



LAB135

Advanced Analytical Chemistry for Lab Technicians in Oil & Gas Industry

Course Introduction:

The good and advanced analytical laboratory can motivate dispirited teams of chemist and technicians to accomplish high quality work. It is very important for lab staff to learn how to create the success in their lab. The course is designed to provide an introduction and practical application of analytical chemistry in the laboratory. It is designed also to understand concepts of basic analytical chemistry in the laboratory, and how to apply quality standards, how to do health and safety risks assessments, how to develop the technical and methods in the lab and how to evaluate the lab results.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- ✓ Understand principles of analytical chemistry in advance
- ✓ Provide an advanced understanding of the roles of quality standards, how to develop the technical, and methods in the analytical chemistry lab and how to evaluate the lab results.

Who Should Attend?

This course is of interest for all laboratory staff, Chemists and Technicians.

Course Outline:

Module (01) Basic chemistry

- Introduction
- Chemistry Historical and review
- Basic Principal and theory
- Atoms
 - Atomic structure
 - The proton, electron and neutron
 - Atomic weight (mass)
 - Light, Photon Energies, and Atomic Spectra
- Elements
 - Periodic table of Elements
 - Structure of Elements
 - Chemistry of Elements
 - Metals, non-metals and semi-metals

- Isotopes'
- Ions
 - Types of Ions
 - Valiancy of Ions
 - Radicals
 - Solubility of ionic Substances
- The periodic Table
- Chemical Bonding
 - Ionic Bond
 - Covalent Bond
 - Hydrogen Bond
 - Metallic Bond
- Molecules and Compounds
 - Molecular weight of Compounds
 - Equivalent weight of Compounds
 - Mole and the Avogadro constant
- Solution
 - Solution, Mixture, Compound and Solvent
 - Standard Solution
 - Solvent Types and properties
 - PH Solution
 - Acid Solution
 - Base (Alkaline)Solution
 - Neutral Solution
 - Indicators for pH
 - Stability of Acid and Base Solution
 - Buffer Solution
 - Acid- Base chemistry
 - Salt solution
 - Chemical Reactions in Solution
 - Physical behavior of Solutions
- Matter
 - Matter and Measurements
 - Electronic Structure of Matter
 - States of Matter (Gas, Liquid, Solid, Plasma)
 - Physical properties of Matter
- Units for Expressing Concentration
 - Percent weight and percent Volume
 - Molarity
 - Molality

- Normality

Module (02) Water Chemistry Analysis

- Basic Principal and Theory of Analytical Chemistry
- Analytical Chemistry and Chemical Analysis
- Type of Chemical Analysis Methods
 - Classical Methods
 - Semi micro Qualitative Analysis
 - Gravimetric Analysis
 - Titrimetric (volumetric) Analysis
 - Instrumental Analysis
 - Spectroscopy Analysis
 - Chromatography Analysis
 - Electromechanical Analysis
 - Choosing the Right Instrument
 - Source of Water
 - Type of water
 - Soft water
 - Hard water
- Type of Hardness in water
 - Pathogenic microorganisms

Module 3 Standard Solution

- Standard Solution
- Type of standard solution
 - Primary Standard solution
 - Secondary Standard Solution
- Preparation, Handling, and Storage of standard solution
 - Molar Solution
 - Normal Solution
 - Part per million (PPM)
 - Part per billion (PPB)
- Calibration and Standardization
 - Instruments Calibration and Traceability
 - Calibration work instructions
 - Calibration Procedures, Certificate and Documentation
 - Reference Standard materials
 - Correction of errors and improving blank
 - Measurement Uncertainty in testing and Calibration

Module 4 Analytical Chemistry

- Analysis of Water
- Global standard test methods of water and wastewater analysis
 - PH acidity and alkalinity
 - Temperature
 - Density
 - Turbidity
 - Total Hardness
 - P,M & OH Alkalinity
 - Specific conductance
 - Total Solids (TS)
 - Total Dissolved Solids (TDS)
 - Total Suspended Solids (TSS)
 - Dissolved Oxygen (DO)
 - Oxygen Demand (COD, BOD)
 - Organic Contaminants
 - Toxic Organic Compounds
 - Radioactive contaminants
 - Nutrients
 - Chloride
 - Cyanide
 - Pathogenic microorganisms
- Sulfite
- Phosphate
- Oil and Grease
- Inorganic Chemicals

Module 5 Troubleshooting of Laboratory Equipment

- Laboratory Equipment
- Problem, Troubleshoot and Routine Maintenance
- Comparing Instrumental Techniques
- Choosing the Right Instrument

Module 6 Crude Oil Dehydration and Desalting Process

- Petroleum Origin
- Petroleum Composition and its Properties
- Classification of crude oil types
- Crude Oil receiving analysis
- Physical Properties of Crude Oil
- Chemical Composition of crude oil
- Evaluation of Crude oil
- Crude Oil Treatments

- Dehydration of Crude Oil
- Desalting of Crude Oil
- Petroleum refining processing
- Major refinery Products
- Analysis of Crude oil

Module 7 Gas Processing

- Historical review
- Natural Gas Origin
- Natural Gas sources
- Natural Gas Production
- Natural Gas Processing
- Gas-Handling Facilities and Treatment
- Stored and Delivered of Natural Gas
- Measurement of Natural Gas
- Natural Gas uses
- Properties of Natural Gas
- Physical and Chemical Properties of;
 - Natural Gas
 - Composition of Natural Gas
 - Testing and Analysis of Natural Gas
 - Composition of Natural Gas by Gas Chromatography

Module 8 Hydrocarbons Laboratory and field tests

- Hydrocarbons Laboratory
- Sampling of Petroleum and Petroleum Products
- Crude oil and Hydrocarbon Products analysis (ASTM-IP)
 - Carbon Residue, Asphaltene Content
 - Density(Specific Gravity)
 - Distillation
 - Light Hydrocarbons
 - Metallic Constituents
 - Salt Content
 - Sulfur Content
 - Viscosity and Pour Point
 - Water and Sediment
 - Wax Content
 - Other Tests
 - The Evaluation of Results and Methods
 - Data Analysis
 - Laboratory Report
 - Quality Control and Quality Assurance

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 Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee/Tea
08:20 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Coffee/Tea/Snacks)
13:30 - 15:00	Last Session