

TRAINING TITLE

HYDROTREATING UNIT OPERATIONS

Training Duration

5 day

Training Venue and Dates

Ref. No. PE212	Hydrotreating Unit Operations	5	01-05 Sep 2025	\$5,500	DUBAI, UAE
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In any of the 4 or 5-star hotels. The exact venue will be informed later.

Training Fees

- \$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch

Training Certificate

Define Management Consultants Certificate of course completion will be issued to all attendees.

TRAINING DESCRIPTION

A specialized 5-day course designed to provide professionals in the oil and gas industry with a comprehensive understanding of the hydrotreating process, its operations, and key principles. Hydrotreating plays a crucial role in refining operations, particularly in removing sulfur, nitrogen, and other impurities from feedstocks to produce high-quality, environmentally compliant fuels.

TRAINING OBJECTIVES

By the end of the course, participants will be able to understand

- Understand the principles and importance of hydrotreating in the refining industry, especially for producing clean fuels.
- Learn the fundamental chemical reactions involved in hydrotreating, such as desulfurization, denitrification, and hydrogenation.
- Gain hands-on knowledge of hydrotreating unit operations, including reactor design, catalyst selection, and process control.
- Master best practices for maintaining and troubleshooting hydrotreating units to optimize performance and ensure safety.
- Explore safety protocols and environmental considerations when operating hydrotreating units, ensuring compliance with industry standards and regulations.

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WHO SHOULD ATTEND?

This course is designed for engineers, process technicians, operators, and maintenance professionals working in oil refineries and petrochemical plants. It is also beneficial for safety officers, project managers, and regulatory compliance specialists involved in hydrotreating unit operations and maintenance.

TRAINING METHODOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work & Practical Exercises
- 20% Videos & General Discussions

COURSE PROGRAM:

Day 1: Introduction to Hydrotreating in Refining

- Overview of Hydrotreating Technology
 - Introduction to hydrotreating and its role in refining processes
 - Importance of hydrotreating in producing clean fuels and complying with environmental regulations
 - Key objectives of hydrotreating: sulfur removal, denitrification, and aromatics reduction
- Hydrotreating Units and Components
 - Overview of hydrotreating units in a refinery
 - Key components: reactors, catalyst beds, pumps, heat exchangers, and separation units
 - The role of catalysts in hydrotreating processes (e.g., Co-Mo, Ni-Mo)
- Understanding Feedstocks and Product Specifications
 - Types of feedstocks processed in hydrotreating units (e.g., diesel, jet fuel, naphtha)

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- Feedstock characteristics: sulfur content, nitrogen compounds, and aromatics
- Desired product specifications: sulfur content limits, cetane number, and API gravity

Day 2: Fundamentals of Hydrotreating Reactions and Kinetics

- Hydrotreating Reactions
 - Chemical reactions in hydrotreating: hydrogenation, desulfurization, and denitrification
 - Mechanism of hydrogenation: saturation of unsaturated hydrocarbons
 - Desulfurization reactions: removal of sulfur compounds (mercaptans, thiols, sulfides)
- Reaction Kinetics and Thermodynamics
 - Understanding the kinetics of hydrotreating reactions
 - Thermodynamic considerations in the reaction process (temperature, pressure, and hydrogen flow)
 - Catalyst activity and deactivation
- Catalyst Selection and Preparation
 - Criteria for selecting catalysts based on feedstock and desired product
 - Catalyst activation, regeneration, and deactivation mechanisms
 - Factors influencing catalyst performance: temperature, pressure, and feed composition

Day 3: Hydrotreating Unit Operation and Control

- Hydrotreating Reactor Operation
 - Reactor design and configuration: fixed bed vs. ebullated bed reactors
 - Hydrotreating reaction conditions: temperature, pressure, hydrogen flow rates
 - Role of hydrogen in maintaining catalyst activity and promoting reactions
- Process Control and Optimization
 - Key process parameters to monitor and control in hydrotreating units (e.g., temperature, pressure, hydrogen-to-carbon ratio)
 - Common control systems in hydrotreating units
 - Process optimization techniques to improve product yield and quality
- Troubleshooting and Operational Challenges
 - Identifying common operational problems (e.g., catalyst deactivation, pressure drops, poor conversion)
 - Diagnostic tools and methods for troubleshooting hydrotreating unit issues

Day 4: Safety, Maintenance, and Environmental Considerations

- Safety in Hydrotreating Operations

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- Safety hazards associated with hydrotreating units: high pressure, high temperature, and hydrogen exposure
- Fire, explosion, and toxicity risks in hydrotreating processes
- Safety measures: proper equipment design, safety systems, and emergency protocols
- : Maintenance of Hydrotreating Units
 - Routine maintenance practices: catalyst replacement, reactor cleaning, and equipment inspections
 - Managing catalyst life and performance
 - Preventive maintenance strategies to minimize downtime
- : Environmental Considerations and Compliance
 - Environmental regulations related to hydrotreating (e.g., emissions control, wastewater treatment)
 - Minimizing the environmental impact of hydrotreating operations
 - Strategies for achieving sustainability and regulatory compliance in hydrotreating

Day 5: Advanced Topics, Emerging Trends, and Case Studies

- : Advanced Hydrotreating Technologies
 - Innovations in hydrotreating technologies: new catalysts, reactor designs, and process enhancements
 - Hybrid hydrotreating processes (e.g., combining hydrotreating with other refining processes)
 - Challenges and opportunities in refining heavy crudes and biofuels
- : Future Trends and Career Development in Hydrotreating
 - Future trends in hydrotreating and refining: digitalization, automation, and AI
 - Career development opportunities in hydrotreating and refining operations
 - Q&A session and course wrap-up

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NOTE:

Pre- & Post Tests will be conducted.

Case Studies, Group Exercises, Group Discussions, Last Day reviews, and assessments will be carried out.

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