



# AL035:

## **Trace Analysis: Applications, Methodologies, Techniques, Sample Preparation, Measurement & Reporting**

## Training Description:

Trace Analysis measurements plays a key role in many areas of interest to industry and commerce, to governments, and to individuals. For example, the development and production of many new materials, of microelectronic devices and of safe pesticides has been dependent on the availability of specific trace analysis techniques. Similarly, Trace Analysis is used in the first instance by government to set many regulatory limits for purposes such as protection of the environment or protection of the consumer or to protect the health and safety of the workforce. Subsequently, Trace Analysis must be used by both industry and government to monitor or enforce these limits. Trace Analysis is also essential to ensure the smooth flow of the trade between companies or countries. For example, a manufacturing company purchasing materials or components will need to know that its suppliers are meeting an agreed specification.

Obviously, checking such specifications may require a wide variety of physical or chemical measurements but Trace Analysis data are often vital, particularly with high technology products or materials intended for human consumption or application. Similarly, international trade is subject to extensive controls and regulations, many of which depend on Trace Analysis data.

This course is designed to provide a comprehensive and up-to-date overview of Trace Analysis. It will introduce the various techniques to determine certain chemical constituents at trace levels together with their applications. The course therefore offers invaluable training to chemist and analysts in all areas and at all levels, providing practical 'expert' advice on methodology.

## Training Objectives:

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

- ✓ Develop an understanding of trace analysis including its importance in today's world, discuss the approach to quality, the approach to trace analysis and the proper analytical methodology in achieving valid trace analysis
- ✓ Illustrate the proper procedure on sample preparation and undertake general precautions in the separation and pre-concentration of chemical constituents
- ✓ Illustrate the proper procedure on sample handling especially in sample storage and stability and sample pre-treatment, homogenization, sub-sampling and potential sources of contaminants
- ✓ Apply the proper methodologies, techniques and measurement of chemical constituents in atomic spectroscopy, elemental mass spectrometry, the chromatography, high performance liquid chromatography, thin layer chromatography and electrochemical techniques
- ✓ Become familiar with the accurate analysis of speculated elements including the extraction of the analyte and preparation of a test solution, comparison of determination techniques, critical factors when using coupled techniques and general precautions and tips in trace analysis

## Training Designed for:

This course is intended for all Laboratory Personnel and Technical Staff such as Chemists, Analysts, Chemical Engineers, Scientists, R&D and anybody who are interested and dealing within Chemical Analysis, Research and Development, Environmental Studies, Quality Control, Refineries, Petrochemical Plants, Water and Wastewater Plants, Hospitals and Medical Centers.

## Training Requirements:

“Hand’s 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 Program:

### DAY ONE:

- ❖ Goals of The Course
- ❖ The Process of Chemical Analysis
- ❖ Instrumental Analytical Methods Versus Classical Analytical Methods
- ❖ Selectivity and Interferences in The Trace Analysis
- ❖ Figures of Merit in Instrumental Analysis (Accuracy, Precision, Sensitivity, Dynamic Range, Detection Limits, Selectivity) Calibration Methods

### DAY TWO:

- ❖ Quality Assurance and Calibration Methods
  - Basic of Quality Assurance
  - Methods Validation
  - Standards Addition
  - Internal Standards
- ❖ Fundamentals of Spectrophotometry
  - Properties of Light
  - Absorption of Light
  - Measuring Absorbance
  - Beer’s Law in Chemical Analysis
  - What Happens When a Molecule Absorbs Light?
  - Luminescence

### DAY THREE:

- ❖ Atomic Spectroscopy
  - An Overview
  - Atomization: Flames, Furnaces
  - How Temperature Affects Atomic Spectroscopy
  - Instrumentation
  - Interference
  - Inductively Coupled Plasma- Mass Spectrometry

### DAY FOUR:

- ❖ Fundamentals of Electrochemistry
  - Lithium- Ion Battery
  - Basic Concepts
  - Galvanic Cells

- Standards Potentials
- Nernst Equation
- E and the Equilibrium Constant
- Cells as Chemical Probes
- ❖ Electrodes and Potentiometry
  - Reference Electrodes
  - Indicator Electrodes
  - What Is a Junction Potential?
  - How Ion- Selective Electrodes Work
  - pH Measurement with a Glass Electrodes
  - Ion- Selective Electrodes
  - Using Ion- Selective Electrodes

#### DAY FIVE:

- ❖ Gas Chromatography
  - The Separation Process in Gas Chromatography
  - Sample Injection
  - Detectors
  - Sample Preparation
  - Method Development in Gas Chromatography
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT and EVALUATION

### 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):

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:

**Aisha Relativo** - Training & Career Development Manager

[aisha@cmc-me.com](mailto:aisha@cmc-me.com) / [training@cmc-me.com](mailto:training@cmc-me.com)

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