



LAB140

Analytical Instrumentation for Laboratory

Course Introduction:

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 training program 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.

Course Objectives:

Upon successful completion of this course, the delegates 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**

Who Should Attend?

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.

Course Fees:

To be advised as per course location. This rate includes participant's manual, and-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation



Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Outline:

Day 1:

Pre Test

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
- Daniell Cell
- Electrolytic Bridges
- Electrochemical Series

Day 2:

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 3:

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 4:

Turbidity Measurement

Hygrometry

Site visit / Practical session

Open Discussion

Day 5:

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

Post Test

Course Requirement:

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

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks

10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session

