MISCIBLE GAS INJECTION RSE007

COURSE DESCRIPTION

Miscible gas injection must be performed at a high enough pressure to ensure miscibility between the injected gas and in situ oil. Miscibility is achieved when interfacial tension (IFT) between the aqueous and oleic phases is significantly reduced. The desired IFT reduction is typically from around 1 dyne/cm to 0.001 dyne/cm or less. This course covers the fundamentals of miscible gas injection enhanced oil recovery, the applications of scientific principles to reservoir fluid phase behavior and multiphase fluid flow in porous media. Also, it covers mathematical tools to help in the design and selection of gas injection enhanced oil recovery (EOR) projects

COURSE GOAL

To enhance the participants' knowledge, skills, and ability necessary to understand of the fundamentals of miscible gas injection enhanced oil recovery, the applications of scientific principles to reservoir fluid phase behavior and multiphase fluid flow in porous media. And necessary to the design and selection of gas injection EOR projects using mathematical tools.

COURSE OBJECTIVES

By the end of this training course, participants will have the knowledge about:

- Understand the miscible gas injection thermodynamics in EOR
- Apply principles of phase and volumetric behavior of reservoir fluids
- Understand reservoir fluid trapping and mobilization mechanisms
- Design a laboratory protocol for a successful gas injection project
- Use numerical reservoir simulators to validate laboratory data
- Evaluate the miscible gas injection EOR processes

WHO SHOULD ATTEND

Reservoir Engineers working in EOR projects

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Reservoir Rock
    - Core analysis
    - Dynamic porosity
    - Representative elementary volume

2. Reservoir Fluids
    - Reservoir Fluids Classification
    - Behavior and properties of fluid phase
3. PVT Studies: Advanced
    - RBA
    - Swelling test (P-x diagram)
    - Slimtube test
    - Multiple-contact experiment
4. Equations of State (EOS) Modelling and Characterization
    - Calculations of fluid phase behavior
    - Fluid characterization
    - Application in compositional simulation
5. Multi-Phase Fluid Distribution in the Reservoir
    - Interfacial tension
    - Capillary pressure
    - Wettability
    - Phase trapping and mobilization
6. Multi-Phase Flow in Porous Medium
    - Relative permeability
    - Methods of relative permeability determination
    - Relative permeability calculation
    - Factors influencing relative permeability
7. Flow Equations
8. Miscible Displacement Processes
    - Thermodynamics of miscible gas injection
    - First contact miscibility displacement
    - Multiple-contact miscibility displacement
    - Factors affecting microscopic and macroscopic displacement efficiencies
    - Screening and criteria of EOR by miscible gas injection

9. Miscible Gas Injection EOR Experimental Design and Modelling
    - Specialized relative permeability experiment
    - EOR displacement experiments
    - Calculation of longitudinal dispersion coefficient
10. PVT and Flow Data for Reservoir Simulation