



# AL033: Analytical Instrumentation for Laboratory

## Training Description:

For many years, chemical measurement has remained the preserve of the analytical chemist. In recent years, however, analytical measurement has become an integral part of process control measurement and is increasingly becoming the responsibility of the instrumentation and control technologist.

As a result, a working knowledge of analytical measurement is now a prerequisite for efficiency in the workplace. Unfortunately, schoolboy chemistry provides few people with the skills required for the rigors of analytical chemistry as applied to on process control.

In modern laboratories, there is an increasing need for analyst to understand and be able to quantify the performance of analytical instruments, in particular with respect to the following:

- *Specify equipment for purchase*
- *Estimating uncertainties in instrumental measurements*
- *Quantifying and demonstrating performance quality*

This intensive training on analytical instrumentation is specifically tailored for Engineers and Technicians working within industry who do not have a chemical background and has been designed to take the mystery out of analytical measurement and explain it in terms that are easily understood by the beginner.

## Training Objectives:

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

- ✓ Analyze the instrument performance characteristics which include types and interaction between different characteristics
- ✓ Prepare and handle sample for different analytical instrumentations
- ✓ Define what are the pH measurement, measurement of redox, and conductivity measurement
- ✓ Explain the dissolved oxygen measurement, installation and troubleshooting and chlorine measurement
- ✓ Describe the vapor pressure, relative humidity, sling psychomotor, mirror system and hydrometric calculations
- ✓ Apply the basic principles of infrared spectroscopy and gas chromatography
- ✓ Gain more knowledge after **practical session**

## Training Designed for:

This course is intended for all Laboratory Professionals, Laboratory Managers, Superintendents, Supervisors, Engineers, Chemists, Analysts and other Technical Staff. This course is ideal for Instrumentation and control staff including Engineers and Technical Analyzers.

## 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:

#### ❖ Basic Chemistry

- Elements, Compounds and Mixtures
- Properties of Elements
- Formation of Ions
- Bonding
- Ionic Bonding
- Covalent Bonding
- Chemical Formula and Equations
- Atomic Weight
- Molar Concentrations
- Acids and Bases

#### ❖ Electrochemical Cells

- Electrode Potentials
- Simple Voltaic Cell
- Polarization
- Danielle Cell
- Electrolytic Bridges
- Electrochemical Series

### DAY TWO:

#### ❖ pH Measurement

- Definition of pH
- Measurement of pH
- The Measuring Electrode
- The Reference Electrode
- Temperature Effect
- Sources of Errors
- Calibration

#### ❖ Measurement of Redox

- Applications
- Calibration/ Checking Procedure

#### ❖ Conductivity Measurement

- Ionic Mobility
- Cell Construction and Constant
- Temperature Compensation
- Conductivity Measurement of High Purity Water
- Installation
- Sensor Maintenance
- Troubleshooting
- Applications



### DAY THREE:

- ❖ **Dissolved Oxygen Measurement**
  - Measuring Cells
  - Calibration
- ❖ **Chlorine Measurement**
  - Basic Chlorine Chemistry
  - Measuring Principle and Systems
  - Calibration
  - Application
- ❖ **Installation and Troubleshooting**
  - Electrode Maintenance and Storage

### DAY FOUR:

- ❖ Turbidity Measurement
- ❖ Hygrometry
- ❖ **Site Visit/Practical Session**
- ❖ Open Discussion

### DAY FIVE:

- ❖ **Infrared Spectroscopy**
  - Basic Principles
  - Identifying Compounds
  - Quantitative Analysis
  - Beer-Lambert Law
  - Sampling Methods
- ❖ **Gas Chromatography**
  - Basic Principles
  - The Chromatographic Column
  - Detectors
  - Sample Injection
  - Data Processing and Presentation
  - Process Gas Analyzer
- ❖ **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):

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:

**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