

Review of
Carbonate Reservoir Characterization: A Geologic - Engineering
Analysis, Part 2*

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BOOK REVIEW

Carbonate Reservoir Characterization: A Geologic-Engineering Analysis, Part II, edited by G. V. Chilingarian, S. J. Mazzullo, and H. H. Rieke (1996). Elsevier Developments in Petroleum Science Volume 44. 992 p. Published by Elsevier Science, P. O. Box 945, New York, NY 10159-0945, USA, or P. O. Box 211, 1000 AE Amsterdam, The Netherlands. Price US\$ 375.00/NLG 600.00.

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This lengthy volume completes a two-part treatise on Carbonate Reservoir Characterization that is suitable for geologists, petroleum engineers, managers, and lecturers. Part I, which was published by Elsevier in 1992 as Developments in Petroleum Science Volume 30, presented the fundamentals of geologic and engineering concepts for characterizing and evaluating carbonate reservoirs. Part II, which is reviewed here, concentrates on technologies and practices used to obtain basic information on carbonate reservoirs. Together, both volumes are a complete, modern reference to the properties and production behavior of carbonate petroleum reservoirs.

The first chapter is an Introduction by the editors that presents an overview of the other chapters of the book, and also references Part I, within the context of discussions on some important topics, e.g. fluid flow relationships, hydrocarbon recovery, and importance of fractures. Seismic Expression of Carbonate Reservoir Systems by C. G. St. C. Kendell, W. E. Full and G. L. Whittle, which is Chapter 2, presents background information on seismic data, synthetic seismic traces, and carbonate play types. The seismic character of diverse carbonate systems is presented in the context of sheet, buildup, and clinoform margin play types.

Core Analysis and Its Application in Reservoir Characterization by D. P. Murphy, G. V. Chilingarian and S. J. Torabzadeh, Chapter 3, succinctly and completely reviews the various types of coring methods, core handling, and core analysis including special procedures for carbonates. Chapter 4, Formation Evaluation by D. P. Murphy, examines the determination of formation properties of interest including lithology, porosity, pore fluid saturation and properties, permeability, and net formation thickness within a framework of understanding the petrophysics of the rock. Both of these chapters are well written and will be valuable as basic references.

Performance and Classification of Carbonate Reservoirs by H. H. Rieke III, G. V. Chilingarian and S. J. Mazzullo, which is Chapter 5 and a major portion of the book, focuses on reservoir classification schemes, incremental recovery technology, reservoir heterogeneity models, and laboratory and field characterization of heterogeneity. The review of classifying reservoirs based on fluid composition, drive mechanism, pore system, or geological framework should prove to be particularly useful; the discussion of incremental recovery technology addresses problems of handling macroscopic

heterogeneity by infill drilling, slant-horizontal drilling, and advanced fracturing; and the reservoir heterogeneity models section introduces geostatistical approaches to model building and assigning properties within a model. A summary of reservoir characteristics and primary performance data is given in table form for 243 reservoirs categorized on pore type and drive mechanism.

Chapter 6, Well Test Analysis in Carbonate Reservoirs by F. Samaniego V. and H. Cinco Ley, covers flow behavior and diagnosis, pressure drawdown and buildup tests, pressure transient analysis, and well interference tests. For each, the methodologies are explained and shown by detailed examples. Naturally-Fractured Carbonate Reservoirs by T. D. Van Golf-Racht, Chapter 7, discusses types of fractures, fracture evaluation, and the physical properties of fractures and matrix. The evaluation of fractured carbonate reservoirs through well production or transient flow well data and matrix-fractures imbibition fluid exchange are important sections.

Chalk Reservoirs by G. M. Friedman, Chapter 8, is a short section principally describing chalk reservoirs from the North Sea and North America. Hydrocarbon Reservoirs in Karsted Carbonate Rocks by S. J. Mazzullo and G.V. Chilingarian, which is Chapter 9, overviews the origins of karst and classifications of karst reservoirs. The main sections are on the geological and petrophysical characteristics of karst reservoirs and recognizing karst in the subsurface using seismic, mapping, drilling characteristics and well data. Factors Affecting Oil Recovery from Carbonate Reservoirs and Prediction of Recovery by N. C. Wardlaw, Chapter 10, reviews displacement efficiency, volumetric sweep efficiency, and reservoir models for simulation of production. Primary and tertiary recovery strategies are also discussed.

Four appendices are also included: (A) Glossary of selected geological terms, (B) Petroleum engineering glossary, (C) Fundamental of surface and capillary forces, and (D) Sample questions and problems. Of these, the glossaries of terms should be especially helpful for the nonspecialist. An author index and subject index complete the volume.

This book is an important reference that will be of great use to both geologists and engineers. Congratulations to the editors and Elsevier for bringing together such vast amounts of information within both parts of Carbonate Reservoir Characterization: A Geologic-Engineering Analysis. Part 2 should be on everyone's reference shelf, but because of the extreme high cost it likely won't be.