ANALYTICAL TRAINING SOLUTIONS

Premier Training for Analytical Chemists

Intermediate Gas Chromatography

To develop a more in-depth understanding of gas chromatography

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WHAT DOES IT COVER?

The Intermediate Gas Chromatography tutorial is designed for GC users who have a fundamental understanding of how gas chromatography works and who are ready to develop a more in-depth understanding of the technique. As with the 'Introduction to Gas Chromatography' course, the 'Intermediate Gas Chromatography' course is organized into sections and modules. The sections focus on a given theme and the modular structure underneath exposes students to the information within time-effective sections.

The 'Intermediate Gas Chromatography' course is a logical next step after completing the 'Introduction to Gas Chromatography' course.

COURSE OBJECTIVES

Upon successful completion of the course, trainees will have increased knowledge and skills in development of gas chromatography methods. They will gain an understanding of both qualitative and quantitative methods, as well as expanding their skills to encompass areas such as fast GC, and further developing maintenance and troubleshooting abilities.

TARGETED AUDIENCE

This course is designed for users of gas chromatographs who are looking to further development their method development and troubleshooting 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.

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 'Intermediate Gas Chromatography' on-line tutorial is segmented in several sections. The sections are made up of independently accessible modules of approximately. 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. Basic GC Method Development
Section 1 takes details the process of developing a GC method. Within the context of the modular video lesson format, it describes the importance of defining goals and constraints – presenting and defining many of goals that are typically involved with GC method development. It then walks one through initial selection of equipment and instrument configuration based on the goals and constraints and follows with initial selection of parameters and conditions. Section 1 concludes with the evaluation of results, including definition of common performance metrics, fine tuning, and verification of performance.

- *The approach, goals, constraints, metrics*
- *Initial equipment selections*
- *Initial setpoints*
- *Verification/validation*

Section 2. Qualitative Analysis
Section 2 centers on the aspects of GC that concern qualitative analysis – all things relating to retention. It starts with a description of terms and performance metrics and then migrates to retention mechanisms in gas chromatography. It retains the theme by presenting the fundamental aspects directly relating to retention, relative retention, and reproducibility of retention of sample analytes. Subsequent modules in Section 2 resolve differences between isothermal retention indices, temperature programmed indices, and retention time locking concepts while thoroughly explaining their implementations as well as how they can work together. It finishes with a description of the qualitative information that GC detectors can provide, including definitions and examples of universal versus selective detectors.

- *Retention*
- *Selectivity*
- *Retention indices*
- *Retention time locking*
- *Detector information*

Section 3. Quantitative analysis
Section 3 focuses on the quantitative aspects of gas chromatography, starting with a review of the salient definitions and associated performance metrics. It covers the calibration process, including the typical characteristics of detector response in GC, best practices in developing calibrations, and evaluation of response functions. Subsequent modules then present and explain the most common forms of reporting quantitative results: area percent, external standard, internal standard, and standard addition.

- *General*
- *Area percent, external standard analysis*
- *Internal standard, standard addition*

Section 4. Fast GC
Section 4 is all about speed of analysis and how to improve speed of GC analyses in a predictable way. The parameters involved with GC analysis speed are reviewed with a critical focus on tradeoffs that must be made in capacity and/or resolution. Practical goals as well as limitations are clearly presented and explained throughout the chapter. The important concept of method translation is explained so that one can quickly apply its simple concept to the predictable migration of an existing method. Section 4 concludes with a timely discussion of the issues with migration to the use of hydrogen as a carrier gas, including a review of the recent trends in helium production and supply.

- *Definition & Variables*
- *Method translation*
- *Transition to use of H_2 carrier gas*

Section 5. Maintenance & Troubleshooting

Section 5 maintains the practical orientation of the Intermediate GC course. It starts with a quick overview of typical tools necessary for maintenance of gas chromatographs including flow measurement and leak checking. It then follows a hardware oriented approach in subsequent modules that explain how to avoid the most common problems encountered in GC through recommended preventative maintenance for sample introduction, inlets, columns, and detectors. Section 5 concludes with a comprehensive approach to troubleshooting problems, stressing techniques that minimize time to diagnose sources of problems.

- *Tools*
- *Performance verification*
- *Sampler & inlet maintenance*
- *Column & Detector maintenance*
- *Logical approach to troubleshooting*

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

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