



N621: Introduction to Petroleum Refinery Processing and Bitumen Upgrading

Tutor(s): Marvin Rakow

3 Days

Competence Level:
Awareness



Classroom Course



3D Outcrop Imagery

Summary

This popular, long-running three-day course presents an overview of the modern, integrated petroleum refinery. Each refining process is presented covering configuration, operating description and conditions, feedstock and catalyst selection, stream yields and properties, process parameter relationships and their effect on unit performance and yields. The impact of each process on environmental regulations and pollution control is also discussed. Crude oil properties and assays are reviewed. Current and anticipated future worldwide fuel product specifications are presented. The effects of changes in crude oil source and supply, in particular bitumen and shale oil, as well as shifting product demand and import/export balances on future refinery operation is also discussed. Oil sands bitumen and heavy oil properties, upgrader projects and their process flowsheets to produce "synthetic crude oil" and refinery feeds are presented.

Learning Outcomes

Participants will learn to:

1. Identify key characteristics and variables of crude oil, and other gas and liquid feed streams supply for refineries.
2. Recognize how bitumen properties differ from typical crude oils
3. List and describe the possible refinery product streams, and marketed product properties.
4. Describe the principle components of a refinery.
5. Explain refinery operations.
6. Understand catalytic cracking, catalytic reforming, isomerization, and alkylation principles.
7. Describe hydroprocessing and processes for making hydrogen, recovering sulfur, making lube oil and upgrading resid.
8. Understand how bitumen upgraders differ from crude oil refineries and why
9. Describe the principle refinery process components chosen for existing or planned upgraders
10. Understand pollution control requirements.
11. Use petroleum refining terminology.
12. Discuss worldwide trends in refined product supply and demand.

Duration and Training Method

Three classroom days providing 2.4 CEU (Continuing Education Credits) or 24 PDH (Professional Development Hours)

Who Should Attend

The course provides substantial technical detail; however, it is designed and presented to be understood by, and of benefit to, both technical and non-technical personnel including environmental, safety and maintenance staff; all engineering disciplines; consulting and engineering organization staff; equipment, catalyst and chemical suppliers; R&D and government agency staff, as well as oil traders, pipeline, financial and business development personnel.



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Course Content

Course Agenda

Day One

- The Refinery Flow Plan – Configuration, Vocabulary, Streams, What Goes Where and Why
- Hydrocarbon Chemistry – How Paraffins, Olefins, Naphthenes and Aromatics Differ
- Crude Oil – Properties and Assays, What's Different About Bitumen and Shale Oil
- Fuel Products – Gasoline, Jet, Fuel Oil and Diesel Specifications: Today and Tomorrow
- Atmospheric and Vacuum Distillation

Day Two

- Fluid Catalytic Cracking, Including Role in Diesel and Propylene Markets
- Catalytic Reforming
- Aromatics Recovery for BTX Petrochemical Feedstocks
- Isomerization, Alkylation and Polymer Gasoline
- Hydroprocessing – Hydrotreating and Hydrocracking Applications
- Hydrogen Production
- Hydrogen Sulfide Removal (Amine Treating) and Sulfur Recovery (Claus)

Day Three

- Vacuum Resid Properties
- Vacuum Resid Processes – Visbreaking, Solvent Deasphalting, Coking, Hydrocracking
- Bitumen Properties
- Bitumen (Tar Sand Oil) Upgrader Projects
- Upgrader Flowsheets – Process Selection and Synthetic Crude Oil Quality
- Pollution Control Overview – Waste Water, Stacks