

## Determination of Concentrations of Elements in Glass Samples Using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) 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?

The elemental compositions of glasses can vary widely. Measurement of the concentrations of elements in glass samples can be conducted for the purpose of determining if two or more fragments could have originated from the same broken source object.

Inductively coupled plasma mass spectrometry (ICP-MS) provides a quantitative measurement of multiple elements within a glass sample. This technique is sensitive from parts per million (ppm) to percent (%) concentrations.

This test method is amenable to irregularly shaped fragments of glass and can be applied to fragments as small as two hundred micrograms.

### WHY IS THIS STANDARD IMPORTANT? WHAT ARE ITS BENEFITS?

This standard describes procedures for highly precise measurements of the concentrations of specific elements within glass samples.

The use of an internal standard helps to ensure reliable and accurate test results. Additionally, the calibration verification requirements of this method further promote the accuracy of the test results.

The detailed procedure for sample preparation promotes consistency between forensic science service providers that follow this method for forensic glass comparisons by ICP-MS.

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

This test method provides an objective, sensitive approach for quantitatively measuring the concentrations of a range of elements in glass samples. It is intended for use in the forensic comparison of glass fragments. To this end, the use of ICP-MS to measure element concentrations is reported to be highly discriminating.

Procedures for sample preparation and instrument set-up and calibration are detailed in this standard. Procedures for the interpretation of the results and the associated calculations are specified.

The results of interlaboratory studies for determining the precision and bias of ICP-MS measurements of glass element concentrations are presented in this standard.

Forensic examination of glass can include characterization and measurement of multiple characteristics (e.g., color, density, refractive index, and elemental composition). ICP-MS is a destructive technique that is often placed at the end of analytical schemes.

