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# Gas Chromatography & Troubleshooting for the Oil and Gas Industry



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## Introduction:

Gas chromatography GC embodies a significant analytical technology employed extensively in various sectors, including the oil and gas industry, over the past 50 years. As an essential tool for analyzing complex mixtures, gas chromatography is instrumental in phases ranging from crude oil exploration to refining petroleum products and innovating new petrochemicals. Participants will study GCs fundamental principles, including its operation, maintenance, and troubleshooting measures.

The gas chromatography maintenance and troubleshooting course will help participants understand the significance of gas chromatography in diverse sample analysis. It will also offer insights into current best practices related to system configuration and recommended starting conditions for methods.

This comprehensive gas chromatography maintenance and troubleshooting training course provides an in-depth examination and training on gas chromatography and associated troubleshooting techniques within the oil and gas sector.

## Targeted Groups:

This gas chromatography maintenance and troubleshooting course is for laboratory and quality assurance professionals seeking foundational or advanced knowledge in gas chromatography. It is also highly beneficial for Environmental Quality Personnel and fiscal quality inspectors.

## Course Objectives:

Upon completing the gas chromatography maintenance and troubleshooting course, participants will:

- Grasp the foundational theoretical concepts of gas chromatography.
- Convey practical information regarding the capabilities and constraints of gas chromatography systems.
- Develop confidence in:
    - GC Analysis Technique.
    - GC Troubleshooting.
    - Analytical Results Evaluation.

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## Targeted Competencies:

Participants competencies in this gas chromatography maintenance and troubleshooting training will enhance their proficiency in the following:

- Gas Supply and Handling.
- Utilization of Split/Splitless and PTV inlets.
- Operation of the Auto Sampler.
- Management of PC and Data Systems.
- Construction of Methodologies.
- Mastery of Integration and Reporting.
- Implementation of Quantitation and Calibrations.
- Sample Inlet and Auto Samplers.
- Columns.
- Detectors.
- Data Analysis Systems.

## Gas Chromatography Troubleshooting Guide:

This gas chromatography maintenance and troubleshooting course incorporates a specialized segment on gas chromatography maintenance and troubleshooting. Participants will gain proficiency in problem-solving techniques tailored to the peculiarities of gas chromatography operation, emphasizing definitive protocols for recognizing and remedying issues frequently encountered in GC analysis. This segment aims to imbue trainees with a troubleshooting mindset, ensuring swift and effective resolution of technical difficulties, thereby maintaining GC system integrity and analytical precision.

## Course Content:

### Unit 1: Introduction to Chromatography:

- The overall scope of gas chromatography.
- The theoretical underpinnings of GC.
- Development processes in GC.
- Retention influencing factors.
- Molecular forces and their influence on chromatographic selectivity.
- Implications of stationary phase loading on GC performance.
- Chromatographic nomenclature.

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## Unit 2: Injection Ports:

- Gas Supply and Handling.
- GC Inlets Selection Variation.
- Capillary vs. Packed Column.
- Direct Capillary.
- Split/Split Less.
- Programmed Temperature Vaporizer PTV Inlets.
- Cool on Column.
- The Role of Sample Introduction and Injection Ports in GC Operations.
- Sample Introduction - Auto Samplers.

## Unit 3: Gas Chromatography GC Columns:

- Column Selection.
- Packed.
- Capillary.
- GC Column Impact on Performance.
- Peak Dispersion in a Chromatographic Column.
- Column Maintenance and Troubleshooting.
- GC Oven.
- Isothermal VS Temperature Programming.

## Unit 4: Gas Chromatography GC Detectors:

- GC Detector Selection.
- Detector Role in GC Operations.
- How can detectors impact GC performance?
- Detector Maintenance and Troubleshooting.
- Chromatography Applications.
- Method Development.
- Setup and GC Operation.
- Preparation for Operation.

## Unit 5: Gas Chromatography GC Data Acquisition and Processing:

- Sampling techniques.
- Data acquisition and processing systems.
- Calibration processes and performance optimization.
- Comprehensive gas chromatography troubleshooting.
- Understanding the Laboratory Information Management System LIMS.
- Basics of ISO17025 Accreditation.
- Extensive laboratory management and troubleshooting skills.