

Introduction to Petroleum Chemistry

Calendar: 2nd day semester

Contact Hours: TP 45,0h; OT 7,5h

Scientific Area: Chemistry

Intended learning outcomes (knowledge, skills and competences to be developed by the students):

This course presents an introduction to petroleum chemistry: Composition of crude oil, physicochemical characteristics, methods of characterization. It also aims to introduce different analytical methods for obtaining qualitative and quantitative information about the composition and structure of the materials.

Students should acquire knowledge which will give them the ability to understand the physical-chemical principles of the analytical methods. Identify qualitative and quantitative capabilities of the methods. Select the most appropriate method in the context of the oil industry.

Syllabus:

1 Quantitative Chemical Analysis

1.1 General Concepts;

1.2 Concentration of solutions;

1.3 Statistics

1.4 Calibration Methods

2 Nature and classification of oil:

2.1 Chemical composition of crude oil

(paraffins, olefins, aromatics, sulfur compounds, oxygen compounds, naphthalene)

2.2 Chemical composition of the main products of refining

3 Characterization of physical and thermophysical properties of oil:

3.1 Theoretical foundations

3.2 Methods and interpretation of data: ASTM distillation; viscosity; API; Flash point; index of refraction; octane

4 Chemical characterization of oil:

4.1 Elemental analysis;

4.2 SARA analysis;

5 Introduction to modern methods of characterization of petroleum and derivatives:

5.1 Chromatographic Methods - GC, HPLC and GPC

5.2 Spectroscopic methods - infrared, Raman

Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

In this curricular unit, the student should acquire the following skills:

Knowledge of the features and types of oil

Know and apply different methods of characterization of substance

Apply techniques to the characterization of petroleum and petrochemical products.

The contents of this programmatic UC are designed to provide the proper training for acquiring the proposed skills.

References:

1. Mohamed A. Fahim, Taher A. Al-Sahhaf, Amal Elkila; Fundamentals of Petroleum Refining, Elsevier 2010 (parte 2, 3, 4, 5)
2. Jones, D. S. J, and Pufado, P. R. "Handbook Of Petroleum Processing." Springer, Berlin (2005).
3. Vasily Simanzhenkov Raphael, "Crude Oil Chemistry", by Marcel Dekker, Inc (2003)
4. GARY, James H; Glenn E.; " Petroleum Refining –Technology and Economics", New York, Marcel Dekker Inc. (2001)
5. Nadkarni, R. A. "Guide to ASTM Test Methods for the Analysis of Petroleum Products and Lubricants: 2nd Edition" ASTM International (2007)