



Gas Chromatography &
Troubleshooting for the Oil and Gas
Industry



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Introduction:

In the past 50 years, Gas Chromatography has become an important analytical tool in virtually every phase of the petroleum industry, from the exploration of crude oil and refining of finished products to research on new petrochemicals. Gas Chromatography GC is one of the most widely used techniques in modern analytical chemistry and its basic form, is used to separate complex mixtures of different molecules based on their physical properties, such as polarity and boiling point. It is an ideal tool to analyze gas and liquid samples containing many hundreds or even thousands of different molecules, as in the case of crude oil or its products. The technique allows the analyst to identify both the types of molecular species present and their concentrations.

This training course introduces the fundamental theory of Gas Chromatography along with the operation, maintenance, and troubleshooting, from sample introduction through to data analysis. Instrument components are described and presented, along with their underlying theories as they apply to guide best practices and effective method optimization and troubleshooting.

Because of the variety and complexity of sample types, petroleum chemists use a broad spectrum of gas chromatographic methods. You will learn about current best practices in terms of system configuration choices and initial method conditions

Targeted Groups:

This course is ideal for lab and quality professionals that do not have formal training or experience in gas chromatography or those that want to refresh their current knowledge of gas chromatography. It is also suitable for Environmental Quality Personnel, and fiscal quality inspectors

Course Objectives:

At the end of this course the participants will be able to:

- Understand the basic theoretical aspects of gas chromatography
- Communicate practical information, capabilities, and limitations of gas chromatography
- Gain confidence on the:
 - GC Analysis Technique
 - GC Troubleshooting
 - Analytical Results Evaluation

Targeted Competencies:

- Gas Supply and Handling
- Split / Splitless and PTV inlets
- The Auto Sampler
- PC & Data System
- Creating Methods
- Integration and Reporting
- Quantitation and Calibrations
- Sample Inlet & Auto Samplers

- Columns
- Detectors
- Data Analysis Systems

Course Content:

Unit 1: Introduction to Chromatography:

- Overview of Gas Chromatography
- Gas Chromatography Theory
- The Development Process
- Factors Controlling Retention
- Molecular Forces and Chromatographic Selectivity
- Stationary Phase Loading and GC Performance
- Chromatography Nomenclature

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 detectors can 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



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Processing:

- Sampling Techniques
- Data Acquisition and Processing Systems
- Calibration and GC Performance
- Gas Chromatography Troubleshooting
- Laboratory Information Management System LIMS
- ISO17025 Accreditation Basics
- Laboratory Management & Troubleshooting