

ANALYTICAL METHODS AND TECHNIQUES APPLIED TO CRUDE OIL AND PETROLEUM PRODUCTS

OBJECTIVES

To provide a broader understanding of analytical methods and techniques applied to hydrocarbons through lectures linked to practical work in laboratories.

On completion of the course, the following have been acquired:

- a good grasp of the techniques used in petroleum analysis
- an understanding of the area of application, the operating procedures, the different types of equipment, the reliability of results, ...

COURSE CONTENT

MAJOR ANALYTICAL METHODS

3 days

Elementary analysis

C, H, O, N, S, Ni, V, ... analysis.

Methods: microanalysis, X-ray fluorescence, plasma spectrography, atomic absorption.

Separation techniques

Analytical and preparatory distillation. Chromatography (GC, LC). Liquid-liquid extraction.

Spectrographic methods

UV, IR, visible spectrography. NMR spectrography. Mass spectrography.

Standard tests

Standards: principle, application field, evolution.

Classification of main standards, quality control related to product utilization: volatility, combustion properties, flowing, lubrication and storage, cold conditions, corrosiveness and pollution.

PRODUCT ANALYSIS BY TYPE

2.25 days

Gases

Principal analyzed gases, C₃/C₄ cuts.

Problem of the traces.

Gasoline cuts

Detailed analysis (GC), analysis by hydrocarbon structure (GC, LC, MS).

Overall characteristics: octane number, specific gravity, vapor pressure, ...

Kerosene and gasoil cuts:

Simulated distillation (GC). Analysis by hydrocarbon structure (LC/GC - MS).

Aromaticity (UV), ...

Vacuum distillates

Analysis by hydrocarbon structure. Overall characteristics: viscosity, ...

Aromaticity (NMR-IR).

Residues

Analysis by hydrocarbon structure (saturates, aromatics, resins, asphaltenes).

Characterization of molecular weight and sizes. Modeling.

ON LINE ANALYSIS

0.25 day

Gases sampling analysis

Buckle fast.

Problem of injection.

Validity of the results.

Applications to various gases.

Liquid effluents

On-line system of injection.

Industrial analysis of sulfur.

NIR analysis.

MEASUREMENT METHOD UNCERTAINTY

0.5 day

Statistical fundamentals. Accuracy of measurement method.

Decision, detection, quantification limits. Examples.

DEMONSTRATIONS OF EXPERIMENTS IN LABORATORIES

4 days

The analyses are demonstrated in the Institut Français du Pétrole laboratories.

The practical work alternates with lectures and is carried out in the following laboratories: distillation, standard tests, elementary analysis, chromatography, spectrography. It includes demonstration of experiments, equipment, interpretation of results, examples of applications.

*A visit to the IFP pilot plants is included in the laboratory program.
The number of participants is limited by the laboratory demonstration facilities.*

▲ Who should attend?

Graduate engineers, supervisory and managerial staff from laboratories, refining units, research centers, and process departments, who are responsible for defining analyses, performing them and applying the results in order to monitor process operation and performance and to assure product quality.

▲ Duration

10 days

▲ Dates & Locations

November 17 to 28, 2008

Solaize (Lyon)

▲ Tuition Fees

€ 4,370

▲ Course Coordinator

Jean-Yves Bouriez

Ref. **APD / AMT-E**