

Practical

FUNDAMENTALS OF CHEMICAL ENGINEERING



AFTER THIS WORKSHOP YOU WILL BE ABLE TO:

- Understand the fundamentals of Chemical Engineering
- Do simple specifications of pumps and heat exchangers
- Understand mass transfer phenomena including agitation scale-up
- Perform simple process calculations
- Troubleshoot process equipment and provide simple fixes
- Contribute to process design activities
- Understand process drawings and link them to plant operation
- Apply safety guidelines to a Process or Chemical Plant
- Understand basic chemical engineering jargon and terminology

WHO SHOULD ATTEND:

- Process Development Engineers
- Electrical Engineers
- Plastics & Material Engineers
- Maintenance Engineers
- Environmental Engineers
- Environmental Technicians
- Laboratory Technicians
- Chemical Plant Operators
- Control & Instrumentation Engineers
- Industrial Engineers
- Mechanical Engineers
- Civil Engineers
- Food Scientists
- Chemists
- Maintenance Supervisors
- Shift Tradespeople



Technology Training that Works

THE WORKSHOP

This workshop will cover the fundamentals of Chemical and Process engineering. It will equip you with a practical knowledge of the basic concepts involved in this area of engineering. This is not an advanced course but one focusing on the fundamentals.

PRE-REQUISITES

An elementary understanding of engineering concepts such as fluid flow, heat and mass transfer is useful; however a revision will be undertaken at the commencement of the course. Please bring your scientific calculator for solving problems during the practical sessions.

WORKSHOP OBJECTIVES

Chemical Engineering for non-chemical engineers aims to cover the fundamental concepts of chemical engineering and provide you with a solid working knowledge associated with it. If you are a non-chemical engineer this course will enable you to confidently talk to and work effectively with chemical engineers and process equipment. Many technical professionals today find themselves working with large scale chemical processes even though they don't have formal training in Chemical Engineering. This workshop intends to fill this gap and provide you with knowledge of chemical engineering fundamentals along with the ability to apply this knowledge to specify, design, operate, maintain and troubleshoot chemical processes.

At the end of this workshop, participants will be familiar with the following aspects:

The Fundamentals of Chemical Engineering with regards to:

- Stoichiometry
- Fluid Flow
- Thermodynamics
- Heat Transfer
- Mass Transfer
- Reaction Kinetics
- Unit Operations
- Process Control
- Process Economics

Process Design considerations for:

- Pumps
- Heat Exchangers
- Distillation Columns
- Reactors
- Agitators
- Filtration Equipment

Troubleshooting of Process Equipment

PRACTICAL SESSIONS

There are twelve practical design exercise sessions throughout the workshop.

THE PROGRAMME

DAY ONE

INTRODUCTION: THE CHEMICAL PROCESS

UNDERSTANDING A PROCESS FLOW SHEET

- Process Flow Diagrams (PFDs)
- Piping and Instrumentation Diagrams (P&IDs)
- Process Legends used in flow sheets

STOICHIOMETRY

- Dimensions and Units
- Processes and Process Variables
- Basic Chemical Calculations
- Material Balance
- Energy Balance
- Combustion

FLUID MECHANICS

- Fluid statics and its applications
- Basic equations and fluid flow
- Flow of compressible fluids
- Transportation & Metering of fluids
- Agitation & Mixing

HEAT TRANSFER & ITS APPLICATIONS

- Heat transfer by Conduction in solids
- Principles of heat flow in fluids
- Heat transfer to fluids
- Radiation heat transfer
- Heat-exchange applications
- Evaporation

MASS TRANSFER AND ITS APPLICATIONS

- Distillation
- Leaching & Extraction
- Principles of diffusion and Mass transfer between phases
- Adsorption
- Drying of solids

CHEMICAL ENGINEERING THERMODYNAMICS

- Fundamental quantities
- Thermodynamics
- Volumetric properties of pure fluids
- Heat Effects
- Phase Equilibria
- Chemical reaction equilibrium
- Conversion of heat into work by power cycles
- Refrigeration & Liquefaction

DAY TWO

CHEMICAL KINETICS

- Basic definitions
- Introduction to reactor design
- Design for single reactions
- Mixing of fluids
- Fluid Particle reactions
- Solid-catalyst reactions

PROCESS EQUIPMENT DESIGN

- Storage vessels
- Pressure vessels
- Heat Exchangers
- Evaporators and Crystallizers
- Agitators
- Filters
- Dryers
- Process Hazards and Safety measures

PROCESS CONTROL AND INSTRUMENTATION

- Process Instrumentation
 - Temperature
 - Pressure
 - Level
 - Flow
- Process Control Fundamentals

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*The instructor was very good
in all respects.*

Paul Liptloko

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