



## Fundamentals of Chemical Engineering Conference





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## Introduction:

Chemical engineering is at the epicentre of numerous sectors, including the chemical, oil, gas, and petrochemical industries. Chemical engineers specialize in transporting and transforming solids, liquids, and gasses. Still, they must also possess knowledge in many other engineering realms, such as mechanical, electrical, and instrumentation.

Separation processes such as distillation, heat transfer, hydraulics, fluid flow, and reaction engineering are central, alongside process control and economics. These areas encompass the practical fundamentals of chemical engineering and the fundamental principles of chemical engineering.

This chemical engineering fundamentals conference meticulously explores these prevalent areas in chemical engineering, providing comprehensive insights and understanding of the practical fundamentals and theoretical principles to non-specialists and professionals.

The chemical engineering fundamentals conference offers a refreshing overview suitable for practising engineers. It provides diverse examples across several process industries, such as oil and gas processing, petrochemicals, and chemical manufacturing.

## Enhancing Chemical Engineering Competence:

The chemical engineering fundamentals conference will emphasize chemical engineering workshops and seminars, emphasizing the training necessary for professionals to stay at the forefront of their field. These practical workshops cement the fundamentals of engineering chemical principles through engaging, hands-on experiences that go beyond theoretical concepts.

## Targeted Groups:

- Petrochemical Engineers.
- Chemical Engineers.
- Plant Engineers.
- Consulting Engineers.
- Engineering Managers.
- Maintenance Engineers/Technicians.
- Project Engineers.
- Process Control Engineers.

## Conference Objectives:

By the end of this chemical engineering conference, participants will be able to:

- Interpret flowsheets and process flow diagrams with improved proficiency.
- Comprehend the use of mass and energy balances in process design.
- Acquire fundamental knowledge of fluid flow dynamics, including pumping and mixing.
- Analyze examples pertinent to the oil and gas industry through the lens of fundamentals of chemical reaction engineering.
- Design heat exchangers and differentiate the advantages/disadvantages of various types.
- Grasp the intricacies of distillation and separation techniques utilized in oil and gas processing.
- Recognize the significance of controlling environmental pollution emanating from industrial activities.
- Controller process control techniques.
- Conduct a rudimentary economic analysis of projects utilizing principles of chemical engineering thermodynamics.

## Targeted Competencies:

By the end of this chemical engineering conference, participants competencies will be able to:

- Design transfer equipment, including heat exchangers, with fundamentals of chemical reaction engineering solutions in mind.
- Apply mass and energy balances in the conception of process design.
- Minimize effluents and implement treatment solutions.
- Control processes effectively.
- Perform a fundamental economic analysis of projects with a comprehension of the fundamentals of chemical engineering thermodynamics.

## Conference Content:

### Unit 1: Process Engineering Fundamentals:

- Basic Concepts to Remember.
- Flow Diagrams and Interpretation.
- Piping and Instrumentation Diagrams P&IDs.
- Essential Process Equipment.
- Introduction to Mass and Energy Balances.
- Distinctions Between Batch and Continuous Processes.
- Essentials of Risk Assessments and Hazard Studies.
- Flammability and Electrical Area Classification.

## **Unit 2: Fluid Flow:**

- Understanding Pressure and Head.
- Application of Bernoulli's Theorem.
- Dynamics of Liquid Flow.
- Exploration of Reynolds Number and Pressure Drop in Pipes.
- Studying Compressible Flow.
- Introductory Thermodynamics Concepts.
- Dealing with Two-phase and Multiphase Flow.
- Design principles for process relief devices and relief system process design.
- Choosing Pumps and Compressors.
- Techniques for Mixing and the Use of Mixers.

## **Unit 3: Heat Transfer:**

- Delving into Thermal Conductivity.
- Exploring Conduction and Convection.
- The Role of Insulation.
- Calculating Heat Transfer Coefficients.
- Types and Sizing of Heat Exchangers.
- Understanding Chemical Reactions.
- Delving into Reaction Kinetics.
- Introduction to Catalysis and Principles of Green Chemistry.

## **Unit 4: Introduction To Separation Processes:**

- Gain knowledge of Distillation basics.
- Phase Behaviour and Vapour/Liquid Equilibria.
- Utilization of Distillation Equipment.
- Strategies for Distillation Troubleshooting.
- Methods for Gas/Liquid Separation.
- Techniques for Absorption and adsorption.
- Approaches for Solid-Liquid Separation.
- Tackling Air and Water Pollution Control.
- Proficiency in Effluent treatment.

## **Unit 5: Process Control and Economics Basics:**

- Identify Measured variables.
- Execute Simple feedback control.
- Understanding SIS and SIL Safety Instrumented Systems and Safety Integrity Level.
- Managing Process Utilities:
  - Air.
  - Water and Cooling Water Systems.
  - Steam.
  - Electricity and power generation.
- Fundamentals of Process Economics:
  - Preliminary economic analysis principles.
  - Fixed and Variable Costs, Break-even Analysis.
  - Calculate raw materials usage accurately.
  - The Scale-up Philosophy and the Six-tenths Rule.
  - Estimate the costs of process equipment and plants.