
Enhanced Oil Recovery Field Case Studies Chapter 19 Introduction To Meor And Its Field Applications In China

Theory and Practice in Microbial Enhanced Oil Recovery

Enhanced Oil Recovery Field Case Studies

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Modern Chemical Enhanced Oil Recovery

Chemical Enhanced Oil Recovery Handbook

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Theory and Practice in Microbial
Enhanced Oil Recovery Gulf Professional

Publishing
Chemical Methods, a new release in the
Enhanced Oil Recovery series, helps
engineers focus on the latest
developments in one fast-growing area.
Different techniques are described in
addition to the latest technologies in
data mining and hybrid processes.

Beginning with an introduction to chemical concepts and polymer flooding, the book then focuses on more complex content, guiding readers into newer topics involving smart water injection and ionic liquids for EOR. Supported field case studies illustrate a bridge between research and practical application, thus making the book useful for academics and practicing engineers. This series delivers a multi-volume approach that addresses the latest research on various types of EOR. Supported by a full spectrum of contributors, this book gives petroleum engineers and researchers the latest developments and field applications to drive innovation for the future of energy. Presents the latest research and practical applications specific to chemical enhanced oil

recovery methods Helps users understand new research on available technology, including chemical flooding specific to unconventional reservoirs and hybrid chemical options Includes additional methods, such as data mining applications and economic and environmental considerations
Enhanced Oil Recovery Field Case Studies Springer Nature
 Based on the enhanced oil recovery (EOR) survey in Oil and Gas Journal (2010), approximately 280,000bbl of oil per day or 6% of US crude oil production was produced by carbon dioxide (CO₂) EOR. Just like any other gas injection processes, field CO₂ flooding projects suffer from poor sweep efficiency due to early gas breakthrough, unfavorable mobility ratio, reservoir heterogeneity,

viscous fingering and channeling, and gravity segregation. Many of these problems are believed to be alleviated or overcome by foaming the injected CO₂. Since the 1970s, CO₂-foam flooding has been used as a commercially viable method for EOR processes. Foams, defined as a mixture of internal gas phase in a continuous external liquid phase containing surfactant molecules, can improve sweep efficiency significantly by reducing gas mobility, especially in the reservoirs with a high level of geological heterogeneity. This chapter consists of three main parts: the first part (Section 2.1) deals with fundamentals on foams in porous media and recent advances in this field of research, including three foam states (weak-foam, strong-foam, and

intermediate states) and two steady-state flow regimes of strong foams; the second part (Section 2.2) overviews field examples of foam-assisted CO₂-EOR processes; and the third part (Section 2.3) covers typical field injection and production responses if CO₂-foam pilot or field-scale treatments are successful.

Enhanced Oil Recovery Field Case Studies Springer Science & Business Media

This chapter contains a thorough coverage of in situ combustion (ISC) as an enhanced oil recovery method, describing its complex aspects in a simple and practical manner. It is the first really international treatise of the subject as the international experience was carefully put together.

Modern Chemical Enhanced Oil

Recovery Elsevier Inc. Chapters
Water flooding of oil reservoirs has been performed for a century in order to improve oil recovery for two reasons: (1) give pressure support to the reservoir to prevent gas production and (2) displace the oil by viscous forces. During the last 30 years, it was discovered that the wetting properties of the reservoir played a very important role for the efficiency of the water flood. Even though much work have been published on crude oil-brine-rock (CBR) interaction related to wetting properties, Professor N.R. Morrow, University of Wyoming, asked the audience the following question at the European enhanced oil-recovery (EOR) meeting in Cambridge, April 2011: Do we understand water flooding of oil reservoirs? If we are not

able to explain why injection fluids of different ionic composition can have a great impact on displacement efficiency and oil recovery, the answer to Morrow's question is NO. Researchers have to admit that we do not know the phenomena of water flooding well enough. The key to improve our understanding is to obtain fundamental chemical understanding of the CBR interaction by controlled laboratory studies, and then propose chemical mechanisms, which should be validated also from field experience. In this chapter, I have tried to sum up our experience and chemical understanding on water-based EOR in carbonates and sandstones during the last 20 years with a specific focus on initial wetting properties and possibilities for

wettability modification to optimize oil recovery. Chemically, the CBR interaction is completely different in carbonates and sandstones. The proposed chemical mechanisms for wettability modification are used to explain field observations.

Chemical Enhanced Oil Recovery Handbook Elsevier

The fundamentals of individual chemical process (alkaline, surfactant, and polymer) and their two-component combinations have been discussed in preceding chapters. This chapter only briefly discusses the synergy and practical issues in the three-component combination—Alkaline-surfactant-polymer process. The practical issues discussed are produced emulsion, scaling, and chromatographic

separation. Overall performance and amount of chemicals used in field projects are summarized. Most of the Chinese field cases were presented in Sheng (2011). In this chapter, we only present a few field cases outside China. These projects are the Lawrence field in Illinois, the Cambridge Minnelusa field, the West Kiehl field and Tanner field in Wyoming, and Lagomar LVA-6/9/21 area in Venezuela.

Enhanced Oil Recovery Field Case Studies Gulf Professional Publishing

In this chapter, we briefly present the fundamentals of alkaline flooding which include comparison of alkalis, alkaline reactions with crude oil, water and reservoir rock, and alkaline flooding mechanisms. Typical field injection data like alkaline injection concentrations and

volumes, and field application conditions are discussed. Finally, we present two mobility-control cases in Russia, one case using high alkaline concentration in Hungary, one caustic-flooding case in India, three cases in the United States, and one case in a Canadian heavy oil field.

Enhanced Oil Recovery Field Case

Studies Elsevier Inc. Chapters Formation Damage during Improved Oil Recovery: Fundamentals and Applications bridges the gap between theoretical knowledge and field practice by presenting information on formation damage issues that arise during enhanced oil recovery. Multi-contributed technical chapters include sections on modeling and simulation, lab experiments, field case studies, and

newly proposed technologies and methods that are related to formation damage during secondary and tertiary recovery processes in both conventional and unconventional reservoirs. Focusing on both the fundamental theories related to EOR and formation damage, this reference helps engineers formulate integrated and systematic designs for applying EOR processes while also considering formation damage issues. Presents the first complete reference addressing formation damage as a result of enhanced oil recovery Provides the mechanisms for formation damage issues that are coupled with EOR Suggests appropriate preventative actions or responses Delivers a structured approach on how to understand the fundamental theories,

practical challenges and solutions

Chemical Enhanced Oil Recovery

Elsevier Inc. Chapters

This chapter presents microbial-enhanced oil recovery (MEOR) mechanisms first. Microbes and nutrients used in MEOR are introduced. Screening criteria are listed. Finally, several microbial field applications are presented. These applications include single-well microbial huff-and-puff, microbial waterflooding, wellbore stimulation to remove wellbore or formation damage, and MEOR using indigenous microbes.

Enhanced Oil Recovery Field Case

Studies Elsevier Inc. Chapters

Crude oil development and production in U.S. oil reservoirs can include up to three distinct phases: primary, secondary, and

tertiary (or enhanced) recovery. During primary recovery, the natural pressure of the reservoir or gravity drive oil into the wellbore, combined with artificial lift techniques (such as pumps) which bring the oil to the surface. But only about 10 percent of a reservoir's original oil in place is typically produced during primary recovery. Secondary recovery techniques to the field's productive life generally by injecting water or gas to displace oil and drive it to a production wellbore, resulting in the recovery of 20 to 40 percent of the original oil in place. In the past two decades, major oil companies and research organizations have conducted extensive theoretical and laboratory EOR (enhanced oil recovery) researches, to include validating pilot and field trials relevant to

much needed domestic commercial application, while western countries had terminated such endeavours almost completely due to low oil prices. In recent years, oil demand has soared and now these operations have become more desirable. This book is about the recent developments in the area as well as the technology for enhancing oil recovery. The book provides important case studies related to over one hundred EOR pilot and field applications in a variety of oil fields. These case studies focus on practical problems, underlying theoretical and modelling methods, operational parameters (e.g., injected chemical concentration, slug sizes, flooding schemes and well spacing), solutions and sensitivity studies, and performance optimization strategies.

The book strikes an ideal balance between theory and practice, and would be invaluable to academicians and oil company practitioners alike. Updated chemical EOR fundamentals providing clear picture of fundamental concepts Practical cases with problems and solutions providing practical analogues and experiences Actual data regarding ranges of operation parameters providing initial design parameters Step-by-step calculation examples providing practical engineers with convenient procedures

Enhanced Oil Recovery Field Case Studies Gulf Professional Publishing

Enhanced Oil Recovery Field Case Studies bridges the gap between theory and practice in a range of real-world EOR settings. Areas covered include steam

and polymer flooding, use of foam, in situ combustion, microorganisms, "smart water"-based EOR in carbonates and sandstones, and many more. Oil industry professionals know that the key to a successful enhanced oil recovery project lies in anticipating the differences between plans and the realities found in the field. This book aids that effort, providing valuable case studies from more than 250 EOR pilot and field applications in a variety of oil fields. The case studies cover practical problems, underlying theoretical and modeling methods, operational parameters, solutions and sensitivity studies, and performance optimization strategies, benefitting academicians and oil company practitioners alike. Strikes an ideal balance between theory and

practice Focuses on practical problems, underlying theoretical and modeling methods, and operational parameters Designed for technical professionals, covering the fundamental as well as the advanced aspects of EOR Elsevier Inc. Chapters Cold production is a solution-gas drive process in which a reservoir saturated with live heavy oil reservoir is depleted as quickly as possible to generate relatively stable gas bubbles leading to higher oil recoveries (5–10% original oil in place (OOIP)) than for light oils (2–5% OOIP). More specifically, these bubbles increase the oil/gas mixture compressibility, which maintains the reservoir pressures for longer times than for light oils. *Formation Damage During Improved Oil*

Recovery Elsevier Inc. Chapters

This chapter first reviews the mechanisms, theories, and screening criteria of cyclic steam stimulation (CSS) projects. Then we will focus on the practice of CSS projects. Finally field cases are presented which include Cold Lake in Alberta, Canada, Midway Sunset in California, Du 66 block in the Liaohe Shuguang field, Jin 45 Block in the Liaohe Huanxiling field, Gudao Field, Blocks 97 and 98 in the Karamay field, and Gaosheng Field in China.

Chemical Nanofluids in Enhanced Oil Recovery Gulf Professional Publishing

This chapter presents models of wettability alteration using surfactants and upscaling models related to oil recovery in fractured carbonate reservoirs. Chemicals used in carbonate

reservoirs are reviewed. The presented field cases where surfactants were used to stimulate oil recovery are the Mauddud carbonate in Bahrain, the Yates field and the Cretaceous Upper Edwards reservoir in Texas, the Cottonwood Creek field in Wyoming, and the Baturaja formation in the Semoga field in Indonesia.

Enhanced Oil Recovery Field Case Studies BoD – Books on Demand

In this chapter, the fundamentals of surfactant flooding are covered, which include microemulsion properties, phase behavior, interfacial tension, capillary desaturation, surfactant adsorption and retention, and relative permeabilities. The surfactant-polymer interactions are discussed. The mechanisms and screening criteria are briefly discussed.

The field cases presented include low-tension waterflooding (Loma Novia, Wichita County Regular field), sequential micellar/polymer flooding (El Dorado, Sloss), micellar/polymer flooding (Torchlight and Delaware-Childers), and Minas SP project preparation and SP flooding (Gudong).

Enhanced Oil Recovery Field Case Studies Gulf Professional Publishing

This chapter introduces the reader to the fundamentals of field implementation for chemical EOR projects. Chemical handling, processing, and injection schemes are discussed and current-day facilities and equipment systems are shown from actual projects. Design requirements for processing polymer, alkaline agents, and surfactants provide the reader with an understanding of

special considerations for facility process flow design, materials of construction, project logistics, and daily operations. Useful spreadsheets for calculating chemical consumption rates and polymer system design basics are shown. Basic water quality issues are introduced for polymer, surfactant-polymer, alkaline-polymer, and alkaline-surfactant-polymer projects.

Enhanced Oil Recovery Field Case Studies

Gulf Professional Publishing Commercial application of chemical enhanced oil recovery (cEOR) processes is expected to grow significantly over the next decade. Thus, Chemical Enhanced Oil Recovery (cEOR): A Practical Overview offers key knowledge and understanding of cEOR processes using an evidence-based approach intended

for a broad audience ranging from field operators, researchers, to reservoir engineers dealing with the development and planning of cEOR field applications. This book is structured into three sections; the first section surveys overall EOR processes. The second section focuses on cEOR processes, while the final section describes the electrorheology technology. These sections are presented using a practical and realistic approach tailored for readers looking to improve their knowledge and understanding of cEOR processes in a nutshell.

Fundamentals of Enhanced Oil and Gas Recovery from Conventional and

Unconventional Reservoirs Elsevier Inc.

Chapters

Sustainable world economy requires a

steady supply of crude oil without any production constraints. Thus, the ever-increasing energy demand of the entire world can be mostly met through the enhanced production from crude oil from existing reservoirs. With the fact that newer reservoirs with large quantities of crude oil could not be explored at a faster pace, it will be inevitable to produce the crude oil from matured reservoirs at an affordable cost. Among alternate technologies, the chemical enhanced oil recovery (EOR) technique has promising potential to recover residual oil from matured reservoirs being subjected to primary and secondary water flooding operations. Due to pertinent complex phenomena that often have a combinatorial role and influence, the implementation of

chemical EOR schemes such as alkali/surfactant/polymer flooding and their combinations necessitates upon a fundamental understanding of the potential mechanisms and their influences upon one another and desired response variables. Addressing these issues, the book attempts to provide useful screening criteria, guidelines, and rules of thumb for the identification of process parametric sets (including reservoir characteristics) and response characteristics (such as IFT, adsorption etc.) that favor alternate chemical EOR systems. Finally, the book highlights the relevance of nanofluid/nanoparticle for conventional and unconventional reservoirs and serves as a needful resource to understand the emerging oil recovery technology. Overall, the

volume will be of greater relevance for practicing engineers and consultants that wish to accelerate on field applications of chemical and nano-fluid EOR systems. Further, to those budding engineers that wish to improvise upon their technical know-how, the book will serve as a much-needed repository. Chemical Enhanced Oil Recovery Simulation in Highly Stratified Heterogeneous Reservoir Elsevier Inc. Chapters
This chapter describes polymer flooding applications as a mobility control and profile modification process to enhance oil recovery from mature fields. Successful experience from the Daqing Oilfield, the largest oil field application of polymer flooding, is summarized. The experience will be of considerable value

to future polymer flood applications elsewhere in oil fields with appropriate reservoir conditions. Based on laboratory research and field applications at Daqing, technologies were developed that expand conventional ideas concerning favorable conditions for mobility improvement by polymer flooding. These include: 1. The oil strata and well pattern design should be optimized and integrated considering interwell connectivity and permeability differential among the oil zones. 2. The injection procedures and formulation are the key points when designing a polymer project—such as profile modification before polymer injection and zone isolation during polymer injection, higher molecular weight (MW) of the polymer used in the injected slugs, large polymer

bank size, higher polymer concentrations and injection rate based on the well spacing, and injection pressure. 3. Surface mixing, injection facilities, oil production, and produced water treatment are important to reservoir engineering aspects of polymer flooding.

Enhanced Oil Recovery Field Case Studies

The importance of oil in the world economy cannot be overstated, and methods for recovering oil will be the subject of much scientific and engineering research for many years to come. Even after the application of primary depletion and secondary recovery processes (usually waterflooding), much oil usually remains in a reservoir, and indeed in some

heterogeneous reservoir systems as much as 70% of the original oil may remain. Thus, there is an enormous incentive for the development of improved or enhanced methods of oil recovery, aimed at recovering some portion of this remaining oil. The techniques used range from 'improved' secondary flooding methods (including polymer and certain gas injection processes) through to 'enhanced' or 'tertiary' methods such as chemical (surfactant, caustic, foam), gas miscible (carbon dioxide, gas reinjection) and thermal (steam soak and drive, in-situ combustion). The distinction between the classification of the methods usually refers to the target oil that the process seeks to recover. That is, in 'improved' recovery we are usually aiming to

increase the oil sweep efficiency, whereas in 'tertiary' recovery we aim to mobilise and recover residual or capillary trapped oil. There are a few books and collections of articles which give general overviews of improved and enhanced oil recovery methods. However, for each recovery method, there is such a wide range of interconnected issues concerning the chemistry, physics and fluid mechanics of flow in porous media, that rarely are these adequately reviewed.

Enhanced Oil Recovery Field Case Studies Elsevier Inc. Chapters

This chapter first summarizes the fundamentals about foams used in enhancing oil recovery. These fundamentals include characteristics of foams, foam stability, mechanisms of

foam flooding to enhance oil recovery, and foam flow behavior. Foam application modes and the factors that need to be considered in designing foam flooding applications are discussed.

Some survey results about foam projects are summarized. Finally, several field application cases to enhance oil recovery are presented.

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