

**TRAINING TITLE**

**GAS INJECTION MECHANISMS**

**Training Duration**

**5 days**

**Training Venue and Dates**

<b>Ref. No.</b> OP025	<b>Gas Injection Mechanisms</b>	<b>5</b>	<b>14-18 Apr. 2025</b>	<b>\$5,500</b>	<b>Abu Dhabi, UAE</b>
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In any of the 4 or 5-star hotels. The exact venue will be informed later.

**Training Fees**

- \$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch

**Training Certificate**

**Define** Management Consultants Certificate of course completion will be issued to all attendees.

**TRAINING DESCRIPTION**

The Gas Injection Mechanisms Course provides an in-depth understanding of the principles, technologies, and practical applications of gas injection methods used in reservoir management and enhanced oil recovery (EOR). Gas injection is a widely used technique in the oil and gas industry to maintain reservoir pressure and improve oil recovery from reservoirs that are no longer producing at optimal levels. The course focuses on various gas injection techniques such as miscible, immiscible, and water-alternating-gas (WAG) processes.

**TRAINING OBJECTIVES**

**By end of course participants will be able to understand**

- Understand Gas Injection Principles: Learn the fundamental principles behind gas injection in reservoirs, including pressure maintenance and improved oil recovery.
- Explore Gas Injection Techniques: Understand various gas injection methods (miscible, immiscible, CO<sub>2</sub> injection, nitrogen injection) and their suitability for different types of reservoirs.
- Analyze Reservoir Behavior: Gain insights into the impact of gas injection on reservoir performance, including the influence on reservoir pressure, fluid flow, and oil recovery.
- Design and Optimize Gas Injection Projects: Understand how to design and optimize gas injection projects for maximum recovery and efficiency, including selecting the right gases and injection methods.

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- Address Operational Challenges: Learn about the challenges and common problems encountered in gas injection, such as gas breakthrough, reservoir heterogeneity, and monitoring strategies.
- Ensure Safety and Environmental Compliance: Learn about the safety, environmental, and regulatory considerations for gas injection processes, including CO<sub>2</sub> storage and emissions control.

### **WHO SHOULD ATTEND?**

- Petroleum engineers
- Reservoir engineers
- Production engineers
- Geologists and geophysicists
- EOR specialists
- Operations managers and technicians
- Project managers in oil and gas fields

### **COURSE PROGRAM**

#### **Day 1: Introduction to Gas Injection in Reservoirs**

- **Overview of Gas Injection in EOR**
  - Importance of gas injection in reservoir management
  - Purpose of gas injection: pressure maintenance and enhanced oil recovery (EOR)
  - Basic concepts of reservoir drive mechanisms and fluid dynamics
- **Types of Gas Injection Techniques**
  - Miscible gas injection (e.g., CO<sub>2</sub>)
  - Immiscible gas injection (e.g., nitrogen, flue gas)
  - Water-alternating-gas (WAG) injection
- **Reservoir Behavior and Gas Flow**
  - Reservoir pressure maintenance and displacement efficiency
  - Understanding gas behavior in porous media
  - Influence of rock properties and fluid viscosity

#### **Day 2: Gas Injection Mechanisms**

- **Miscible Gas Injection Mechanisms**
  - Definition of miscible flooding: CO<sub>2</sub> and hydrocarbon miscibility
  - Mechanism of oil displacement in miscible gas injection
  - Miscibility, capillary pressure, and residual oil saturation
- **Immiscible Gas Injection Mechanisms**
  - Nitrogen and flue gas injection: immiscible flooding techniques
  - Oil displacement in immiscible gas injection

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- Factors affecting immiscibility and recovery efficiency
- **Water-Alternating-Gas (WAG) Injection**
  - Principles and benefits of WAG
  - Reservoir response to WAG cycles
  - Designing an effective WAG injection program

### Day 3: Gas Injection Equipment and Techniques

- **Injection Wells and Equipment**
  - Types of injection wells used in gas injection: vertical, horizontal, and dual injection wells
  - Equipment used for gas injection: compressors, separators, and pipeline systems
  - Key design factors: well placement, injection rates, and pressure management
- **Monitoring and Control Systems**
  - Techniques for monitoring gas injection: downhole sensors, surface monitoring
  - Injection control and regulation systems
  - Automated control of injection rates and pressure
- **Optimization Strategies**
  - Gas injection optimization: reservoir simulation models and forecasting
  - Pressure management and minimizing gas breakthrough
  - Dynamic modeling and real-time monitoring for optimizing gas injection

### Day 4: Challenges in Gas Injection and Their Solutions

- **Gas Breakthrough**
  - Understanding gas breakthrough: causes and impact on recovery
  - Techniques to minimize and manage gas breakthrough
  - Identifying early signs of breakthrough and corrective actions
- **Reservoir Heterogeneity**
  - Impact of heterogeneity on gas injection efficiency
  - Geostatistical analysis for optimizing injection strategies
- **Scaling, Corrosion, and Gas Quality Issues**
  - Challenges of scaling, corrosion, and gas contamination in injection wells
  - Methods for mitigating scaling and corrosion in injection systems
  - Gas quality control: ensuring proper gas composition for effective injection

### Day 5: Safety, Environmental Impact, and Case Studies

- **Safety in Gas Injection Operations**
  - Health, safety, and environmental considerations in gas injection operations
  - Safety protocols for CO<sub>2</sub> injection and high-pressure injection operations
  - H<sub>2</sub>S, CO<sub>2</sub>, and other gas hazards: detection and emergency response planning

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- **Environmental Impact and Regulatory Compliance**
  - Environmental concerns: CO<sub>2</sub> storage and potential leakage
  - Emission reduction and environmental sustainability practices
  - Regulatory frameworks for gas injection and CO<sub>2</sub> storage (e.g., carbon capture and storage (CCS) regulations)

**NOTE:**

**Pre- & Post Tests will be conducted.**

**Case Studies, Group Exercises, Group Discussions, Last Day reviews, and assessments will be carried out.**



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