

Process Technology for Hydrotreating and Hydrocracking

Engineering Principles and Process Design for Petroleum Products Hydro-Transformation

Introduction

The principles and basic understanding of Hydrotreating and Hydrocracking processes—where Hydrogen is a crucial component in the upgrading and treatment of refinery products and fractions—are covered in this extensive course on Hydrotreating & Hydrocracking Process Technology. Potentially significant advancements in process design, energy, and mass integration will be reviewed and the state of the art in these areas will be reviewed.

Every topic covered in the training course includes a thorough, hands-on overview of hydrotreating and cracking technology. In addition to saturated products with increased cetane numbers and free of sulfur, nitrogen, and metals, the contents concentrate on the hydro-conversion of heavy products, distillates, diesel, and naphtha into other hydrogenated/lower molecular weight products. Along with discussing potential changes, this training course covers some process design, chemistry, and engineering topics.

This training course on Hydrotreating and Hydrocracking Process Technology is beneficial for engineers, scientists, designers, and researchers working in the refinery hydro-conversion business. However, experts with prior expertise in other industries who are eager to learn about hydro-conversion processes stand to gain the most from it.

This training session on Course N Carry Hydrotreating & Hydrocracking Process Technology will include:

- Talks, activities, and group projects on a few areas of process design and enhancement
- Valid research showing solutions for improving the environment and energy
- Transfer of knowledge from the instructor's in-depth, active industrial consultations
- Using Excel-based design tools to integrate mass and energy in refining facilities
- Real-world issues and data for design and improvement are openly discussed.

Objectives

Following completion of this program in Hydrotreating & Hydrocracking Process Technology, participants will be able to:

- Gain a thorough grasp of the energy balance between mass and H₂ in refining operations.
- Learn everything there is to know about the newest developments in material and energy integration.
- Examine several flow plans for the hydrotreating and hydrocracking procedures.
- Altered operation parameters and process architecture to improve H₂-conversion performance
- Expert knowledge of chemistry and kinetics, catalyst function, clean production, and environmental concerns related to standard enhanced fuel production

Training Methodology

A range of tried-and-true adult learning strategies will be employed in this Hydrotreating and Hydrocracking Process Technology training course to guarantee optimal acquisition, retention, and understanding of the material covered. This comprises reading recommendations and cutting-edge training seminar material, lecture presentations, exercises, group projects and conversations, and completed applications. The training will be interactive and focus on teaching students how to think rather than what to think. The following will guide the way the training seminars are delivered:

- Gaining a thorough comprehension of all subjects and themes at the cutting edge
- Evaluation and enhancement of a few case studies concerning the environment and economy
- Procedures for process modeling and design of particular applications using Excel or, if available, commercial software

Organizational impacts

Teaching the principles of Interactive Economics to your employees can help drive organizational growth and seamless operations:

- A short course that equips employees with skills for the real world
- Employees receive enhanced and economically driven decision-making skills
- Helps create better marketing strategies for higher sales
- Provides a competitive advantage by helping make calculated risks

Personal Impact

Enrolling in this course can benefit you in the following ways:

- Gain a deep understanding of the relation between human behavior and finances
- Learn modern techniques to estimate market demand and prediction
- Attain leadership, adaptability, and decision-making skills
- Analyze and understand successful market strategies

Who should attend?

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Course Outline

Day 1

The Basics of Mass/Hydrogen and Energy Balance in Refineries

- An Introduction Modern Material and Energy Integration Techniques
- Essentials of Petroleum Refinery Operations: Refining Crude Oil Downstream
- The features and specifications of the products
- Schemes for Heat Integration and Process Design and Optimization
- Economic and Environmental Concerns

Day 2

Hydrotreating: Foundations and Ideas

- Overview of H₂ Sources and Hydro-Conversion Processes Process Flow Diagrams
- Kinetics and Process Chemistry in Process
- The heat of reactions and catalysts
- Principles, Design Considerations, and Operating Conditions
- Requirements for Hydrogen in Hydrotreating

Day 3

Applications of Hydrotreating: Advanced Processing Reactor Design for Naphtha, Middle Distillate, and Gas Oil

- Atmospheric Sulfurization of Residues
- Benzene Saturation in Gasoline
- Possible Upgrades to Reduce Material and Energy Use
- Important Concerns with Clean Diesel Hydrotreating Process Technology

Day 4

The Principles and Foundations of Hydrocracking

- Feed Stocks and Related Items
- Chemistry and Kinetics in Process
- Deactivation and Regeneration of Catalysts
- Product Quality and Yields: Operating Process Variables and Parameters, Catalyst Type, and Process Configuration
- Hydrocracking Technology in Reactors
- Technology for a Single-Stage Hydrocracking Process

Day 5

Advanced Processing with Hydrocracking

- Features of the Two-Stage Hydrocracking Process Technology Process Design
- Hydrogen Equilibrium and Utilization
- Potential for Enhancements in Process Integration

- Balance, Integration, and Management of Hydrogen