



THE CHEMICAL ENGINEERING MAJOR

A Basic Course in Corrosion Control & Prevention

Website: www.btsconsultant.com

Email: info@btsconsultant.com

Telephone: 00971-2-6452630



A Basic Course in Corrosion Control & Prevention

Introduction:

This corrosion course covers fundamental aspects of corrosion control and its prevention. The course will enable beginners to establish a solid foundation in corrosion before moving on to advanced topics. Exercises, hands-on practical sessions and virtual experiments throughout the course will help participants understand the basic concepts and fundamentals important to corrosion. This basic corrosion course also helps participants prepare for their NACE certification examinations at the corrosion technician, corrosion technologist and senior corrosion technologist levels. It provides an excellent avenue for corrosion practitioners, designers, technical managers, inspection and maintenance engineers, quality control personnel and those involved in failure analysis to update their appreciation of corrosion and the awareness of the emerging technologies for corrosion control and prevention.

Who Should Attend?

Corrosion Control Engineers & Personnel, Process Engineers, Metallurgists, Inspection Personnel, Mechanical Engineers, Material Selection Personnel, Plant Contractors, Operations Engineers, Team Leaders & Supervisors, Maintenance Engineers, Maintenance Supervisors, Senior Plant Supervisors, Mechanical Engineers, Corrosion Control & Monitoring Systems Personnel, Equipment Engineers,

Maintenance Engineers and Planners, Team Leaders, Managers & Coordinators, Construction Coordinators, Technologists, Safety Officers, Maintenance Team Leaders & Engineers, Design Engineers, Service Company Representatives, Oil and Gas Production Facilities Personnel, Chemists, Chemical Engineers, Inspectors and Inspection Engineers & Supervisors, Technicians and Supervisors, Environmental Specialists, New Petroleum Engineers, Asset Management Personnel, Construction Engineers, Refinery Chemists, Chemical Engineers, Personnel who are / will be responsible for detecting, inspecting, monitoring, controlling corrosion in oil and gas piping, pipelines used in production operations and Personnel responsible for metallurgy, corrosion or the prevention of failures in plant and equipment.

Course Objectives:

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

- Understand why and how corrosion occurs
- Know how to control and prevent corrosion
- Gain an understanding of corrosion ramifications in oil production operations
- Recognize the various forms of corrosion attack
- Carry out a corrosion failure analysis
- Utilize the most appropriate method for corrosion control
- Adopt the most appropriate monitoring techniques and
- Utilize the current information sources including current corrosion software

Course Outline:

Introduction

- Corrosion: what it is - definition of corrosion
- Corrosion in action: examples of corrosion
- Corrosion and society: its economic, social, political and environmental impacts
- Liabilities due to corrosion
- Lessons of history
- Basic concepts in corrosion
- Primer in chemistry and electrochemistry
- Understanding electrochemical cells
- Corrosion terminologies and conventions

Why Do Metals Corrode? The Driving Force for Corrosion

- Thermodynamics
- Faraday's Law
- Electrode potentials
- Reference electrodes
- Electromotive force (EMF) series vs. galvanic series

- Nernst equation
- Pourbaix diagram (potential - pH diagram)
- Passivity

Kinetics: The Rate of Corrosion

- Polarization
- Rate of reaction and rate constant
- Anodic and cathodic current densities
- Exchange current density
- The mixed potential theory
- E-log(i) Evans diagram
- Tafel Equation and Tafel plot for corrosion rate determination
- Linear polarization and Stern-Geary Equation
- Type of polarization and rate-controlling steps
- Concentration polarization and the importance of dissolved oxygen
- Effect of oxidizer concentration on the rate of corrosion
- Effect of velocity on the rate of corrosion
- Area effect

·Depolarizers and Depolarization

Different Forms of Corrosion: Mechanisms, Recognition and Prevention

- General attack/uniform corrosion
- Galvanic corrosion/de-alloying
- Pitting corrosion
- Crevice corrosion
- Filiform corrosion
- Intergranular corrosion/exfoliation
- Environmental cracking
- Liquid metal embrittlement
- Hydrogen damage
- Corrosion fatigue
- Flow assisted corrosion
- Fretting corrosion
- High temperature corrosion

Practical Corrosion Cells Important to Corrosion Diagnosis

- Galvanic cell
- Concentration cell

- Active/passive cell
- Thermogalvanic cell
- Stress cell

Corrosion in Specific Environments

- Corrosion in atmosphere
- Corrosion in waters
- Corrosion in soil
- Corrosion in concrete
- Corrosion in high temperature environments

Methods for Corrosion Control and Prevention

- Materials selection and design
- Protective coatings and linings
- Cathodic protection and anodic protection
- Modification of environment (chemical treatment)
- Corrosion testing and monitoring