FACTSHEET FOR ANSI/ASTM STANDARD GUIDE E2937-18

Using Infrared Spectroscopy in Forensic Paint 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?

Infrared (IR) spectroscopy is commonly used by forensic laboratories during the examination of paints and coatings. These may be received in the form of small chips, residues, particles or smears.

IR spectroscopy provides information on the molecular structure or chemical components within a single paint layer. It can be used to identify components of paint, such as binders, pigments, extenders, and other additives.

This standard provides guidance to examiners performing forensic paint examinations using Fourier Transform Infrared (FTIR) spectroscopy. The guide covers critical aspects of FTIR analysis such as instrument setup, performance assessment, sample preparation, data acquisition, and spectral evaluations.

WHY IS THIS STANDARD IMPORTANT? WHAT ARE ITS BENEFITS?

IR spectroscopy is an instrumental technique that is used as part of the overall analytical scheme for the forensic examination of paint.

The document offers guidance to obtain the most reliable data for the purpose of making *identifications* (i.e., investigative leads) and *comparisons* (i.e., determining whether there is a common source between known and questioned items).

Forensic science service providers (FSSPs) performing paint examinations using this instrumental technique are encouraged to meet this standard.

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

The standard describes the requirements, benefits, limitations, and proper use of IR accessories and sampling methods available during a forensic paint examination. The IR analysis of paint can be carried out using either transmission or reflection techniques and uses a variety of equipment configurations and accessories, the most common being the infrared microscope. In *transmission* mode, the electromagnetic wave or signal passes through a medium, whereas *reflection* involves the signal being returned at a boundary or surface.

The standard offers guidance on the following: sample handling and micromanipulations; transmission and reflection modes using the IR microscope and bench accessories; the choice of an appropriate detector; considerations for performance checks prior to analysis of casework samples; classification of paint components based on infrared spectra including the use of spectral libraries; criteria for spectral comparisons and evaluations; the use of specialized libraries, such as the Paint Data Query (PDQ) database to aid in the identification of make, model, and year of an unknown vehicle; and, documentation (i.e., case notes).

FTIR spectroscopy is part of an established analytical scheme for the examination of paint described in ANSI/ASTM E1610-18. The overall analytical scheme is designed to detect as many chemical components as possible and maximize the discriminating potential in the context of comparative examinations.

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