

COURSE OUTLINE: FORENSIC FTIR INSTRUMENTATION AND SAMPLE PREPARATION

Day 1

I. The Basics of FTIR

- A. Introduction to Infrared Spectroscopy
 - 1. The Properties of Light
 - 2. What is an Infrared Spectrum?
 - 3. Infrared Spectroscopy: Good and Bad Points
 - B. The Advantage of FT-IR: Signal-to-Noise Ratio
 - C. The Disadvantage of FTIR: Water and CO₂ Peaks
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II. How an FT-IR Works

- A. Interferometers & Interferograms
 - B. How is a Spectrum Measured?
 - C. Optimizing Spectral Quality
 - D. FTIR Hardware
 - E. Instrument Troubleshooting
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III. Dealing with Mixtures

- A. Spectral Subtraction
 - 1. Theory
 - 2. Optimizing Subtraction Results
 - 3. Spotting Artifacts

B. Library Searching

1. Background & Theory
 2. The Search Process
 3. Properly Interpreting Search Results
 4. Subtract & Search Again
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IV. Infrared Microscopes

- A. How an Infrared Microscope Works
 - B. Preparing Samples
 - C. Applications
 1. Forensics
 2. Biological Samples
 3. Molecular Mapping
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Day 2

V. Introduction to FTIR Sample Preparation

VI. Transmission Sampling

- A. Advantages & Disadvantages
 - B. Transmission Sampling of Solids
 1. KBr Pellets
 2. Mineral Oil Mulls
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VII. Transmission Sampling of Polymers

- A. Casting Films
- B. The Heat & Pressure Method

VIII. Transmission Analysis of Fluids

- A. Capillary Thin Films
 - B. Sealed Liquid Cells
 - C. Gasses and Gas Cells
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IX. Introduction To Reflectance Sampling

X. Specular Reflectance

XII. Diffuse Reflectance (DRIFTS) for Solids and Powders

- A. Sample Prep.
 - B. Applications
 - C. Abrasive Sampling
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XIII. Attenuated Total Reflectance (ATR): A Technique for Many Samples

- A. Theory & Background
- B. Depth of Penetration
 - 1. Depth Profiling
 - 2. Quantitative Analysis