Crude Oil & Vacuum Distillation

Overview

LEVEL
Proficiency

PURPOSE
This course provides a deeper understanding of the operating and monitoring of atmospheric and vacuum distillation units.

LEARNING OBJECTIVES
Upon completion of the course, the participants will be able to:
grasp fundamental process control and the impact of each controller on the process and on the characteristics of the cuts produced,
analyze desalter operation and corrosion monitoring,
detect potential deficiencies by troubleshooting.

WAYS AND MEANS
Applications, teamwork, case studies and interactive workshops based on typical real situations.
Possible use of a dynamic simulator for crude oil distillation unit operation issues.

LEARNING ASSESSMENT
Quiz.

PREREQUISITES
No prerequisites for this course.

MORE INFO
Realizado en Español si requerido.

Agenda

IMPACT OF CRUDE OIL QUALITY ON PRODUCTS
Tuning of the volatility of petroleum fractions in view of their end-use: constraints and flexibility of cut points; principal problems related to quality.
Crude oils: properties (TBP analysis), product yields, related margins.
Main schemes for crude oil fractionation.

OPERATING CONDITIONS OF AN ATMOSPHERIC & VACUUM DISTILLATION UNITS
Material balance: cut points, product characteristics, separation quality, fractionation capability.
Top condensation and pressure in the column - Partial pressures.
Feed vaporization: inlet temperature, overflash.
Product side stripping.
Heat balance of the column - Pumparounds and heat integration.
Modern internals for crude oil distillation column.
DESALTING & CORROSION CONTROL
Corrosion by sulfur, naphthenic acids and mineral salts.
Crude oil desalting: purpose, functioning of the desalter, operating variables and troubleshooting.
Downstream neutralizing treatment: purpose, advantages and drawbacks.
Controlling corrosion at the head of topping column and anticorrosion techniques.

SAFETY & ENVIRONMENTAL CONCERNS
Risks related to main equipment: furnace, pumps, vacuum system.
Heat recovery optimization and energy consumption.
Efficient and low energy consumption vacuum equipment (steam ejector vs. liquid ring pump).

PROCESS CONTROL, OPERATION & TROUBLESHOOTING OF MULTI-DRAW-OFF COLUMNS
Different control systems in atmospheric and vacuum distillation columns, using flowrate, level or temperature control.
Cut point control: modification of flowrate of a cut and consequences on the column.
Impact of the preflash on the operation of the furnace and the atmospheric column.
Separation control: tuning of the separation selectivity, consequences on the column and on the heat recovery system.
Influence of pressure and pressure control.
Case studies on overall control setup of these two distillation columns and disturbances.
Maximizing the performances of the unit under constraints or limit conditions.
Start-up - Shutdown - Troubleshooting.

DISTURBANCES & TROUBLESHOOTING
Case studies (in groups) related to disturbances and incidents; detection, consequences and corrective actions:
Stripping shutdown.
Failure of one pumparound pump, of the furnace.
Loss of part of the feed, etc.