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TRUSTED EXPERTISE IN CHEMISTRY AND FORENSICS

COURSE OUTLINE: PRINCIPLES OF FORENSIC CHROMATOGRAPHY

I. Introduction to Chromatography

A. Terms and Definitions
B. The Separation Process
C. Elution Times and Capacity Factors
D. Peak Widths
E. Resolution
F. Optimizing Separations

II. Gas Chromatography (GC)

A. Sample Preparation
B. Instrumentation
1. Injectors
2. Ovens
3. Columns
4. Mobile Phases
5. Detectors
C. Method Development
D. GC-FTIR
E. Troubleshooting

III. High Pressure Liquid Chromatography (HPLC)

A. Sample Preparation
B. Instrumentation
1. Injectors
2. Pumps

Contact Brian Smith: Tel: +1 (508) 579-6514 Email: bcsmith@spectros1.com Website: https://spectros1.com/

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3. Columns
4. Mobile phases
5. Separation Types & Mechanisms
6. Detectors
C. HPLC-FTIR
D. Method Development
E. Troubleshooting

IV. Calibrating Chromatographs for Quantitative Analysis

A. Accuracy and Precision
B. Standards
C. Calculating Calibration Lines
D. Method Validation
E. UV-Vis Detection: Beer's Law

V. Introduction to Mass Spectroscopy

A. How a Mass Spectrometer Works
B. Instrumentation
C. Ionization mechanisms
D. Mass Separation schemes
E. Determining Molecular Weights and formulas
F. Determining Molecular Structures

VI. Gas Chromatography-Mass Spectrometry (GC-MS)

A. Instrumentation
B. GC-MS interfaces
C. Understanding GC-MS data

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VII. High Pressure Liquid Chromatography-Mass Spectrometry (LC-MS)

A. Instrumentation
B. Interface Types
C. Understanding LC-MS Data

VIII. Forensic Applications of Chromatography

A. Toxicology
1. Blood Alcohol
2. Drugs in Blood and Urine
B. Questioned Documents (Ink)
C. Controlled Substances
D. Lipstick
E. Fibers
F. Paint
G. Ignitable Liquids