

Using Pyrolysis Gas Chromatography and Pyrolysis Gas Chromatography-Mass Spectrometry in Forensic Polymer Examinations



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?

Pyrolysis is the thermal breakdown of large molecules into smaller molecules and can be exploited under controlled conditions to provide chemical information about polymeric materials.

In a forensic setting, pyrolysis coupled with gas chromatography is useful for characterizing and comparing the organic portion or components of polymeric materials (e.g., paint, tape, and fibers).

This guide provides recommendations for instrumental parameters, sample suitability, and data interpretation and comparison strategies in the context of a forensic investigation.

WHY IS THIS STANDARD IMPORTANT? WHAT ARE ITS BENEFITS?

This guide briefly discusses the different types of commercial instrumentation and their benefits, as well as typical ranges for critical instrumental parameters.

Consistent and repeatable pyrolysis gas chromatographic analysis of polymers can be achieved following the guidance provided in this document.

The standard discusses the interpretation of pyrograms to assist the forensic science practitioner with understanding and identifying exclusionary differences.

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

This standard provides guidance and recommendations for the application of pyrolysis gas chromatography with or without mass spectrometry for the forensic analysis of polymeric materials. Details of the types of information that can be obtained from the pyrolysis of polymeric evidence are provided.

This technique can provide information about materials that is difficult to obtain by other analytical techniques, such as the presence and identity of residual solvents in tape adhesives.

Recommendations for sample size and considerations for ensuring optimal instrument performance are presented in this document.

The analysis of polymeric materials in a forensic investigation is often multi-faceted. Pyrolysis is a destructive technique that is often placed at the end of analytical schemes.

