

# PRACTICAL ANALYTICAL INSTRUMENTATION IN ON-LINE APPLICATIONS



Specifically tailored for those without a chemical background, this workshop has been designed to take the mystery out of on-line analytical measurement and explain it in terms that are easily applied in the workplace.

## WHAT YOU WILL LEARN:

- The basics of chemistry and how to read chemical formulae
- How analytical chemistry is applied in industrial control
- To improve your understanding and capabilities in on-line analytical chemistry
- How to troubleshoot problems in the measurement of pH, conductivity, turbidity, hygrometry, DO and chlorine

## WHO SHOULD ATTEND:

For many years, chemical measurement has remained the preserve of the analytical chemist. Increasingly, on-line analytical measurement is being applied in on-line process control and is therefore rapidly becoming the responsibility of the instrumentation and control technologist.

- Electricians
- Technicians
- Senior Operators
- Project Engineers
- Design Engineers
- Systems Engineers
- Electrical Engineers
- Consulting Engineers
- Maintenance Engineers
- Process Control Engineers
- Instrumentation Sales Engineers
- Instrumentation and Control Engineers



## The Workshop

On-line analytical measurement has become an integral part of process control measurement. As a result, a working knowledge of analytical measurement is now a prerequisite for anyone working with process instrumentation and control.

The two-day workshop will 'demystify' the world of analytical measurement and equip you with the knowledge required to understand, identify and confidently troubleshoot On-Line Analytical Measurement Instrumentation in Process Control.

This workshop will offer you the vital knowledge that you need to multi-skill, reduce downtime, save your company money and secure your value in the workplace.

## Workshop Objectives

This practical, hands-on workshop introduces on-line analytical measurement to anyone who needs to understand industrial and chemical analysis techniques used in process control.

This workshop offers you the most up-to-date knowledge to allow you to:

- recognise and efficiently troubleshoot a wide variety of industrial analytical measuring instruments
- understand the construction and operation of the most important analytical instruments
- understand chemical technology
- effectively apply the principles of chemical analysis to industrial instrumentation
- identify chemical formulae and symbols
- implement procedures for testing and calibration of analytical instruments
- multi-skill with colleagues within your industry

## Practical Sessions

There are a total of five practical, hands-on sessions that aim to give you the confidence and experience you need to work with and troubleshoot analytical instruments.

These practical sessions are:

- Basic chemistry
- pH measurement
- Conductivity measurement
- Dissolved oxygen
- Colorimetry

## The Program

### BASIC CHEMISTRY

- Elements, compounds and mixtures
- Properties of elements
- Formation of ions
- Bonding
- Chemical formulae and equations

- Atomic weight
- Molar concentrations
- Acids and bases

### ELECTROCHEMICAL CELLS

- Electrode potentials
- Simple voltaic cell
- Polarisation
- Daniell cell
- Electrolytic bridges
- Electrochemical series

### PH MEASUREMENT

- Definition of pH
- Measurement of pH
- The measuring electrode
- The reference electrode
- Nernst equation
- Temperature effect
- Antimony electrode
- 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
- 4-electrode sensor
- Installation
- Sensor maintenance
- Preventative maintenance
- Troubleshooting
- Applications

### TURBIDITY MEASUREMENT

- Interaction between light and matter
- Absorptimeters
- Nephelometers
- Practical on-line systems
- Calibration
- Applications

### HYGROMETRY

- Vapour pressure and humidity
- Partial vapour pressure
- Relative humidity
- Hygrometric instruments
- Hygrometric calculations

### DISSOLVED OXYGEN MEASUREMENT

- Measuring cells
- Calibration
- Installation and troubleshooting
- Electrode maintenance and storage

### TOTAL FREE CHLORINE MEASUREMENT

- Basic chlorine chemistry
- Measuring principle and systems
- Calibration
- Applications

### ON-LINE COLORIMETRY AND TITRATION

### ON-LINE GAS CHROMATOGRAPHY

