FACTSHEET FOR ANSI/ASTM STANDARD TEST METHOD E2927-23

Determination of Trace Elements in Soda-Lime Glass Samples Using Laser Ablation Inductively Coupled Plasma Mass Spectrometry for Forensic Comparisons

WHAT IS AN AAFS STANDARD FACTSHEET?

The AAFS produces clear, concise, and easy-to-understand factsheets to summarize the contents of technical and professional forensic science standards on the OSAC Registry. They are not intended to provide an interpretation for any portion of a published standard.

WHAT IS THE PURPOSE OF THIS STANDARD?

This test method provides an objective approach for quantitatively measuring the concentrations of seventeen elements in soda-lime glass samples using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS).

The elemental composition between glass samples can vary widely. As such, measurement of the elemental composition can be conducted to determine if two or more glass fragments are indistinguishable and could have originated from the same common source.

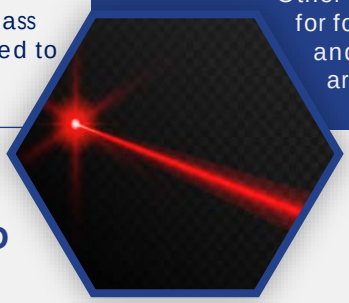
This test method is intended for comparing glass fragments for forensic purposes and is reported to provide high discriminating value in forensic glass comparison.

WHY IS THIS STANDARD IMPORTANT? WHAT ARE ITS BENEFITS?

The standard dictates requirements for instrument calibration frequency and quality control analyses, facilitating the collection of reliable and accurate data from forensic glass evidence. The detailed procedure for data acquisition, including replicate measurements, enables the adequate characterization of samples for soda-lime glass comparisons.

Repeatability and reproducibility limits presented in this standard have been established through an interlaboratory study.

Other elemental analysis techniques for forensic glass and the strengths and limitations relative to LA-ICP -MS are described.



HOW IS THIS STANDARD USED, AND WHAT ARE THE KEY ELEMENTS?

This test method provides a procedure for the quantitative measurement of seventeen elements using LA-ICP-MS. This technique is sensitive from the low part per million (ppm) to percent (%) level concentrations in soda-lime glass.

This method consumes approximately 0.4 to 3 micrograms of glass per analysis and is, therefore, suitable for small, irregularly shaped glass fragments like those often encountered in forensic glass examinations.

A procedure for the calculation and interpretation of the results is provided. To assist with interpretation, the limits of detection (LOD) and limits of quantitation (LOQ) obtained from laboratory analyses of soda–lime glass using LA-ICP-MS are included in the standard.

The standardized approach to quantitative elemental analysis of glass by LA-ICP-MS facilitates the creation of glass databases that can be shared to assist with the interpretation of common and uncommon elemental compositions.

Forensic examination of glass often includes characterization and measurement of multiple properties (e.g., color, density, refractive index, and elemental composition). LA-ICP-MS is minimally destructive to the sample tested and requires a smaller sample size than other methods in an analytical scheme.

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