ANALYTICAL TRAINING SOLUTIONS

Premier Training for Analytical Chemists

Introduction to Gas Chromatography

A comprehensive short course in Gas Chromatgraphy

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WHAT DOES IT COVER?

The 'Introduction to Gas Chromatography' On-Line Tutorial is basic introduction to the theory and practice of gas chromatographic analysis. It is designed to bring GC users to a more comfortable and capable level of proficiency in instrument operation, optimization, and troubleshooting. Lessons are presented in a visually engaging and accessible manner through narrated on-line video presentations. In full recognition of the difficulty in setting large blocks of uninterrupted time for training; the lessons are presented in short segments that can be easily fit into even the busiest schedules.

- This course presents the basic processes and instrumentation involved with GC analysis.
- The level of material is specifically designed for GC users without extensive formal training.
- Applicable theory is covered to the extent that it helps guide best practices, method optimization and effective troubleshooting.

COURSE OBJECTIVES

Upon successful completion of the tutorial, trainees will have increased confidence and skills in using gas chromatographs. They will better understand how GC works, be more competent at detecting and diagnosing problems, and will be better at interpreting the quality of analytical results. In the end, trainees will be more capable and comfortable using gas chromatographs.

TARGETED AUDIENCE

This tutorial is designed for users of gas chromatographs with little or outdated training, as well as those seeking a refresher. The course will benefit first time users, previous users whose skills have lapsed, and just about anyone seeking desiring to improve their GC skills.

A key demographic is companies who provide their employees with yearly skill set development objectives. Even though supported by management, fulfilment of these objectives is difficult to accomplish through traditional training due to scheduling issues and frequent work-related interruptions. The on-line tutorial approach provides a unique solution by being accessible from anywhere with internet access, and at any time.

The tutorial is also well suited to any students with a general interest in learning more about gas chromatography, including those seeking an alternate traditional GC courses.

INSTRUCTOR

Dr Matthew S. Klee is a recognized authority in the area of GC analysis and instrumentation. Armed with a Ph.D. in analytical chemistry and 7 years in the chemical and pharmaceutical industries, he joined HP (later to become Agilent Technologies). During 23 years at HP/Agilent, Dr Klee was involved with the invention and commercialization with many of the GC and GC-MS products that Agilent now sells. He is a the author of monthly articles in *GC Solutions* and regularly teaches GC short courses.

COURSE STRUCTURE

The 'Introduction to Gas Chromatography' On-Line Tutorial is segmented in several chapters. The Chapters are made up of independently accessible modules of approximately 20 minutes duration. Once initiated, a given module can be stopped, resumed and reviewed as necessary.

COURSE DETAIL

Below are listed each section and sub-section of the class. A brief summary of each section is given first.

Section 1. Fundamentals of the Separation Process

Section 1 covers the underlying theory of gas chromatography including metrics and nomenclature of gas chromatography, the strengths and weaknesses of gas chromatography, and some underlying theory

- ***What is analytical chromatography***
- ***The Strengths and Weaknesses of Gas Chromatography***
- ***The Metrics and Nomenclature of Gas Chromatography***
- ***The Impact of Column Dimensions and carrier Gas Flow Rate on Column Efficiency***
- ***Isothermal vs Programmed temperature Analysis***

Section 2. Columns

Section 2 teaches about the heart of GC separations; Columns. The concepts of retention, selectivity, packed versus capillary column formats, stationary phase types, and column selection criteria are discussed in a way directly applicable to decisions a GC user must make on a regular basis.

- ***Stationary Phase Interactions: Partitioning vs Adsorption***
- ***Stationary Phase Interactions: Selectivity Concepts***
- ***Stationary Phase Capacity and the Effects of Overload***
- ***Column Formats: Packed Columns, WCOT and PLOT Capillaries***
- ***Adsorbents***
- ***Liquid Stationary Phases***

Section 3. Sample Introduction

This section discusses Sample Introduction; how samples are typically introduced into the gas chromatograph. Choices of sample introduction devices based on sample characteristics are described, followed by details on valves, automatic liquid samplers, and peak focusing mechanisms.

Choice of Sampler Introduction Technique Based on Sample Characteristics

- ***Sampling Valves***
- ***Automatic Liquid Samplers***
- ***Focusing Phenomena***

Section 4. Inlets

Section 4 Covers one of the more problematic areas of gas chromatographs; Inlets. Descriptions, strengths, weaknesses, and best practices are covered as they pertain to packed column direct, hot split/splitless, programmed-temperature split/splitless, and cool on-column inlets.

- ***Inlet Overview and the Packed Column Direct Inlet***
- ***Hot Split***
- ***Hot Splitless***
- ***Programmed Temperature Split/Splitless Inlet***
- ***Cool On-column Inlets***

Section 5. Detectors

Section 5 covers a major advantage of GC over other separation techniques; how the analytes of interest are detected. Basic detector metrics and nomenclature are presented, then characteristics and uses of the most popular detectors are described, including the FID, TCD, ECD, FPD, NPD, and MSD.

- ***Detector Metrics and Nomenclature***
- ***Thermal Conductivity Detector***
- ***Flame Ionization Detector***
- ***Nitrogen Phosphorus Detector***
- ***Flame Photometric Detector***
- ***Electron Capture Detector***
- ***Nitrogen and Sulfur Chemiluminescent Detectors***
- ***Atomic Emission Detector***

- *Mass Spectrometer Detector*
- *Photoionization and Pulsed Discharge Detectors*

Section 6. Basics of Data Analysis

This section addresses the bottom line of chromatographic analysis; turning chromatographic information into qualitative and quantitative reports. The importance of choosing the proper data rate, range and attenuation is discussed as well as calibration concepts, report types, and the basics of proper peak integration.

- *Data Rate, Range and Attenuation*
- *Basics of Peak integration and Calibration Curves*
- *Area Percent and External Standard Reports*
- *Internal Standard and Standard Addition Reports*

For more information and to discuss your training requirements, contact:

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