

Petroleum Engineering Laboratories (LAIP) perform experimental studies on porous media and fluids, organized in **four macro-areas**:

Petrophysics & Fracture Analysis

Know-how and development of experimental methodologies on porous media to characterize the petrophysical properties of the reservoir. The main properties (porosity, permeability, relative permeability, conductivity, wettability, capillary pressure, water saturation) are measured by cutting-edge equipments and technology and using Imaging technology (X-Ray CT and Magnetic Resonance Imaging).

The network of natural fractures is directly characterized on the rock sample from micro-scale (thin section) to meso-scale (core). The fracture analysis, integrated with the experimental petrophysical studies and with image and conventional log analysis, helps to determine the static and dynamic reservoir model.

Rock Mechanics

In the Rock Mechanics laboratories the compressive and tensile strength, the friction angle and the acoustic properties of cap rock and reservoir rock are measured.

These parameters are used both in the planning of drilling operations (where to know compressive and tensile strength is essential) and in the planning of the reservoir development (where to know the pore compressibility is fundamental).

The acoustic velocity measured at different levels of load and saturation support the 4D seismic studies.



Improved Oil Recovery / Enhanced Oil Recovery

The main experimental analyses performed are: fluid-rock interaction, fluxing in porous media both at ambient condition and at high pressure and temperature, reproduction of phenomena of chemical-physical interaction at reservoir condition using fluid and core coming from the field, included the treatment of water, gas, CO₂, chemicals (emulsions, dispersions, polymers, surfactants, steam) injection, acid stimulation, solvent extraction.

They support the technologies aimed at increasing the recovery factor (advanced recovery and unconventional reservoir).

Thermodynamics & Gascromatography

The laboratories of Thermodynamics PVT and Gascromatography specialize in the characterization of the properties of hydrocarbons stored in reservoir (gas and light oils).

They are provided with high quality equipments working at high pressure and high temperature. For the prediction of the main parameters PVT of heavy oils, an in-house developed set of empirical correlations is available.

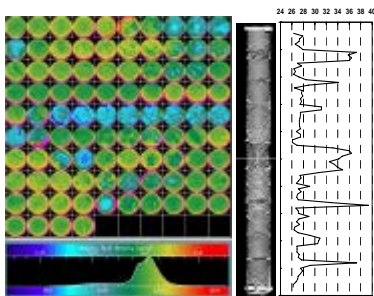


Petroleum Engineering Labs - LAIP

Experimental Studies on Porous Media and Fluids

PETROPHYSICS Tomography

- Core QC
- Fluid distribution in porous media
- X-Ray CT porosity log
- RCA and SCAL
- Fracture analysis
- Particle size analysis



ROCK MECHANICS

- Compressional stress
- Subsidence
- Sand production prediction
- Cap-rock sealing efficiency
- Well-bore stability
- Rock acoustic properties



IOR/EOR

- Microscopic efficiency of displacement
- Core flooding at $T_{\max} = 200^{\circ}\text{C}$, $p_{\max} = 700 \text{ bar}$
- Chemicals selection
- Heavy oil dehydration
- Monitoring of phase ratio during fluxing



THERMODYNAMICS Gas chromatography

- PVT Conventional studies
- Sample validation
- Recombination process
- Composition
- Expansion at constant composition and Depletion at constant Volume
- Routine chromatographic analyses



eni

exploration & production