



Introduction to Oil & Gas Refinery
Process, Design, and Operation



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Introduction:

This oil and gas refinery process, design, and operation course imparts essential knowledge regarding the fundamentals of oil refining and related technologies. Its content is designed to enlighten participants on varied types of refineries, their setups, product slates, and the crucial expertise necessary to identify the most appropriate ones. It delves into the intricacies of the oil and gas refinery process, design, and operations.

Participants in this oil and gas refinery process, design, and operation training will emerge with a stronger grasp of the key components and operations that underscore the oil and gas process design, ensuring they are prepared to face the dynamic challenges encountered in the industry with informed agility and strategic insight.

Targeted Groups

- Process Engineers, Technologists, Oil and Gas Operators, and Supervisory personnel who engage in refining activities and wish to deepen their understanding of refinery processes.
- Refinery scheduling staff, blending staff, and crude oil buyers who actively participate in the economically vital activities of oil and gas operations.
- Engineering and operations personnel and Technical sales team members who require comprehensive knowledge of the broad scope of refinery operations will find this course particularly beneficial.
- Professionals involved in selling equipment or supplies to the oil and gas refinery industry or those engaged with economic evaluations of such operations.

Targeted Competencies:

At the end of this oil and gas refinery process, design, and operation training, participants competencies will:

- Understand crude oil characteristics and the pivotal role of oil and gas process operators in managing these properties.
- Know refinery configuration, complexity, and the essential oil and gas refinery equipment involved.
- Master over major refinery process operations, including operational excellence in oil and gas principles.
- In-depth comprehension of environmental issues affecting the design and operation of refineries.
- Develop optimization strategies and methods to enhance the efficiency and sustainability of the oil and gas design processes.

Course Objectives

By the end of this oil and gas refinery process, design, and operation course, participants will:

- Understand the fundamental principles of the oil and gas refinery process.
- Learn about the design, including the basis of design in oil and gas and the operation of oil and gas refinery units.
- Acquire knowledge of various refining technologies and methods.
- Develop skills in optimizing oil and gas operations with an emphasis on operational excellence in oil and gas.
- Familiarize with safety and environmental regulations in refining.

Course content:

Unit 1: Introduction to petroleum refining and crude oil composition:

- Market drivers for the refining industry.
- A of refinery products and processes.
- The chemical constitution of crude oil.

Unit 2: Properties and classification of crude oil:

- API gravity.
- Pour point.
- The concentration of various contaminants.
- Distillation and boiling points.
- Crude assay.
- Characterization factors.
- Elemental analysis and ternary classification of crude oils.

Unit 3: Overall refinery flow:

- Desalting and distillation.
- Light ends unit.
- Catalytic reformer.
- Catalytic hydrotreatment.
- Conversion of heavy gas oil.
- Conversion and processing of vacuum gas oils.
- Processing and conversion of vacuum distillation residue.
- Paths for upgrading heavy oil.

Unit 4: Separation processes:

- Atmospheric and vacuum distillation units.
- Distillation methods.
- Distillation terminology.
- Fractionation in light ends unit LEU.
- Deasphalting.
- Gradient solubility model.
- Dewaxing.

Unit 5: Thermal conversion processes:

- Chemistry of thermal cracking.
- Thermal reactivity considerations in processing.
- Visbreaking.
- Coking.

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- Chemistry of thermal cracking.
- Thermal reactivity considerations in processing.
- Visbreaking.
- Coking.

Unit 7: Catalytic conversion processes:

- Chemistry of thermal cracking.
- Catalytic cracking processes.
- Catalytic hydrocracking.
- Catalytic reforming.
- Chemistry of catalytic reforming.
- Catalytic reforming processes.
- Alkylation.
- Polymerization.
- Isomerization.

Unit 8: Finishing processes:

- Hydrogenation.
- Hydrotreatment.
- Hydrodesulfurization.
- Hydrodenitrogenation.
- Hydro demetallation.
- Hydrotreatment processes.
- Product blending.



Unit 9: Supporting processes:

- Gas processing unit.
- Sulfur recovery.
- Hydrogen production.
- Wastewater treatment.
- Environmental regulation of refineries.

Unit 10: Past and future of petroleum refining:

- Refinery evolution.
- Future trends in petroleum refining.

Unit 11: Natural gas processing:

- Shale gas.
- Natural gas liquids.
- Natural gas composition and specifications.
- Natural gas processing.