Introduction to Oil Refining and Global Refined Petroleum Products

Course Description

Petroleum refining plays a significant role in our lives. Most transportation vehicles are powered by refined products such as gasoline, diesel, aviation turbine kerosene, and fuel oil. It is well known that the oil quality is reducing in the next years so new refineries have to be designed to handle heavier crude oil and required produce clean a less expense fuels.

This course provides a holistic approach of main refinery processes. The course starts with the analysis of feedstocks and composition of crude oil to analyze the inherent yields, then processes to enhance refined product quality will be studied. The course includes an overview and discussion of main refinery processes such as: the crude distillation unit (or atmospheric distillation unit), vacuum distillation unit, Fluidized Catalytic Cracking (FCC), Catalytic Reforming and Isomerization, Thermal Cracking and Coking, Hydroconversion, and Alkylation. Also, a chapter related to refinery economics, environmental regulations, and distribution and marketing of refined products will be addressed. and final products under environmental regulations.

At the end of the training the attendee will have a better understanding of the oil refining processes and its impact in the global market of refined products.

Who Should Attend?

This course is designed for professionals with background in engineering who are seeking to gain knowledge in crude oil refining as well as professionals with knowledge in refinery, process unit operations, technicians, supervisors and managers.

1. Preferably, attendants should have some basic knowledge of chemical engineering.

What You Will Gain:

1. Understand the fundamentals of the crude distillation unit and the vacuum distillation unit.
2. Understand the chemical and physical principles of thermal cracking, Fluid Catalytic Cracking (FCC), Alkylation, Isomerization, and Hydroconversion
3. Learn the function of major refinery equipment's
4. Understand the process to meet quality specifications of market
5. Understand what determines crude oil's relative economic value
6. Understand the significance Nelson complexity index and how we relate this term with refinery capacity of producing refined product quality
7. Understand the economics of refinery processes

Training Methodology

The training course will combine lectures (30%) with workshop/work presentations (30%), interactive practical exercises and case studies (20%), supported by video material, software and general discussions (20%).

Course Content

Introduction to refining processes

- Crude oil definition, physical and chemical classification
- Typical crude oil fractions, crude oil yield
- Hydrocarbon chemistry
- Refining process description

Crude distillation unit or atmospheric distillation unit

- Process description and workflows
- Operation of Crude Distillation Units
- Cut points
- Crude oil desalting and pre-treating

Vacuum Distillation Unit

- Process description and workflows
- Products

Catalytic Reforming and Isomerization

- Process description and workflows
- Role of reformer in the refinery and feed preparation

- Products

Catalytic Reforming and Isomerization

- Process description and workflows
- Role of reformer in the refinery and feed preparation
- Commercial processes of catalytic reforming: Platforming (UOP LLC), Powerforming (Exxon), Magna forming (ARCO), Catalytic Reforming (Engelhard),
- Reforming (IFP), others.
- Isomerization reactions
- Products

Thermal Cracking and Coking

- Process description and workflows
- Products

Hydroconversion

- Process description and workflows
- Hydrotreating
- Products

Fluidized Catalytic Cracking

- Process description and workflows
- Role of FCC in the Refinery
- Feedstock and Products

Alkylation and Polymerization

- Process description and workflows
- Role of Alkylation and Polymerization
- Products

Refinery Economics

- Refining capacity, Refining costs
- Factors Affecting Refinery Costs
- Nelson complexity index
- Overview of refined petroleum products market.

Environmental Aspects in Refining

- Wastes in refinery units
- Waste management