# Visbreaking

## Overview

**LEVEL**
Skilled

**PURPOSE**
This course provides a comprehensive understanding of the operation of visbreaking units.

**LEARNING OBJECTIVES**
Upon completion of the course, the participants will be able to:
- understand the stability and compatibility properties of residues,
- know about the processing parameters, especially those of the furnace and the fractionation,
- seize the relationship between operating conditions and residue's stability.

**WAYS AND MEANS**
Applications, case studies based on typical industrial situations.

**LEARNING ASSESSMENT**
Quiz.

**PREREQUISITES**
No prerequisites for this course.

## Agenda

### VISBREAKING PROCESS & FEEDSTOCKS

### THERMAL CRACKING REACTIONS
Characteristics of primary cracking reactions and secondary reactions. Reactivity of the different families of hydrocarbons. Influence of the nature of the feedstock. Parameters influencing the severity: temperature, residence time. Role and influence of the soaker. Changes in the various families of hydrocarbons present in the feedstock: saturated compounds, aromatics, resins, asphaltenes.

### PRODUCTS OF THE VISBREAKING UNIT
ANALYSIS OF THE WORKING CONDITIONS OF A VISBREAKING UNIT

Process flow diagram, operating conditions, main controls.
Material balance, yields, energy consumption.
Process performance analysis: conversion, viscosity reduction, diluent saving, reduction of fuel pool, upgrading value provided by visbreaking.
Cracking conditions. Temperature profile in furnace and residence time.
Role and effect of injecting steam or naphtha, pressure and pressure drop.
Fractionating the products.
Monitoring the fouling of the equipment.
Application: study of a recorded case of a visbreaker in operation.

OPERATION OF THE UNIT

Operating variables. Influence on the severity of the thermal treatment.
Effects on the yields and the product quality.
Operating the visbreaker furnace. Coke deposition mechanism. Main parameters having an influence on its formation. Precautions to be taken. Effects of coking on the furnace and monitoring the skin temperature of the tubes.
Adjusting the severity.

INCIDENTS & TROUBLESHOOTING

Special operating precautions. Safety.
Incidents: furnace failure, vacuum system failure, failure of quench pump or of cracked vacuum residue pump.
Troubleshooting: excess of coking in furnace or at the bottom of the fractionator.
Emergency shut down and flushing, ISS.