



AL157: Inductively Coupled Plasma Atomic, Emission/Mass Spectrometry: (ICP-AES, ICPMS)

Training Description:

This course is designed to provide participants with a detailed and up-to-date overview of inductively coupled plasma atomic, emission/mass spectrometry (ICP-AES, ICPMS). It covers the sampling and sample handling including the effect of sampling error on overall precision; the sample contamination, preservation and sample preparation; the inductively coupled plasma-atomic emission spectroscopy; the fundamentals of spectroscopy, plasma spectroscopy and mass spectrometry spectrometers; and the torches, spectrometers, line isolation, monochromators and polychromators.

Further, this intensive course will also discuss the photomultiplier tubes, solid state, nebulisers and spray chambers, read out devices, instrument control and data processing; the axial systems, sample introduction system, detectors, accuracy and precision; the instrumental drift, matrix effects, plasma effects, spectral effects, interferences and background correction; the detection, dynamic range, multi-element capability and selectivity instrumental and radio frequency generators; and the inorganic mass spectrometry, interfaces, interface and mass spectrometer.

During this interactive course, participants will learn the inductively coupled plasma-atomic emission spectroscopy mass – spectrometry; the detectors, interfaces, isotope dilution analysis and mass spectral interpretation; the application of inductively coupled plasma technology using forensic science, industrial analysis, clinical/biological analysis, materials analysis, food analysis and pharmaceutical analysis; the analytical methods, concept of validation and the benefits of applying the validation approach, uncertainty and its measurement; the method validation parameters covering accuracy, precision and selectivity; and the initial calibration, linearity and range covering limit of detection, limit of quantification, ruggedness, robustness, traceability, sensitivity, PT, repeatability and reproducibility.

Training Objectives:

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

- ✓ Apply and gain a good working knowledge on inductively coupled plasma atomic, emission/mass spectrometry (ICP-AES, ICPMS)
- ✓ Discuss sampling and sample handling including the effect of sampling error on overall precision
- ✓ Carryout sample contamination, preservation and sample preparation
- ✓ Discuss inductively coupled plasma-atomic emission spectroscopy
- ✓ Explain the fundamentals of spectroscopy, plasma spectroscopy and mass spectrometry spectrometers
- ✓ Describe torches, spectrometers, line isolation, monochromators and polychromators
- ✓ Determine photomultiplier tubes, solid state, nebulisers and spray chambers, read out devices, instrument control and data processing
- ✓ Identify the axial systems, sample introduction system, detectors, accuracy and precision
- ✓ Recognize instrumental drift, matrix effects, plasma effects, spectral effects, interferences and background correction
- ✓ Interpret detection, dynamic range, multi-element capability and selectivity instrumental and radio frequency generators
- ✓ Discuss inorganic mass spectrometry, interfaces, interface and mass spectrometer
- ✓ Describe the inductively coupled plasma-atomic emission spectroscopy mass – spectrometry



- ✓ Explain the detectors, interfaces, isotope dilution analysis and mass spectral interpretation
- ✓ Select application of inductively coupled plasma technology using forensic science, industrial analysis, clinical/biological analysis, materials analysis, food analysis and pharmaceutical analysis
- ✓ Validate analytical methods, as well as discuss the concept of validation and the benefits of applying the validation approach, uncertainty and its measurement
- ✓ Identify method validation parameters covering accuracy, precision and selectivity
- ✓ Apply initial calibration, linearity and range covering limit of detection, limit of quantification, ruggedness, robustness, traceability, sensitivity, PT, repeatability and reproducibility

Training Designed for:

This course is intended for those who are involved in analytical instrumentation, equipment calibration, operations, quality and safety including laboratory managers, engineers, chemists, scientists and other laboratory technical staff. Further, the course is suitable for instrumentation engineers and other instrumentation staff who are in-charge of instrument calibration and maintenance.

Training Program:

DAY ONE:

- ❖ PRE-TEST
- ❖ Introduction
- ❖ **Sampling & Sample Handling**
 - Course Overview
 - Sampling and Sample Handling Representative Sampling
 - Effect of Sampling Error on Overall Precision
- ❖ **Sample Contamination & Preservation**
 - Transmittal of Samples to Laboratory & Sample Receiving
 - Disposal of Completed Samples
 - Reporting of Data and Sample Accountability
- ❖ **Sample Preparation**
 - Sample Requirements for Gases, Liquids and Solid Samples
 - Sample Clean Up, Solvent Extraction, Soxhlet Extraction, Solid Phase Extraction, Solid Phase Micro Extraction
 - Sample Derivatization, Improved Volatility and Separation, Improved Sensitivity and Selectivity

DAY TWO:

- ❖ **Inductively Coupled Plasma-Atomic Emission Spectroscopy**
 - Fundamentals of Spectroscopy
 - Plasma Spectroscopy
 - Fundamentals of Mass Spectrometry Spectrometers
 - Torches
 - Spectrometers
 - Line Isolation
 - Monochromator
 - Polychromators



- Photomultiplier Tubes
- Solid-State
- Nebulisers and Spray Chambers
- Read-out Devices, Instrument Control and Data Processing
- Axial Systems
- The Sample Introduction System
- Detectors
- Accuracy and Precision

DAY THREE:

❖ Inductively Coupled Plasma-Atomic Emission Spectroscopy (cont'd)

- Instrumental Drift
- Matrix Effects
- Plasma Effects
- Spectral Effects, Interferences and Background Correction
- Detection
- Dynamic Range
- Multi-Element Capability and Selectivity
- Instrumental
- Radio-frequency Generators
- Inorganic Mass Spectrometry
- Interfaces
- Mass Spectrometer

DAY FOUR:

❖ Inductively Coupled Plasma-Atomic Emission Spectroscopy- Mass Spectrometry

- Detectors
- Interferences
- Isotope Dilution Analysis
- Mass Spectral Interpretation

❖ Selection Application of Inductively Coupled Plasma Technology

- Forensic Science: Document Analysis
- Industrial Analysis
- Clinical/Biological Analysis: Whole Blood and Urine
- Materials Analysis: Gadolinium Oxide, Environmental Analysis: Soil
- Food Analysis such as Milk Products, and Pharmaceutical Analysis

❖ Practical Session/Site Visit

DAY FIVE:

❖ Validation of Analytical Methods

- The Concept of Validation
- The Benefits of Applying the Validation Approach
- Uncertainty and Its Measurement

❖ Method Validation Parameters

- Accuracy
- Precision

- Selectivity
- ❖ **Initial Calibration, Linearity & Range**
 - Limit of Detection
 - Limit of Quantification
 - Ruggedness & Robustness
- ❖ Course Conclusion
- ❖ POST-TEST and EVALUATION

Training Requirement:

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

Please note that the above topics can be amended 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, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

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

Training Fees:

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 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

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

Aisha Relativo: aisha@cmc-me.com

Tel.: +971 2 665 3945 or +971 2 643 6653 | Mob.: +971 52 2954615

Training & Career Development Department

