead portion of bullets and shot pellets may be used by forensic laboratories for comparison of two projectiles to see whether they may have a single production source. Of more recent concern is the ability to determine a source, such as country of manufacture, of one or more bullets used in a terrorist event. In an international cooperative effort, NITE-CRIME Network has developed analytical protocols for the use of natural isotopes and trace elements in a variety of materials, including bullet lead. As part of this task, consideration was given to the fact that, while ICP-AES has long been used for the comparison of bullets, quadrupole ICP-MS instruments are seeing growing popularity and may be better suited to projectile sourcing. Interlaboratory studies were conducted using both ICP-AES and ICPMS to evaluate the performance of each method for this purpose. The results of studies considering the relative merits of combinations of each instrument with dissolution protocols, both with and without lead removal, and direct solid sampling by laser ablation will be presented. Figures of merit, such as precision and accuracy, are related to the specifics of sample digestion and instrumental operating parameters. Specific recommendations will be made concerning some practical considerations in the utilization of these instrumental methods in the forensic laboratory.

Bullet Lead, Elemental Analysis, Interlaboratory Study

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