Petrofacies Determination and Their Applications in Petrophysical Reservoir Characterization

Course Description

This course provides the concepts, tools and applications of petrophysical characterization using the Petrofacies methodology or Rock Typing. Petrophysical rock typing in reservoir characterization is a vital input for successful drilling, production, injection profile distribution, reservoir studies, and reservoir simulation

Participants are expected to actively engage in activities, discuss the practical value of their learning, and apply what they learn during the practical exercise section. The workshop begins with an overview of the porous system and the possible causes that control porous space interconnection (texture, grain size, diagenesis, type and distribution of clays, among others). The course focus on the determination of Petrofacies or Rock Types to define flow units and their application in Reservoir Characterization and simulation.

The definition of rock types is based on mercury injection capillary pressure curves. It incorporates the analysis of complex variations in pore geometry and the pore throats that control the initial and residual distribution of fluids and their flow through the porous media.

The course emphasizes the importance of the relationship between porosity, permeability, irreducible water saturation, and pore throat radius. The relationship between storage and flow capacity of formations will be also addressed. Other topics developed in this course are the application of rock typing concepts in carbonate reservoirs, the relationship between capillary pressure and relative permeability, water saturation models depending on rock types, water saturation models based on J function, estimation of fluid contacts and interpretation of flow units using Lorentz and Miller plots. The training ends with a review of best practices of samples' selection by rock types to perform special core analysis

The course will be supplemented by practical class project example problems, group exercises and interactive group discussion designed to consolidate and reinforce learning, and identify and offer solutions to specific problems associated with petrofacies determination and their application in petrophysical reservoir characterization.

Who Should Attend?

This course is designed for professionals of the petroleum industry in the areas of production geology, operations geology, reservoir engineering, petrophysics, log analysis related to reservoir characterization, integrated studies, and field development of oil and gas fields.

What You Will Gain:

- Understanding the workflow related to petrofacies determination
- Learning how to obtain the rock types based of logs and core data analysis
- Learning the classification of Petrofacies and application in sandstone and carbonate reservoirs
- Understanding the applications of capillary pressure in reservoir characterization. Winland's equation and Pittmann's equations
- Understanding the methodology to define flow units
- Learning the best practices for selecting Special Core Analysis to define Rock Type.

Training Methodology

The training course will combine lectures (30%) with workshop/work presentations (30%), interactive practical exercises and case studies (20%), supported by video material, software and general discussions (20%)

Course Content

Introduction to Petrophysics

- Basic petrophysical concepts, Capillary Pressure. Relative Permeability, Petrofacies concept (Rock Types)
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Rock type definition

- Permeability / Porosity Ratio (K / Phi)
- Environmental corrections and normalization
- Effect of Diagenesis in K / Phi ratio
- Concept of capillary pressure
- Pore Throat Radius distribution

Applications of capillary pressure in reservoir characterization

- Winland's equation.

- Pittmann's equations

Classification of Petrofacies

- Sandstone reservoir
- Carbonate reservoirs

Rock type applications

- Reservoir characterization
    - Water oil contacts
    - Compartmentalization studies
- Reservoir simulation

Best practices of samples' selection by rock types to perform special core analysis