

## OBJECTIVES

To give the participants a better understanding of the operation of visbreaking units.

At the end of this training, the participants:

- are able to understand the stability and compatibility properties of residues
- know the process parameters, especially those of the furnace
- are able to make a relationship between the operating conditions used and the stability of the visbroken residues.

## COURSE CONTENT

### VISBREAKING PROCESS 0.25 day

Role and situation among the conversion processes of the heavy residues fraction: visbreaking, thermal cracking.

Integration of visbreaking into the refinery scheme.

Different schemes for fractionating the cracked effluents.

### CHARACTERISTICS OF THE FEEDSTOCK 0.25 day

Origins and physical properties.

Routine quality control tests and impurities concentrations (sulfur, nitrogen, metals).

Structure of residues: asphaltenes, maltenes and resins.

### THERMAL CRACKING REACTIONS 0.5 day

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 0.75 day

Stability of the visbroken residues. Problem of asphaltenes flocculation. Practical tests for assessing stability. Changes in stability during thermal cracking. Influence of the diluents used to adjust the viscosity. Compatibility of fuel bases.

Main characteristics and yields of other products. Problems raised for subsequent treatments.

**Applications:** *changes in stability of a residue under the effect of diluents; limits of fuels compatibility.*

### ANALYSIS OF THE WORKING CONDITIONS OF A VISBREAKING UNIT 1.25 days

Scheme, 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 and residence time.** Role and effect of injecting steam or naphtha. Pressure and pressure loss.

Fractionating the products.

Monitoring the **fouling** of the equipment.

**Application:** *study of a recorded case of a visbreaker in operation.*

### OPERATING OF THE UNIT 1 day

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.

Special operating precautions. **Safety.**

### ▲ Who should attend?

Operators, control panel operators, supervisors and personnel from refineries, research centres, oil and engineering companies involved in various ways with visbreaking units.

### ▲ Duration

**4 days**

### ▲ Dates & Location

**Non-scheduled**

**May only be organized for a single company**

### ▲ Tuition Fees

**To be agreed upon**

### ▲ Course Coordinator

**Jean-Pierre Baumann**

Ref. **PTF / VISCO-E**