MAWA EVENTS

Address: No. 857, Block A2. Leisure Commerce Square - No 9., 46150 Petaling Jaya, Selangor, Malaysia

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GAS AND LIQUID CHROMATOGRAPHY AND TROUBLESHOOTING

"Master Chromatographic Techniques and Learn to Diagnose, Solve, and Prevent Instrumentation and Analytical Problems Effectively"

Schedule

Venue (InHouse)	Fees
At Your Organization Premises	Ask For The Quotation

► **Available delivery methods:** In-House Training

Introduction

Chromatography is one of the most widely used analytical techniques in chemical, petrochemical, pharmaceutical, and environmental industries for separating, identifying, and quantifying components in complex mixtures. Both Gas Chromatography (GC) and Liquid Chromatography (LC or HPLC) play vital roles in ensuring product quality, process efficiency, and regulatory compliance.

The Gas and Liquid Chromatography and Troubleshooting course is designed to give participants a thorough understanding of chromatographic principles, instrumentation, and operational practices while focusing on real-world troubleshooting techniques. It bridges theoretical knowledge with practical laboratory applications, helping analysts, chemists, and engineers interpret chromatograms accurately and resolve analytical issues efficiently.

Participants will explore topics such as column selection, detector optimization, sample preparation, method validation, and problem identification in GC and LC systems. The training also provides systematic approaches to diagnosing peak distortion, baseline drift, ghost peaks, leaks, contamination, and pressure fluctuations.

By the end of this course, participants will have the confidence and skills to operate chromatography systems efficiently, interpret data with precision, and implement preventive maintenance to ensure reliable and accurate results.

Objectives

By completing this course, participants will be able to:

- Understand the principles, components, and operation of GC and LC systems.
- Differentiate between various chromatographic techniques and their applications.
- Select appropriate columns, detectors, and stationary phases for specific analyses.
- Perform effective sample preparation, injection, and system calibration.
- Identify and troubleshoot common chromatographic issues.
- Interpret chromatograms and improve resolution and sensitivity.
- Apply best practices in maintenance and system performance optimization.
- Ensure quality assurance and method validation in analytical processes.
- Enhance analytical reliability and minimize downtime through preventive troubleshooting.

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Why Attend

Analytical accuracy and reliability are critical in industries where chromatography is the cornerstone of quality control and research. Even minor operational issues can lead to inaccurate results, wasted resources, and delays in production or testing.

Attending this course ensures you gain the technical understanding and diagnostic skills required to maintain peak performance of GC and LC systems. You will learn to identify the root causes of analytical problems and apply systematic troubleshooting approaches to minimize downtime.

Whether you are an experienced analyst or a beginner, this course will strengthen your ability to produce high-quality chromatographic data, improve laboratory efficiency, and enhance your professional capability in analytical sciences.

Target Audience

This course is ideal for professionals involved in chromatographic analysis and laboratory operations, including:

- Analytical Chemists and Laboratory Technicians
- Quality Control (QC) and Quality Assurance (QA) Professionals
- Research and Development Scientists
- Process and Chemical Engineers
- Instrumentation Specialists and Maintenance Engineers
- Environmental and Petrochemical Analysts
- Laboratory Supervisors and Managers

Individual Benefits

- Gain in-depth knowledge of both Gas and Liquid Chromatography principles.
- Develop the ability to identify, diagnose, and fix analytical issues quickly.
- Learn to optimize chromatographic methods for better accuracy and efficiency.
- Improve understanding of sample preparation and column management.
- Enhance laboratory performance and reliability in data generation.
- Strengthen problem-solving skills and confidence in handling instruments.

Organizational Benefits

- Improve analytical accuracy and reduce downtime in laboratory operations.
- Minimize costs associated with re-analysis, repairs, and instrument maintenance.
- Ensure consistency and reliability in product testing and quality assurance.
- Build technical expertise among laboratory and production teams.
- Strengthen compliance with international analytical and regulatory standards.
- Enhance productivity and efficiency through well-trained analytical staff.

Instructional Methodology

The course is delivered through a balanced combination of theory, practical exercises, and interactive discussions. The instructional methodology includes:

- Comprehensive lectures with visual presentations.
- Real-world case studies on chromatographic troubleshooting.
- Demonstrations of GC and LC components and maintenance techniques.
- Hands-on problem-solving sessions using chromatograms and data examples.
- Group discussions and scenario-based exercises.
- Instructor-led Q&A sessions and peer learning activities.
- Practical assignments emphasizing analytical challenges and corrective actions.

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Course Outline

Module 1: Fundamentals of Chromatography

- Principles of chromatographic separation
- Classification of chromatography techniques
- Comparison between Gas and Liquid Chromatography

Module 2: Gas Chromatography (GC) Basics

- Components of a GC system: injector, column, and detector
- Column types, carrier gases, and temperature programming
- Common GC detectors (FID, TCD, ECD, MS) and their applications
- Sample introduction techniques and split/splitless injection

Module 3: Liquid Chromatography (LC/HPLC) Basics

- Components of LC systems: pumps, injectors, columns, and detectors
- Mobile and stationary phases selection
- Gradient vs. isocratic elution
- UV, fluorescence, and mass spectrometric detection

Module 4: Method Development and Optimization

- Selecting columns and conditions for optimal resolution
- Retention time control and peak shape improvement
- Optimization of temperature, flow rate, and gradient parameters
- Integration of GC/LC with MS for advanced analysis

Module 5: Chromatogram Interpretation and Data Analysis

- Understanding retention time, resolution, and efficiency
- Baseline stability and peak area accuracy
- Identifying and correcting peak distortions, tailing, and fronting

Module 6: Troubleshooting Gas Chromatography Systems

- Common GC problems and their root causes
- Diagnosing leaks, ghost peaks, and detector issues
- Contamination control and preventive maintenance
- System performance qualification and validation

Module 7: Troubleshooting Liquid Chromatography Systems

- LC pressure problems and pump maintenance
- Flow inconsistencies and gradient issues
- Air bubbles, contamination, and noise reduction
- Column lifetime optimization and regeneration

Module 8: Method Validation and Quality Assurance

- Validation parameters: accuracy, precision, LOD, LOQ, and linearity
- System suitability testing (SST) and documentation practices
- Data integrity and regulatory compliance (GLP, GMP, ISO standards)

Module 9: Preventive Maintenance and System Care

- Routine maintenance schedules for GC and LC systems
- Proper column storage, cleaning, and replacement
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Handling mobile phases, gases, and standards

- Best practices for long-term instrument performance

Module 10: Practical Case Studies and Troubleshooting Exercises

- Review of common chromatographic failures and solutions
- Interactive exercises on chromatogram analysis
- Group-based troubleshooting challenges
- Final session: optimizing performance in real laboratory scenarios

Certification

Upon successful completion of this course, participants will be awarded a Certificate in Gas and Liquid Chromatography and Troubleshooting, signifying their competence in chromatographic operation, method optimization, and systematic problem-solving. The certification demonstrates a strong understanding of both theoretical and practical aspects of chromatography and highlights the participant's ability to ensure reliable, precise, and efficient analytical performance in laboratory environments.

Why Choose MAWA Events

- **Global Expertise:** More than 17 years of experience in professional training and consulting.
- **Industry-Leading Faculty:** Courses delivered by seasoned professionals with hands-on experience.
- **Practical Insights:** Learn to turn theory into actionable strategies for real-world business impact.
- **Client-Focused Solutions:** Customized programs designed to achieve your organisation's unique goals.

In-House / Customized Training Interested in running this course for your team? Please contact us:	TEL: **+601116373203**	EMAIL: **info@mawaevents.net**