

## PRACTICAL ENGINEERING ASPECTS OF CHEMICAL EOR

### Workshop Description

It is well known that primary and secondary production schemes in light and medium gravity oil fields (> 20° API) generally result in recoverable reserves of 25% to 40%. Addition of new discoveries has been declining steadily in the last decades, and the increase of recovery factors from mature oilfields in known basins will be critical to meet growing energy demand. Oil remaining as capillary-trapped oil in water-swept zones, provides significant scope for increasing ultimate recovery using chemical means. Also, chemical flooding may be the only viable option for medium gravity oils that are too light for thermal recovery and too shallow for gas solvents. This workshop will provide participants the opportunity to review and learn the most up-to-date information available about chemical enhanced oil recovery (EOR) technologies and strategies, including polymer, surfactant, alkali, and alkali-surfactant flooding, including both pilot testing and strategies for up-scaling to full field scale.

### Duration and Scope

This high-level workshop is of five (5) days duration and it involves a discussion of the state-of-the-art of revitalizing oilfields using chemical enhanced oil recovery (EOR) technologies and strategies. Several hours are devoted to discussion of chemical pilot testing, including both pilot design and interpretation, and there are several class problems for the workshop attendees (students) to work on. A combination of technical discussions plus class room exercises will prepare participants to identify opportunities based on previous field experiences, lessons learned and best practices that have been gathered purposely for this workshop.

### WORKSHOP CONTENT

History of Chemical Oil Recovery and Present Status  
 Remaining Oil Saturation - Unswept and Capillary-trapped Oil  
 Improving Sweep Efficiency - Polymers as Mobility Control Agents  
 Accelerated Recovery and Reduced Water Requirement due to mobility control  
 Recovering Capillary-trapped Oil - Surfactants  
 Screening for Chemical Flooding  
**Mobility Control Processes**

- Process Description
- Characteristics of Polymers: Degradation and Stability Issues
- Polymer Flow through Porous Media
- Adsorption and Other Losses
- Design of Polymer Floods: Water Quality and Mixing Issues

**Chemical Flooding Processes**

- Process Description
- Surfactants, Co-Surfactants and Synergy with Polymers
- Phase Behavior, Displacement Mechanisms, Partitioning
- Design, Modeling and Simulation of Chemical Flood

Economics of Chemical Flooding  
 Pilot Testing, Design, Surveillance, Interpretation -  
 Alkaline and Surfactant - Alkaline Floods  
 Pros and Cons of Alkali Additions  
 Design of Surfactant and ASP Floods for Field Application  
 Facilities for Chemical Flooding - Injection & Production  
 Surveillance of Chemical Floods  
 Chemical Recovery Case Histories

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Upon finishing this workshop, the attendees (students) should:

- (1) Understand the basics of chemical (surfactants as well as polymer) floods
- (2) Understand the interactions of the chemical system and reservoir constituents
- (3) Be able to:
  - a. Screen reservoirs for their stability for chemical recovery
  - b. Identify the requirements of a program to select a chemical flooding system
  - c. Apply chemical flooding to screened reservoir

This workshop also incorporates chemical and polymer recovery case histories from literature, and class problems to help the attendees to better understand the discussed issues.

## Who Should Attend

This five (5) days workshop is custom-designed for senior managers, managers, senior engineers, and other professionals, familiar with reservoir and production engineering, who are interested in the application of chemical EOR technologies and strategies, and chemical pilot testing.

## Workshop Requirements

Each workshop attendee should bring their own notebook computer to work on the class problems. Class rooms should be equipped with power strips for attendees to plug in their notebook computers and a projector for instructors to project their PowerPoint slides.

## Workshop Manual

Each workshop attendee will be provided a workshop manual (in English) containing copies of the instructors' presentation slides and solutions to the class problem.

## Workshop Instructors

This custom designed workshop will be conducted by our high-level and seasoned Chemical EOR consultants with extensive knowledge and experience in the subject matter as well as in conducting training programs around the world.

## Language of Instructions

This workshop will be conducted in English. However, if desired by the client, one of our bi-lingual consultants can be present throughout the workshop for the benefit of those attendees who are not fluent in English.