

## Applied Petroleum Geochemistry

*This book discusses the progress that is being made through innovations in instrumental measurements of geologic and geochemical systems and their study using modern mathematical modeling. It covers the systems approach to understanding sedimentary rocks and their role in evolution and containment of subsurface fluids. Fundamental aspects of petroleum geology and geochemistry, generation, migration, accumulation, evaluation and production of hydrocarbons are discussed with worldwide examples. Various physical and chemical properties of subsurface waters, crude oils and natural gases are described which is especially important to production engineering. Among various properties of liquid and gaseous hydrocarbons the most important are wettability affecting production characteristics and ultimate recovery: relative permeability affecting reservoir fluid flow to the production wells; density differences between immiscible fluids which affects gravity drainage; viscosity of subsurface fluids affecting the relative mobility of each fluid; and fluid chemistry, which affects the absorption, ultimate recovery and monetary value of produced hydrocarbons. Discussion of the formation and accumulation of hydrocarbons includes (1) the changes in the chemical composition of hydrocarbons that originate from the debris of living plants and organisms to form crude oil and natural gas; (2) the origin of hydrocarbons in different areas of a single reservoir; (3) the conditions, which determine the distribution of water, oil and gas in the reservoir; (4) the migration of subsurface fluids until they eventually accumulate in isolated traps; (5) discussion of the traps as a function of sedimentary geology and tectonics. This is based on the systems approach to the specific geologic and geochemical systems using analytical and statistical principles and examples of modern mathematical modeling of static and dynamic systems. \* Discusses fundamental aspects of petroleum geology and geochemistry, and generation, migration, accumulation, evaluation and production of hydrocarbons \* Presents a systems approach to the specific geologic and geochemical systems*

*This edited volume is based on the best papers accepted for presentation during the 1st Springer Conference of the Arabian Journal of Geosciences (CAJG-1), Tunisia 2018. The book is of interest to all researchers in the fields of petroleum engineering, reservoir engineering and petroleum geochemistry. The MENA region accounts for more than 50 percent of the world's hydrocarbon reserves. Despite being the largest oil and gas producer of the world, the MENA countries face routine problems regarding petroleum engineering, reservoir modelling and production optimization. This volume offers an overview of the latest information and ideas regarding reservoir engineering, petrophysical engineering, petroleum system modelling, non-conventional energy resources and environmental impact of oil production. Main topics include: 1. Advances in petrophysical characterization of reservoir rocks 2. Enhanced oil recovery methods 3. Advances in petroleum exploration and management 4. Evaluation of*

*hydrocarbon source potential and petroleum system modeling*<sup>5</sup>. *Non-conventional energy resources*

*This book aims to explore basic principles, concepts and applications of geochemistry. Topics include chemical weathering, impacts on living beings and water, geochemical cycles, oxidation and redox reactions in geochemistry, isotopes, analytical techniques, medicinal, inorganic, marine, atmospheric, and environmental applications, as well as case studies. This book helps in understanding the chemical composition of the earth and its applications. It also includes beneficial effects, bottlenecks, solutions, and future directions in geochemistry.*

*The first volume in this new text book series covers comprehensively relevant aspects related to the appearance and characterisation of fossil matter in the geosphere such as kerogen, oil, shales and coals. As organic geochemistry is a modern scientific subject characterized by a high transdisciplinarity and located at the edge of chemistry, environmental sciences, geology and biology, there clearly is a need for a flexible offer of appropriate academic teaching material on an undergraduat level addressed to the variety of students coming originally from different study disciplines. For such a flexible usage this textbook series' consists of different volumes with clear defined aspects and with manageable length.*

*Proceedings of the 13th International Meeting on Organic Geochemistry, Venice, Italy 21-25 September 1987*

*Earth's System Processes*

*Petroleum Formation and Occurrence*

*Organic facies and palynofacies*

*A Primer Focused on Marcellus Exploration and Development in the Appalachian Basin*

*This text clearly integrates the contributions of geology, geophysics and other branches of geoscience into one complete, definitive volume. Abundant tables and figures, chapter summaries and references contribute to the book's clarity and comprehensiveness.*

*Since the 3rd edition of this publication, emphasis within the petroleum industry has shifted from exploration to appraisal and development of existing hydrocarbon resources. This change is reflected in this new 4th edition, which has been significantly expanded to accomodate additional material. The centrepiece of the book, however, remains a series of descriptions, in stratigraphic order, of the depositional history and hydrocarbon related rock units of the North Sea.*

*As this is the first general textbook for the field published in over twenty years, the editors have taken great care to make sure coverage is comprehensive. Diagenesis of organic matter, kerogens, exploration for fossil fuels, and*

many other subjects are discussed in detail to provide faculty and students with a thorough introduction to organic geochemistry.

A comprehensive handbook of analytical techniques in geochemistry which provides the student and the professional with an understanding of the wide spectrum of different analytical methods that can be applied to Earth and environmental materials, together with a critical appreciation of their relative merits and limitations.

**Practical Petroleum Geochemistry for Exploration and Production**

**Petroleum Geochemistry**

**Concepts and Applications**

**Petroleum Geology of the North Sea**

**Elements of Petroleum Geology**

**Molecular Geochemistry Applied to Petroleum Systems (North Slope, Alaska) and Environmental (oil Spills) Studies**

"Practical Petroleum Geochemistry for Exploration and Production" provides readers with a single reference that addresses the principle concepts and applications of petroleum geochemistry used in finding, evaluating, and producing petroleum deposits. Today, there are few reference books available on how petroleum geochemistry is applied in exploration and production written specifically for geologists, geophysicists, and petroleum engineers. This book fills that void and is based on training courses that the author has developed over his 37-year career in hydrocarbon exploration and production. Specific topical features include the origin of petroleum, deposition of source rock, hydrocarbon generation, and oil and gas migrations that lead to petroleum accumulations. Also included are descriptions on how these concepts are applied to source rock evaluation, oil-to-oil, and oil-to-source rock correlations, and ways of interpreting natural gas data in exploration work. Finally, a thorough description on the ways petroleum geochemistry can assist in development and production work, including reservoir continuity, production allocation, and EOR monitoring is presented. Authored by an expert in petroleum geochemistry, this book is the ideal reference for any geoscientist looking for exploration and production content based on extensive field-based research and expertise. Emphasizes the practical application of geochemistry in solving exploration and production problems. Features more than 200 illustrations, tables, and diagrams to underscore key concepts. Authored by an expert geochemist that has nearly 40 years of experience in field-based research, applications, and instruction. Serves as a refresher reference for geochemistry specialists and non-specialists alike.

Elements of Petroleum Geology, Fourth Edition is a useful primer for geophysicists, geologists and petroleum engineers in the oil industry who wish to expand their knowledge beyond their specialized area. It is also an excellent introductory text for a university course in petroleum geoscience. This updated edition includes new case studies on non-conventional exploration, including tight oil and shale gas exploration, as well as coverage of the impacts on petroleum geology on the environment. Sections

on shale reservoirs, flow units and containers, IOR and EOR, giant petroleum provinces, halo reservoirs, and resource estimation methods are also expanded. Written by a preeminent petroleum geologist and sedimentologist with decades of petroleum exploration in remote corners of the world Covers information pertinent to everyone working in the oil and gas industry, especially geophysicists, geologists and petroleum reservoir engineers Fully revised with updated references and expanded coverage of topics and new case studies

This book presents new insights into the development of different aspects of petroleum science and engineering. The book contains 19 chapters divided into two main sections: (i) Exploration and Production and (ii) Environmental Solutions. There are 11 chapters in the first section, and the focus is on the topics related to exploration and production of oil and gas, such as characterization of petroleum source rocks, drilling technology, characterization of reservoir fluids, and enhanced oil recovery. In the second section, the special emphasis is on waste technologies and environmental cleanup in the downstream sector. The book written by numerous prominent scholars clearly shows the necessity of the multidisciplinary approach to sustainable development in the petroleum industry and stresses the most updated topics such as EOR and environmental cleanup of fossil fuel wastes.

Petroleum geochemistry has turned out to be more than another step in the direction to quantify geology and geosciences in general. Petroleum geochemistry as it is today may very well be the triggering event that brings the other branches of geosciences like sedimentology, stratigraphy, structural geology, geophysics and others to a fruitful synthesis as evidenced by integrated basin studies.

Geochemical Investigations in Earth and Space Sciences

Applied Petroleum Geomechanics

U.S. Geological Survey Bulletin

The Petroleum System

Advances in Petroleum Engineering and Petroleum Geochemistry

General Information and Price List

Understanding the origin and fate of hydrocarbons in the subsurface was the major endeavor of organic geochemists during the second half of the twentieth century. They succeeded to the point where the deciphered interplaying of elements and processes paved the way for the revolutionary concept of the petroleum system, a unifying paradigm that plays an important role in decision making associated with oil and gas exploration. The chemistry and physics involved have been addressed in a quantitative way and integrated into the other aspects of petroleum geology, giving rise to the development of numerical basin modeling. This book has been designed to offer an overview of different aspects of the geochemistry of fossil fuels, in particular the functioning of a petroleum system. In this respect, it can be viewed as a foundation for approaching basin modeling. This book will be of interest to a large audience including specialists in the field, nonspecialist professionals, and undergraduate and graduate students.

The application of surface geochemical methods to finding petroleum is based on the detection of hydrocarbons in the soil that have leaked from a petroleum reservoir at depth. While the seal over the deposit was once considered impermeable, surface geochemistry data now show that such leakage is a common occurrence. Despite its simplicity and low costs, surface geochemistry remains controversial because, until now, there was no objective and in-depth treatment of the various methods of surface geochemistry for oil exploration. Written by a

successful oil finder, this practical guide: \* surveys a broad array of surface geochemistry techniques, from soil gases to microbiology, and provides clear strategies for applying them to the high-stakes art of petroleum exploration \* offers numerous case studies, both successes and failures, to show the strengths and weaknesses of different approaches \* examines statistical and spatial variation, surveys and models in surface geochemistry, demonstrating how each analytical tool can be used to optimize accuracy \* integrates surface geochemistry data interpretation with data from conventional methods of oil exploration, and considers the economics of surface geochemical approaches \* discusses key topics that have been neglected in the literature, such as grid design and the effects of soils. Geologists, geophysicists, geological engineers and exploration managers involved in petroleum exploration will gain valuable insights from this volume. By presenting and evaluating each method of surface geochemistry in a neutral tone, this book enables the reader to select and employ these methods with greater confidence.

Current and authoritative with many advanced concepts for petroleum geologists, geochemists, geophysicists, or engineers engaged in the search for or production of crude oil and natural gas, or interested in their habitats and the factors that control them, this book is an excellent reference. It is recommended without reservation. AAPG Bulletin.

This book brings together the knowledge from a variety of topics within the field of geochemistry. The audience for this book consists of a multitude of scientists such as physicists, geologists, technologists, petroleum engineers, volcanologists, geochemists and government agencies. The topics represented facilitate as establishing a starting point for new ideas and further contributions. An effective management of geological and environmental issues requires the understanding of recent research in minerals, soil, ores, rocks, water, sediments. The use of geostatistical and geochemical methods relies heavily on the extraction of this book. The research presented was carried out by experts and is therefore highly recommended to scientists, under- and post-graduate students who want to gain knowledge about the recent developments in geochemistry and benefit from an enhanced understanding of the dynamics of the earth's system processes.

Sedimentary Organic Matter

Organic geochemistry applied to petroleum source potential and tectonic history of the Inner Moray Firth basin

Geochemistry of Fossil Fuels

Recent Insights in Petroleum Science and Engineering

Principles and Applications

Geochemistry

*This volume presents the most significant papers given during the 13th International Meeting in Organic Geochemistry. The intention of the publication is to provide the scholars of this science with its state-of-the-art and recent papers not only in academic research but above all in practical applications. Several papers attest to an increased use of organic geochemistry not only in the oil industry, during all phases of petroleum exploration, but also in the other research areas of coal origin and structure, metallogeny, sedimentology, molecular palaeontology, biochemistry and pollution. Practical Petroleum Geochemistry for Exploration and Production, Second Edition provides readers with a single reference that addresses the principle concepts and applications of petroleum geochemistry used in finding, evaluating, and producing petroleum deposits. The revised volume includes a new chapter on environmental*

*forensic applications of petroleum geochemistry. With the current emphasis on environmental issues (pollution, climate changes, and corporate responsibility), information about how petroleum geochemistry can be used to recognize these problems, determine their source, help identify who is responsible, and how these problems may be mitigated are vital to efficient and economical operation of a project from exploration to production to abandonment. Practical Petroleum Geochemistry for Exploration and Production, Second Edition will continue to serve as a foundational reference to understanding the underpinning of the science, as well as a source of references that the reader can use to find detailed descriptions of methods and protocols. Emphasizes the practical application of geochemistry in solving exploration and production problems Features more than 200 illustrations, tables, diagrams, and case studies to underscore key concepts Authored by an expert geochemist with over 40 years of experience in field-based research, applications, and instruction New edition includes a chapter on environmental issues (impact, climate change, pollution, and corporate responsibility), as well as expanded coverage of topics such as hydrates as unconventional resources; geomicrobial methods (especially DNA analysis) and the use of sea surface slicks from seafloor seeps in surface geochemistry; using GC x GC and asphaltene FTIR in oil correlation studies; and interpretation isotope data for the maturity of thermogenic natural gas*

*With demand for petroleum products increasing worldwide, there is a tendency for existing refineries to seek new approaches to optimize efficiency and throughput. In addition, changes in product specifications due to environmental regulations greatly influence the development of petroleum refining technologies. These factors underlie the need for t*

*This volume is the product of a technical session organized for the 2002 Geological Society of America Annual Meeting in recognition of Isaac Kaplan's many contributions to various fields of geochemistry. As Kaplan enters his sixth decade of scientific investigation, it is fair to say that his work has touched or influenced innumerable scientists either directly or indirectly. Readers of this volume are presented with a collection of 29 papers written by former students, post-doctoral researchers, friends and colleagues from countries all over the world (including Sweden, Japan, Taiwan, New Zealand, Australia, Israel and the United States) from the fields of stable isotope, forensic, environmental and petroleum geochemistry, atmospheric chemistry and cosmochemistry. The stable isotope section includes papers investigating climate change, diagenesis, recent sediment and petroleum geochemistry and cosmochemistry problems. The forensic and environmental geochemistry section includes a variety of papers ranging from trace metals in soils to atmospheric CO<sub>2</sub> projections. The petroleum geochemistry section includes both basic research and applied geochemistry papers. The ancient and recent sediments section contains papers ranging from carbon flux in modern sediments to Precambrian microfossils. All of the articles together cover a broad range of geochemical studies and represent the diverse and distinguished career of Isaac Kaplan.*

*Fossil Matter in the Geosphere*

*Applied Hydrodynamics in Petroleum Exploration*

*Volume 1*

*Applied Petroleum Geology and Geochemistry for Thermogenic Shale-gas Evaluation*

*Modern Analytical Geochemistry*  
*Illustrated Glossary of Petroleum Geochemistry*

A sound understanding of the global carbon cycle requires an appreciation of the various physico-chemical and biological processes that determine the production, distribution, deposition and diagenesis of organic matter in the natural environment. This book is a comprehensive interdisciplinary synthesis of this information, coupled with an organic facies approach based on data from both microscopy and bulk organic geochemistry.

This book reviews the present status of organic geochemistry and its application to Petroleum Exploration. It is intended to be as practical as possible with all aspects of geochemistry illustrated by a great number of examples taken from case histories from all over the world which show that geochemistry must be used in the framework of a good geological/geophysical background. This book is written for: petroleum geologists and geophysicists; managers who should integrate the impact of geochemistry in exploration decision-making; specialized geochemists who need an accurate panorama of other aspects of geochemistry; university professors and students in petroleum geology.

Over the past two decades there has been increased interest in the availability of hydrocarbon charge through a better understanding of petroleum geochemistry and the identification and characterization of petroleum source rocks. These rocks are geochemically unique and form under specific sets of circumstances. This book brings together both geologic and geochemical data from fifteen petroleum source rocks, ranging in age from Devonian to Eocene, that would otherwise be widely dispersed in the literature or available only in proprietary corporate databases. Much of this information, presented in either a tabular or graphic fashion, provides the petroleum explorationist and the geochemist with a framework to establish relationships among various geochemical indices and depositional settings.

Often the source of confusion to those who have to interpret and apply research results, this glossary gives easy access to the basic nomenclature of petroleum geochemistry. The first part of the book provides a summary in the form of tables and diagrams. The main part gives self-contained explanations for the most common terms. Numerous illustrations and references for further reading are included.

*From Conventional to Unconventional Hydrocarbon Systems*  
*Organic Geochemistry*  
*Application of Analytical Techniques to Petroleum Systems*

*Petroleum Geochemistry of Aromatic Hydrocarbons  
Geology and Geochemistry of Oil and Gas  
Proceedings of the 1st Springer Conference of the Arabian  
Journal of Geosciences (CAJG-1), Tunisia 2018*

*In the first edition of this book, we observed that it had been created to fill a need for a usable "self-contained volume on hydrodynamics" (and hydrogeology) that was written specifically for the petroleum industry, but could also serve the earth science community in general. When the first edition was published (1982), M. K. Hubbert, the father of petroleum hydrodynamics, was approaching the final stages of his very productive career. For this reason, the book served as a vehicle to amplify his concepts and spread and stimulate applications of some of his theories and methods throughout the exploration sectors of the petroleum industry. This was accomplished by blending discussions of Hubbert's concepts with some of the procedures used by industry specialists to answer practical oil and gas questions. The simple aim of the book was to bring this material to the fingertips of working geologists and geophysicists, who were "evaluating the hydrocarbon possibilities in larger exploration regions or assessing the potential of small, local subsurface oil and gas prospects." It was also hoped that by treating areas of conceptual overlap between petroleum geology and ground water hydrology, workers in both disciplines would be brought into closer contact, resulting in mutual benefits gained through healthy scientific and technical interaction. This remains our objective in the second edition, although it has become apparent that additional material is needed to satisfactorily achieve it. The size of this volume reflects the new subject matter.*

*Applied Petroleum Geochemistry Technip Editions*

*A material-balance assessment of the petroleum expelled from source rocks in the New Albany Shale and accountable petroleum within the Illinois Basin.*

*Cutting-edge techniques have always been utilized in petroleum exploration and production to reduce costs and improve efficiencies. The demand for petroleum in the form of oil and gas is expected to increase for electricity production, transport and chemical production, largely driven by an increase in energy consumption in the developing world. Innovations in analytical methods will continue to play a key role in the industry moving forwards as society shifts towards lower carbon energy systems and more advantaged oil and gas resources are targeted. This volume brings together new analytical approaches and describes how they can be applied to the study of petroleum systems. The papers within this volume cover a wide range of topics and case studies, in the fields of fluid and isotope geochemistry, organic geochemistry, imaging and sediment provenance. The work illustrates how the current, state-of-the-art technology can be effectively utilised to address ongoing challenges in petroleum geoscience.*

*Geochemistry in Petroleum Exploration*

*Advances in Petroleum Geochemistry*

*Petroleum Geochemistry and Geology*

*Applied Petroleum Geoche...*

*The Chemistry and Technology of Petroleum*



*Petroleum Source Rocks*

This book is intended primarily as a textbook for geologists engaged in petroleum exploration. Its purpose is to introduce the reader to organic geochemistry and to show how to apply geochemistry advantageously in an exploration program. I have made the explicit assumption that most readers will have a sound background in geology but far less knowledge of, or interest in, chemistry. Because there is no need for an exploration geologist to be an expert in organic chemistry, the amount of chemistry used in the book is rather modest. It is, however, often important for a geologist to understand some basic vocabulary. The emphasis in this book is on applications of geochemistry to hydrocarbon exploration. Most of the analytical techniques are discussed only briefly, because although a geologist should know what a gas chromatograph is, he or she is unlikely to be asked to repair one. If more detailed knowledge does prove necessary, a laboratory is the proper place to learn. The strengths and weaknesses of the various analytical techniques are discussed so that a geologist will be able to anticipate pitfalls, cull bad data, and choose an appropriate analytical program. On-the-job experience will prove invaluable in converting the basic information from this text into a practical working knowledge.

The book on Petroleum Geochemistry the first of its kind in India, is useful for postgraduate students of Science (Geology, Applied Geology, Geophysics, Earth Sciences) and undergraduate students of Engineering and Technology (BE, B.Tech.) undertaking several courses in petroleum science and engineering in the Universities, IIT's and other Institutions. It is also useful to geoscientists, engineers and technologists working in the oil industries dealing with exploration, production and related aspects. The book provides basic information on geochemical processes involved in petroleum generation, migration and accumulation in sedimentary basins, maturation of source rocks, evaluation of their genetic potential and correlations. It deals with the principles and applications of sub-surface geochemical methods including high resolution geochemical technologies for delineation of hydrocarbon kitchens and surface geochemical prospecting of hydrocarbons for prioritising targets for future exploration. In addition to basic principles, the book deals with the occurrence and distribution of petroleum in worldwide sedimentary basins with special reference to Indian basins, geochemical basin modeling and its application to petroleum exploration, application of biomarkers and modern instrumental techniques for characterisation of organic matter in source rocks and identification of their depositional environments.

*Applications of oil field waters and their role in enhanced oil recovery (EOR) operations, implications of scale formation and corrosion on drilling equipment and other installations are described comprehensively. Apart from conventional oil and natural gas the need for exploration and exploitation of unconventional petroleum resources such as Coal bed methane (CBM), Gas hydrates, Bituminous sands, Shale gas and Oil shale, Basinal gas and Tight gas sands, their origin, occurrence, characterisation of depositional environments, exploration and production strategies, environmental concerns and worldwide distribution with special emphasis to India are elaborated in detail.*

*Petroleum Geochemistry and Exploration in the Afro-Asian Region includes 29 papers presented at the 6th International Conference on Petroleum Geochemistry and Exploration in the Afro-Asian Region. Petroleum geochemistry has played a crucial role in determining effective source rocks, classifying petroleum systems and delineating the geneses of conve*

*Applied Petroleum Geomechanics provides a bridge between theory and practice as a daily use reference that contains direct industry applications. Going beyond the basic fundamentals of rock properties, this guide covers critical field and lab tests, along with interpretations from actual drilling operations and worldwide case studies, including abnormal formation pressures from many major petroleum basins. Rounding out with borehole stability solutions and the geomechanics surrounding hydraulic fracturing and unconventional reservoirs, this comprehensive resource gives petroleum engineers a much-needed guide on how to tackle today's advanced oil and gas operations. Presents methods in formation evaluation and the most recent advancements in the area, including tools, techniques and success stories Bridges the gap between theory of rock mechanics and practical oil and gas applications Helps readers understand pore pressure calculations and predictions that are critical to shale and hydraulic activity*

*Petroleum Geochemistry and Exploration in the Afro-Asian Region  
Basic Concepts and Recent Advances*

*From Source to Trap*

*An Introduction to Quantitative Chemical Analysis Techniques for Earth, Environmental and Materials Scientists*

*Feasibility Study of Material-balance Assessment of Petroleum from the New Albany Shale in the Illinois Basin*

*Proceedings of the 6th AAPG International Conference, Beijing, China, 12-14 October 2004*