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AL011:
High Performance Liquid Chromatography (HPLC):
Operation, Calibration, Troubleshooting and Maintenance

Training Description:

HPLC is a technique for separation, identification and quantification of components in a mixture. It is especially suitable for compounds which are not easily volatilized, thermally unstable and have high molecular weights.

The liquid phase is pumped at a constant rate to the column packed with the stationary phase. Before entering the column, the analysis sample is injected into the carrier stream. On reaching the column the sample components are selectively retained on the basis of physic-chemical interactions between the analytic molecules and the stationary phase. The mobile phase moving at a steady rate elutes the components based on the operating conditions. Detection techniques are employed for detection and quantification of the eluted components.

High performance liquid chromatography is basically a highly improved form of column chromatography. Instead of a solvent being allowed to drip through a column under gravity, it is forced through under high pressures of up to 400 atmospheres. That makes it much faster.

It also allows you to use a very much smaller particle size for the column packing material which gives a much greater surface area for interactions between the stationary phase and the molecules flowing past it. This allows a much better separation of the components of the mixture.
The other major improvement over column chromatography concerns the detection methods which can be used. These methods are highly automated and extremely sensitive.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Understand the differences between High-Performance Liquid Chromatography and Gas Chromatography
- ✓ Identify the components of the High-Performance Liquid Chromatograph (HPLC)
- ✓ Learn the separation processes
- ✓ Fully understand chromatogram
- ✓ Understand the most common modes of HPLC

Training Designed for:

This course is intended for Laboratory Personnel and Technical Staff such as Chemists, Analysts, Chemical Engineers, and anybody interested in chemical analysis, research and development, environmental studies, quality control, refineries, petrochemical plants, water and wastewater plants, hospitals and medical centers.

Training Program:

DAY ONE:

- ❖ Introduction
  - Historical Perspective
  - Overview of Liquid Chromatography
- ❖ Practical and Theoretical Principles

- Resolution
- Capacity Factor
- Efficiency

❖ Performing an Analysis
- Solvent Preparation, Isocratic and Gradient-Elution
- Sample Preparation
- Columns
- Pump Maintenance

DAY TWO:

❖ High Performance Liquid Chromatography Overview
- Introduction to HPLC
- HPLC Instrumentation Overview
- Detector Details
- Laboratory: HPLC Hardware

❖ Separation Fundamentals and Mobile Phase
- Practical HPLC Theory
- Important HPLC Parameters
- The Mobile Phase
- Laboratory: Mobile Phase Strength, Flow Rate and Temperature

DAY THREE:

❖ Gradient Elution
- Purpose of Gradient Elution
- Scouting Runs and Gradient Profiles

❖ HPLC Instrumentation
- Columns and fittings
- Solvent Delivery System
- Sample Introductions

❖ Detectors and Qualitative and Quantitative Analysis

DAY FOUR:

❖ Modes of Liquid Chromatography
- Packing Materials
- Normal Phase
- Adsorption and Bonded phase
- Reverse Phase
- Principles and Rules of Retention
- Choosing a Reversed Phase Column
- Secondary Ion Effects
- Paired Ion Chromatography
- Ion Exchange Chromatography
- Size Exclusion Liquid Chromatograph
- Chiral Chromatography
- Affinity Chromatography
- Preparative Chromatography

DAY FIVE:

- Separation Modes and Columns
  - Reversed Phase
  - Normal Phase
  - Ion Exchange
  - Size Exclusions
  - Laboratory: pH Effects in Reversed Phase
  - Laboratory: Column Dimensions
- Quantitative Analysis and Troubleshooting
  - Qualitative and Quantitative Analysis
  - LC/MS
  - Hardware Troubleshooting
  - Separation Troubleshooting
  - Laboratory: Internal vs. External Standard
  - Hardware Troubleshooting
- Gradients and Method Development
  - Gradients
  - Fundamentals of Method Development
  - Laboratory: Develop a Method for a Compete Unknown Mixture
- Course Conclusion
- POST-ASSESSMENT and EVALUATION

Training Requirement:

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

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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