

DEVELOPMENTS IN PETROLEUM SCIENCE 31

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# **microbial enhancement of oil recovery - recent advances**

**E.C. DONALDSON**

(EDITOR)

**ELSEVIER**



# Microbial Enhancement Of Oil Recovery Recent Advances

**Erle C. Donaldson**



## **Microbial Enhancement Of Oil Recovery Recent Advances:**

*Microbial Enhancement of Oil Recovery - Recent Advances* E.T. Premuzic, A. Woodhead, 1993-07-23 This volume is concerned with many aspects of petroleum microbiology and biochemistry all with strong commercial applications Worldwide research on the major topic MEOR Microbially Enhanced Oil Recovery is comprehensively covered under experimental work field applications and modeling The challenge of formulating a complete in situ MEOR system microorganisms nutrient package and other amendments is explored together with the future needs in the design and execution of this new biotechnology

*Microbial Enhancement of Oil Recovery - Recent Advances* E.C. Donaldson, 1991-04-03 This conference was instituted to examine field activities in Microbial Enhancement of Oil Recovery The U S Department of Energy has sponsored several field projects and the details from some of these were presented as well as a few from industry The balance of the program was concerned with new developments in research Today's oil production technology leaves one third to one half of the original oil in place in the reservoir at abandonment of secondary recovery waterflooding This leaves a very large target for microbial enhanced oil recovery which was shown by the research papers of this conference to be capable of producing up to 50% of the residual oil The field trials show that the normal projected oil production decline curve can be reversed or leveled off by microbial enhancement of oil recovery This conference has shown that a variety of applications are possible to correct oilfield problems as well as to enhance oil recovery Among these is the suppression of hydrogen sulfide production which alone is a tremendous advance because of the large quantity of sour oil production If hydrogen sulfide production can be curtailed it would increase the value of the produced oil decrease its toxicity and largely decrease its corrosiveness All of these would be welcome both in the field and at the petroleum refinery where special precautions must be taken to process sour crude oil Another very important discovery is the ability of certain bacteria to eliminate paraffin deposition around the producing well and in the tubulars This is a welcome improvement for many producers who have considerable difficulty in controlling paraffin deposition

**Microbial Enhancement of Oil Recovery** Eugene T. Premuzic, Avril D. Woodhead, 1993 *Applied Microbiology and Molecular Biology in Oilfield Systems* Corinne Whitby, Torben Lund Skovhus, 2010-10-13 *Applied Microbiology and Molecular Biology in Oil Field Systems* addresses the major problems microbes cause in oil fields e.g. biocorrosion and souring and how beneficial microbial activities may be exploited e.g. MEOR and biofuels The book describes theoretical and practical approaches to specific Molecular Microbiological Methods MMM and is written by leading authorities in the field from both academia and industry The book describes how MMM can be applied to facilitate better management of oil reservoirs and downstream processes The book is innovative in that it utilises real industrial case studies which gives useful technical and scientific information to researchers engineers and microbiologists working with oil gas and petroleum systems

**Theory and Practice in Microbial Enhanced Oil Recovery** Kun Sang Lee, Tae-Hyuk Kwon, Taehyung Park, Moon Sik Jeong, 2020-07-18 Selection of the optimal

recovery method is significantly influenced by economic issues in today's oil and gas markets. Consequently, the development of cost-effective technologies which bring maximum oil recovery is the main interest in today's petroleum research communities. Theory and Practice in Microbial Enhanced Oil Recovery provides the fundamentals, latest research, and creditable field applications. Microbial Enhanced Oil Recovery (MEOR) is potentially a low-priced and eco-friendly technique in which different microorganisms and their metabolic products are implemented to recover the remaining oil in the reservoir. Despite drastic advantages of MEOR technology, it is still not fully supported in the industry due to lack of knowledge on microbial activities and their complexity of the process. While some selected strategies have demonstrated the feasibility to be used on a mass scale through both lab and field trials, more research remains to implement MEOR into more oil industry practices. This reference delivers comprehensive descriptions on the fundamentals, including basic theories on geomicrobiology, experiments and modeling, as well as current tested field applications. Theory and Practice in Microbial Enhanced Oil Recovery gives engineers and researchers the tool needed to stay up to date on this evolving and more sustainable technology. Covers fundamental screening criteria and theories, selective plugging, and mobility control mechanisms. Describes the basic effects on environmental parameters and the mechanics of simulation, including microbial growth kinetics. Applies up to date practical applications proven in both the lab and the field.

**Microbial Enhancement of Oil Recovery** Erle C. Donaldson, 1991. This conference was instituted to examine field activities in Microbial Enhancement of Oil Recovery. The U.S. Department of Energy has sponsored several field projects, and the details from some of these were presented, as well as a few from industry. The balance of the program was concerned with new developments in research. Today's oil production technology leaves one third to one half of the original oil in place in the reservoir at abandonment of secondary recovery waterflooding. This leaves a very large target for microbial enhanced oil recovery, which was shown by the research papers of this conference to be capable of producing up to 50% of the residual oil. The field trials show that the normal projected oil production decline curve can be reversed or leveled off by microbial enhancement of oil recovery. This conference has shown that a variety of applications are possible to correct oilfield problems, as well as to enhance oil recovery. Among these is the suppression of hydrogen sulfide production, which alone is a tremendous advance because of the large quantity of sour oil production. If hydrogen sulfide production can be curtailed, it would increase the value of the produced oil, decrease its toxicity, and largely decrease its corrosiveness. All of these would be welcome both in the field and at the petroleum refinery, where special precautions must be taken to process sour crude oil. Another very important discovery is the ability of certain bacteria to eliminate paraffin deposition around the producing well and in the tubulars. This is a welcome improvement for many producers who have considerable difficulty in controlling paraffin deposition.

*Petroleum Engineer's Guide to Oil Field Chemicals and Fluids* Johannes Fink, 2015-08-31. The oil and gas engineer on the job requires knowing all the available oil field chemicals and fluid applications that are applicable to the operation. Updated with the

newest technology and available products Petroleum Engineer s Guide to Oil Field Chemicals and Fluids Second Edition delivers all the necessary lists of chemicals by use their basic components benefits and environmental implications In order to maintain reservoir protection and peak well production performance operators demand to know all the options that are available Instead of searching through various sources Petroleum Engineer s Guide to Oil Field Chemicals and Fluids Second Edition presents a one stop non commercialized approach by organizing the products by function matching the chemical to the process for practical problem solving and extending the coverage with additional resources and supportive materials Covering the full spectrum including fluid loss additives drilling muds cement additives and oil spill treating agents this must have reference answers to every oil and gas operation with more options for lower costs safer use and enhanced production Effectively locate and utilize the right chemical application specific to your oil and gas operation with author s systematic approach by use Gain coverage on all oil field chemicals and fluids needed throughout the entire oil and gas life cycle including drilling production and cementing Understand environmental factors and risks for oil field chemicals along with pluses and minuses of each application to make the best and safest choice for your operation Challenges and Recent

Advances in Sustainable Oil and Gas Recovery and Transportation Sanket Joshi,Prashant Jadhawar,Asheesh Kumar,2023-03-10 Challenges and Recent Advances in Sustainable Oil and Gas Recovery and Transportation delivers a critical tool for today s petroleum and reservoir engineers to learn the latest research in EOR and solutions toward more SDG supported practices Packed with methods and case studies the reference starts with the latest advances such as EOR with polymers and EOR with CCS Advances in shale recovery and methane production are also covered before layering on sustainability methods on critical topics such as oilfield produced water Supported by a diverse group of contributors this book gives engineers a go to source for the future of oil and gas The oil and gas industry are utilizing enhanced oil recovery EOR methods frequently but the industry is also tasked with making more sustainable decisions in their future operations Provides the latest advances in enhanced oil recovery EOR including EOR with polymers EOR with carbon capture and sequestration CCS and hybrid EOR approaches Teaches options in recovery and transport such as shale recovery and methane production from gas hydrate reservoirs Includes sustainability methods such as biological souring and oil field produced water solutions **Energy Research Abstracts** ,1993 Semiannual with semiannual and annual indexes

References to all scientific and technical literature coming from DOE its laboratories energy centers and contractors Includes all works deriving from DOE other related government sponsored information and foreign nonnuclear information Arranged under 39 categories e g Biomedical sciences basic studies Biomedical sciences applied studies Health and safety and Fusion energy Entry gives bibliographical information and abstract Corporate author subject report number indexes

**Introduction to Enhanced Oil Recovery (EOR) Processes and Bioremediation of Oil-Contaminated Sites** Laura Romero-Zerón,2012-05-23 This book offers practical concepts of EOR processes and summarizes the fundamentals of

bioremediation of oil contaminated sites The first section presents a simplified description of EOR processes to boost the recovery of oil or to displace and produce the significant amounts of oil left behind in the reservoir during or after the course of any primary and secondary recovery process it highlights the emerging EOR technological trends and the areas that need research and development while the second section focuses on the use of biotechnology to remediate the inevitable environmental footprint of crude oil production such is the case of accidental oil spills in marine river and land environments The readers will gain useful and practical insights in these fields      *Chemical Enhanced Oil Recovery (cEOR)* Laura Romero-Zerón, 2016-10-19 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** Alireza Bahadori, 2018-08-18 Fundamentals of Enhanced Oil and Gas Recovery from Conventional and Unconventional Reservoirs delivers the proper foundation on all types of currently utilized and upcoming enhanced oil recovery including methods used in emerging unconventional reservoirs Going beyond traditional secondary methods this reference includes advanced water based EOR methods which are becoming more popular due to CO<sub>2</sub> injection methods used in EOR and methods specific to target shale oil and gas activity Rounding out with a chapter devoted to optimizing the application and economy of EOR methods the book brings reservoir and petroleum engineers up to speed on the latest studies to apply Enhanced oil recovery continues to grow in technology and with ongoing unconventional reservoir activity underway enhanced oil recovery methods of many kinds will continue to gain in studies and scientific advancements Reservoir engineers currently have multiple outlets to gain knowledge and are in need of one product go to reference Explains enhanced oil recovery methods focusing specifically on those used for unconventional reservoirs Includes real world case studies and examples to further illustrate points Creates a practical and theoretical foundation with multiple contributors from various backgrounds Includes a full range of the latest and future methods for enhanced oil recovery including chemical waterflooding CO<sub>2</sub> injection and thermal

**Economically and Environmentally Sustainable Enhanced Oil Recovery** M. R. Islam, 2020-03-17 There have been many books on the topic of Enhanced Oil Recovery EOR over the last 100 years They all however focus on how to recover more oil faster taking a rather myopic approach The solutions presented all work fantastically in theory and even in the laboratory but each fails to produce results in the field with long term success The petroleum industry is almost resigned to

the belief that for an EOR technique to be successful it must be propped up with public funds or must compromise environmental integrity. In line with modern engineering practices, previous books discuss how existing technologies can be tweaked to accommodate for any shortcomings that just came to light. This book is unlike any other book on the topic of recovery in particular and engineering in general. This groundbreaking volume is a continuation of the author's and his research group's work that started publishing on the subject of global sustainability involving energy and the environment dating back to early 2000s. Starting with a paradigm shift in engineering that involves a long term focus rather than looking for short term solutions, the methods and theories presented here delve into applying green engineering and zero waste principles to EOR. Historically, EOR has received mixed success mainly because innovations in these disciplines relied heavily on processed materials which are both uneconomical and toxic to the environment. This book explains how engineers missed entirely the causes of unsustainability in these technologies due to the prevalence of many myths that are embedded in modern engineering. Once these myths are deconstructed, the appropriate technologies emerge and the merits of them both in terms of economic and environmental benefits become clear. The book reveals how previous practices in EOR can be replaced with their sustainable versions while saving in material costs. A number of innovative technologies are introduced that can render well known technologies such as steam flood, in situ combustion, chemical flooding, and microbial EOR environmentally sustainable and economically attractive. A triple dividend is received once these technologies are applied in otherwise marginal reservoirs, unconventional plays, and even abandoned formations. The overall reserve which reflects recoverable oil with new technologies goes up drastically. Further benefits are drawn when processes such as value addition of waste material is performed. Overall, this book shows how EOR can be rendered green while increasing the profitability. This is in stark contrast to the past practices that considered environmental integrity as a drain on profitability. This book proves that a paradigm shift can turn a technological disaster into a technological marvel.

**Microbial Enhancement of Oil Recovery**, 1992. During recent years, systematic scientific and engineering effort by researchers in the United States and abroad has established the scientific basis for Microbial Enhanced Oil Recovery (MEOR) technology. The successful application of MEOR technology as an oil recovery process is a goal of the Department of Energy (DOE). Research efforts involving aspects of MEOR in the microbiological, biochemical, and engineering fields led DOE to sponsor an International Conference at Brookhaven National Laboratory in 1992 to facilitate the exchange of information and a discussion of ideas for the future research emphasis. At this the Fourth International MEOR Conference, where international attendees from 12 countries presented a total of 35 papers, participants saw an equal distribution between research and field applications. In addition, several modeling and state-of-the-art presentations summed up the present status of MEOR science and engineering. Individual papers in this proceedings have been processed separately for inclusion in the Energy Science and Technology Database.

**Microbial Enhanced Oil Recovery** Lalit Pandey, Pankaj Tiwari, 2021-10-21. This book presents the

fundamentals of the reservoir and interfacial engineering The book systematically starts with the basics of primary secondary and tertiary enhanced oil recovery and emphasizes on the theory of microbial enhanced oil recovery MEOR and its potential toward recovery of oil in place Different approaches of MEOR such as in situ ex situ and integration of chemical and microbial enhanced oil recovery EOR are discussed in detail This book highlights the link between the effectiveness of MEOR and the local reservoir conditions crude oil characteristics and indigenous microbial community The latest implementations of MEOR across the globe are highlighted as case studies to outline the potential as well as the scope of MEOR Given the topics covered this book will be useful for professionals and researchers working in the areas of petroleum science and engineering chemical engineering biotechnology bioengineering and other related fields

**Biotechnology - The Science and the Business** Derek G. Springham,Vivian Moses,Ronald E. Cape,2020-08-18 Biotechnology has not stood still since 1991 when the first edition of Biotechnology The Science and the Business was published It was the first book to treat the science and business of technology as an integrated subject and was well received by both students and business professionals All chapters in this second edition have been updated and revised and some new chapters have been introduced including one on the use of molecular genetic techniques in forensic science Experts in the field discuss a range of biotechnologies including pesticides the flavor and fragrance industry oil production fermentation and protein engineering On the business side subjects include managing financing and regulation of biotechnology Some knowledge of the science behind the technologies is assumed as well as a layperson s view of buying and selling As with the first edition it is expected that this book will be of interest to biotechnology undergraduates postgraduates and those working in the industry along with students of business economics intellectual property law and communications

**Advances in Applied Microbiology** ,2009-03-11 Published since 1959 Advances in Applied Microbiology continues to be one of the most widely read and authoritative review sources in microbiology The series contains comprehensive reviews of the most current research in applied microbiology Recent areas covered include bacterial diversity in the human gut protozoan grazing of freshwater biofilms metals in yeast fermentation processes and the interpretation of host pathogen dialogue through microarrays Eclectic volumes are supplemented by thematic volumes on various topics including Archaea and sick building syndrome Impact factor for 2007 1 821 Contributions from leading authorities and industry experts Informs and updates on all the latest developments in the field Reference and guide for scientists and specialists involved in advancements in applied microbiology

**National Energy Strategy: Enhanced oil recovery** United States. Congress. House. Committee on Interior and Insular Affairs. Subcommittee on Energy and the Environment,1992

**The Practice of Reservoir Engineering** L.P. Dake,2013-10-22 The Practice of Reservoir Engineering has been written for those in the oil industry requiring a working knowledge of how the complex subject of hydrocarbon reservoir engineering can be applied in the field in a practical manner The book is a simple statement of how to do the job and is particularly suitable for reservoir production

engineers and is illustrated with 27 examples and exercises based mainly on actual field developments It will also be useful for those associated with the subject of hydrocarbon recovery Geoscientists petrophysicists and those involved in the management of oil and gas fields will also find it particularly relevant The new <http://www.elsevier.nl/locate/0444506705> Practice of Reservoir Engineering Revised Edition will be available soon

**Studies in Abnormal Pressures** W.H. Fertl, R.E. Chapman, R.F. Hotz, 1994-02-01 When Fertl's first book Abnormal Formation Pressures was published by Elsevier in 1976 the topic was relatively new in book form In the years that followed his book became the standard work for petroleum engineers and drillers The list of major petroleum provinces with abnormally high pore pressures has grown steadily over the years and with it has grown our knowledge and experience There have also been technological advances A new book was required but no longer could the topic be covered adequately by one person The problems of abnormally high formation pressures encountered in the subsurface while drilling for petroleum are very diverse involving geologists geophysicists reservoir engineers drilling engineers and borehole logging engineers The acute anticipation of such pressures before drilling has become possible with modern technology This book treats these developments and covers the following topics world occurrences the geology of abnormal pore pressures and the background theory reservoir engineering aspects of abnormally pressured reservoirs detection of abnormal pressures by geophysical methods before drilling and during drilling and their evaluation after drilling It examines the special problems of shallow hazards from shallow abnormal pressures and relief well engineering to control blowouts It also examines the generation of abnormal pressures from hydrocarbon generation in the Rocky Mountains and the distribution of abnormal pressures in south Louisiana USA The topics are examined from a practical point of view with a theoretical background There is a glossary of terms and a relevant practical conversion table Both SI units and the conventional US oil industry units are used

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