

Basics of Petroleum Chemistry & Refining Processes

The program course contents focuses on the basic definitions of petroleum refining with a brief explanation of crude oil chemistry and the impact on the refinery, a fundamental discussion of the nature and purpose of the major refining processes, and the characteristics of refining products. Health, Safety and Environment considerations of refining processes are discussed.

Learning Objectives

This course will provide participants with fundamental and practical skills necessary to:

1. Explain who refinery customers are, identify the needs and the products they require.
2. Describe / discuss feedstock properties, process chemistry, process variables, operating conditions, unit configuration and refinery products.
3. Describe the principal refinery processes and construct a refinery flowchart indicating streams to and from the various process units.
4. Describe and explain in broad terms each refinery process (physical separation, chemical conversion and treating processes), the process unit with associated equipment, the object and basic principles of the process, the interfaces with other process units.
5. Health, Safety and Environment aspects of the refinery process.

Course Outlines

1. Characteristics of Crude Oil

Composition

Description of Crude Oil Fractions

Definition of Physical and Chemical Processes

2. Fundamentals of Petroleum Chemistry

Description of a Hydrocarbon Molecules

Types of Hydrocarbon Molecules

Definition / Function of a Catalyst

3. Fundamentals of Crude Oil Distillation

Description of the distillation Processes: Crude distillation units, vacuum distillation,

- Thermal cracking
- Cut points of the various fractions
- 4. Basic refinery flow configuration and Auxiliary processes**
 - Refinery flow schemes
 - Gasoline processing options
 - Heavy oil processing options
- 5. Fundamentals of hydroprocessing**
 - Hydrotreating
 - Hydrocracking
 - Chemistry and Process Flow scheme
 - Process variables and operating conditions
 - Hydrotreated product yields and properties
 - Health & Safety considerations
- 6. Fluid Catalytic Cracking**
 - FCC catalysts, chemistry and process flow
 - FCC process variables / operating conditions
 - Cracking of heavy feedstocks
 - Health & Safety considerations
- 7. Catalytic Reforming**
 - Reforming catalysts
 - Chemistry and Process Flow
 - Reformer unit configuration
 - Reduction of Aromatics and Benzene in reformat
- 8. Alkylation**
 - HF Alkylation
 - Sulfuric acid Alkylation Process
 - Feedstock and Product Properties
- 9. Heavy Oil Processing**
 - Delayed Coking
 - Visbreaking
 - Solvent Deasphalting
- 10. Isomerization**
 - Catalyst, Chemistry & Operating Conditions
 - Process flow scheme/ Processing Options
 - Isomerization Yields and Product Properties
- 11. Auxiliary refinery processes**
 - Hydrogen Manufacturing
 - Sulfur recovery plant
 - Merox Treating Process
 - Amine Scrubbing Unit
 - Gas Recovery Plant
 - Fired Heaters / Heat Exchangers
- 12. Health, Safety & Environment**
 - Air Pollution
 - Oil Pollution
 - Hazards in Refinery units

Glossary of Refinery Terms.