TRAINING PROGRAM

Advanced Analytical Chemistry For Lab Technicians Oil & Gas

Introduction:

The good and advance analytical laboratory can motivate dispirited teams of chemists 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 principal of analytical chemistry, and how to apply quality standards, how to do health and safety risk assessments, how to develop the technical, and methods in the lab and how to evaluate the lab results.

Who Should Attend?

The course is of interest for all Laboratory staff, Chemists and technicians

Methodology:

This interactive Training will be highly interactive, with opportunities to advance your opinions and ideas and will include;

- Lectures
- Workshop & Work Presentation
- Case Studies and Practical Exercise
- Videos and General Discussions

Certificate:

BTS attendance certificate will be issued to all attendees completing minimum of 80% of the total course duration

Course Objectives:

By the end of this course delegates will be able to:

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

Course Outline:

Module (01) Basic chemistry

- Introduction
- Chemistry Historical and review
- Basic Principal and theory
- Atoms
    - ❖ Atomic Structure

- ❖ The proton, electron and neutron
- ❖ Atomic wight (mass)
- ❖ Relative Atomic wight (mass)
- ❖ Light, Photon Energies, and Atomic Spectra

- Elements
  - ❖ Periodic table of Elements
  - ❖ Structure of Elements
  - ❖ Chemistry of Elements
  - ❖ Metals, non-metals and semi-metals
  - ❖ Isotops
- Ions
  - ❖ Types of Ions
  - ❖ Valency of Ions
  - ❖ Radicals
  - ❖ Solubility of ionic substances
- The periodic table
- Chemical Bonding
  - ❖ Ionic Bond
  - ❖ Covalent Bond
  - ❖ Hydrogen Bond
  - ❖ Metalic Bond
- Molecules and Compounds
  - ❖ Molecular wight of Compounds
  - ❖ Equivalent wight of Compounds
  - ❖ Mole and the Avogadro constant
- Solution
  - ❖ Solution, Mixture, Compound, and Solvent
  - ❖ Standard Solution
  - ❖ Solvent types and properties
  - ❖ pH of Solution
    - ▪ Acid Solution
    - ▪ Base (Alkline) Solution
    - ▪ Neutral Solution
    - ▪ Idicators for pH
    - ▪ Stability of Acide 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 wight & 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
- Electrochemical Analysis
- Choosing the Right Instrument
- Source of water
- Type of water
  - ❖ Soft water
  - ❖ Hard water
  - ❖ Type of Hardness in water

Module (03) 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 Uncertainly in testing and calibration

Module (04) 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
  - ❖ Sulphite

- ❖ Phosphate
- ❖ Oil and Grease
- ❖ Inorganic Chemicals

Module (05) Troubleshooting of Laboratory Equipment

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

Module (06) 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 (07) 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 (08) 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