



Gas Injection Mechanisms

Course Introduction:

Gas injection is a crucial enhanced oil recovery (EOR) technique used to maintain reservoir pressure and improve hydrocarbon recovery in oil fields. Understanding gas injection mechanisms is essential for petroleum engineers, reservoir engineers, and professionals involved in field development and production optimization. This five-day training program provides an in-depth understanding of gas injection processes, covering theoretical concepts, reservoir behavior, and operational considerations.

Participants will explore different gas injection methods, including miscible and immiscible gas injection, as well as the properties of injected gases such as CO₂, nitrogen, and hydrocarbon gases. The course will also address phase behavior, reservoir screening criteria, and challenges associated with gas injection projects. By the end of the program, attendees will have a strong foundation in the principles of gas injection, enabling them to make informed decisions in reservoir management and enhanced oil recovery operations.

Course Objectives:

Upon completion of this course, participants will:

- Understand the fundamental principles of gas injection as an enhanced oil recovery (EOR) method.
- Differentiate between miscible and immiscible gas injection mechanisms.
- Analyze the phase behavior of injected gases and their interactions with reservoir fluids.
- Evaluate the reservoir conditions suitable for gas injection techniques.
- Examine the role of CO₂, nitrogen, and hydrocarbon gases in reservoir pressure maintenance and oil recovery.
- Identify challenges and limitations of gas injection processes.
- Understand economic and environmental considerations associated with gas injection projects.
- Assess key design and operational factors for successful gas injection implementation.

Who Should Attend?

This training program is designed for petroleum engineers, reservoir engineers, production engineers, and geoscientists involved in oil and gas field development. It is also suitable for project managers, field operators, and technical consultants who need to understand the theoretical framework of gas injection mechanisms for improved hydrocarbon recovery. Additionally, professionals working in EOR strategy development, research, and regulatory compliance will benefit

from gaining insights into the different injection methods, associated challenges, and reservoir performance evaluation techniques.

Course Outline:

Day 1: Introduction to Gas Injection in Reservoir Engineering

- Overview of enhanced oil recovery (EOR) methods.
- Fundamentals of gas injection as an EOR technique.
- Classification of gas injection mechanisms: miscible vs. immiscible.
- Reservoir conditions and screening criteria for gas injection.
- Case studies of gas injection applications in the oil and gas industry.

Day 2: Phase Behavior and Fluid Properties in Gas Injection

- Thermodynamics and phase behavior of injected gases.
- Interactions between reservoir fluids and injected gases.
- Minimum miscibility pressure (MMP) and its significance.
- Role of gas composition in oil displacement efficiency.
- Laboratory experiments and simulation models used for phase behavior analysis.

Day 3: Types of Gases Used in Injection Processes

- Carbon dioxide (CO₂) injection: benefits, challenges, and field applications.
- Nitrogen injection: mechanisms and reservoir suitability.
- Hydrocarbon gas injection (methane, ethane, and rich gas).
- Comparative analysis of different injected gases.
- Environmental impact and sustainability considerations.

Day 4: Operational and Reservoir Management Considerations

- Wellbore and surface facility requirements for gas injection.
- Monitoring and controlling gas injection rates.
- Reservoir pressure maintenance and breakthrough issues.
- Economic considerations in gas injection projects.
- Case studies on field performance and optimization strategies.

Day 5: Challenges, Future Trends, and Final Discussions

- Challenges and limitations in gas injection EOR.
- Advances in gas injection technology and future research directions.
- Regulatory and safety aspects of gas injection operations.
- Summary of key learnings and best practices.
- Open discussion, Q&A session, and course wrap-up.

Course Methodology:

A variety of methodologies will be used during the course that including:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

To be advised as per course location. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session