



المركز العالمي للتدريب والتطوير
International Centre For Training & Development



LAB104

Practical Gas Chromatography: *Fundamentals, Troubleshooting & Method Development*



INTERNATIONAL ACCREDITATION ORGANIZATION



UNIVERSITY OF ROCKHAMPTON
MAKING THE DIFFERENCE



Course Introduction:

The use of Gas Chromatography plays a key role in the modern industry, not only by supplying effective data of known quality, but also providing these data in real-time or near real-time.

This course is offering everything the professional and the novice need to know about running, maintaining, and interpreting the results from Gas Chromatography. Analytical chemists, technicians, and scientists in allied disciplines will regard this course as the best in gas chromatography. In addition to serving as an invaluable update for the experienced practitioner, this course provides the beginner with a solid understanding of gas chromatographic theory and basic techniques.

This course incorporates the most recent developments in the field of Gas Chromatography, including topics on optimization of separations and computer assistance; high speed or fast gas chromatography; mobile phase requirements: gas system requirements and sample preparation techniques; qualitative and quantitative analysis by Gas Chromatography; updated information on detectors; validation and QA/QC of chromatographic methods; and useful hints for troubleshooting gas chromatographs.

The course manual is a very comprehensive and contains many special topics that cover modern applications of GC in numerous disciplines. It is a must-have reference on the shelves of all laboratories doing gas chromatographic analyses.

This program intends comprehensively to highlight and discuss in details the components of the technique, its use, trouble shooting, maintenance, calibration, interface with other techniques and some practical workshops to familiarize the theoretical information into practice.

The program explores other use for the GC, particularly the methods development for new compounds in research and development area and how this technique can be very powerful detection when it is used with other techniques such as Mass Spectroscopy or High Performance Liquid Chromatography.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- ✓ To build extensive understanding and excellent skills in gas chromatography technology and associated techniques used.
- ✓ To operate the gas chromatography equipment in the safest and best practical way.
- ✓ To build up the knowledge and skills on how to maintain gas chromatography and able to train others, particularly the graduates and new comers.

- ✓ To calibrate gas chromatography and produce results with the highest precision and accuracy and reliable source
- ✓ To manage trouble shooting and identifying the source of the problem and the scientific method of eliminating the problem from reoccurring.
- ✓ To develop new methods and procedures development for new tests and using it in research and development projects
- ✓ Be familiar with sampling and sample handling concepts, the effect of sampling error on overall precision, sample contamination and preservation, disposal of completed sample and reporting of data and sample accountability
- ✓ Learn sample preparation, sample requirements for gases, liquids and solid, sample clean up, solvent, soxhlet, solid phase, and solid micro extraction, sample derivatization, improved volatility and separation, improved sensitivity and selectivity.
- ✓ Differentiate packed versus capillary columns, the chromatographic process and component separation, now the effects of carrier gas velocity, capillary tubing, sources of activity and structural flaws, silanol deactivation and column coating
- ✓ Heighten their knowledge about capillary columns, its stationary phase, polarity and selectivity, the types of stationary phase and gas-solid adsorption columns
- ✓ Gain knowledge on gas chromatographic separation effects, the effect of column length and diameter, stationary phase film thickness and stationary phase diffusivity, and also the effect of temperature and temperature programming on column flow, average linear velocity, solute retention and chromatographic efficiency
- ✓ Identify sample injection, learn the factors affecting injection band width, split/splitless injectors, hot vaporizing injection, large volume injection, purge and trap sampling also headspace and purge and trap sampling
- ✓ Understand general aspects of GC detectors, like thermal conductivity detector, flame ionization, electron capture, thermionic, photoionization, flame photometric and chemiluminescent detectors
- ✓ Recognize GC/MS capillary columns, ionization sources, mass analyzers, mass fragment detection, total ion chromatograms and selective ion monitoring
- ✓ Explain high speed GC
- ✓ Conduct validation of GC Methods, Installation Qualification (IQ), Operational Qualification (OQ), and Performance Qualification (PQ)
- ✓ Perform troubleshooting and applications

Who Should Attend?

This course is offering everything the professional and the novice need to know about running, maintaining, and interpreting the results from Gas Chromatography. Analytical chemists, technicians, and scientists in allied disciplines will regard this course as the best in gas chromatography. In

addition to serving as an invaluable update for the experienced practitioner, this course provides the beginner with a solid understanding of gas chromatographic theory and basic techniques.

Course Fees:

To be advised as per course location. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Outline:

Day 1:

- Operating Principles of LC/MS and GC/MS
- Strategies for Data Interpretation - EI, CI, MS/MS, and Ion-Source CAD
- Ionization Techniques - EI, CI, APCI, and ES, Inlet-System Interfacing for LC and GC
- Quantitation Using GC/MS and LC/MS
- Instrument Maintenance
- Experimental Design

Day 2:

- Use of Computer Tools for Generation of and Dealing with LC/MS, GC/MS, and MS/MS Data
- Sources for GC/MS and LC/MS Method Development
- MS Requirements for Hyphenated Techniques
- Consult with expert instructors about your analytical problems and challenges
- Strategy for interpreting mass spectral data
- Compounds are amenable to various MS techniques

Day 3:

- Operating principles of ionization sources, mass analyzers, and detectors
- Operating principles of sample inlet systems (direct-probe and GC and LC inlet) and associated vacuum systems
- How to process data with a data system; appreciate various aspects of tuning and troubleshooting a mass spectrometer
- Library searching on benchtop data systems and the use of other computer-aided mass spectral interpretation tools
- Using a vast array of the latest in modern GC/MS and LC/MS instrumentation
- Chromatography techniques

Day 4:

- Gas Chromatography technique
- Sample preparation
- GC components
- GC columns
- GC detectors
- GC carriers
- Electronic devices connected to GC

Day 5:

- Maintenance and calibration of gas chromatographic instrument
- Troubleshootings and their solutions
- Interpretation of test results and analysis
- GC Methods and processes development
- Combination of gas chromatographic technique with other techniques
- Basic instructions and advanced operating procedures
- Interface and overlaps of mixed chemicals

Course Requirement:

"Hand's on practical sessions, equipment and software will be applied during the course if required and as per the client's request".

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session

