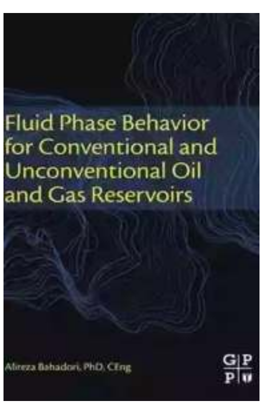
Fluid Phase Behavior For Conventional And Unconventional Oil And Gas Reservoirs

When it comes to the exploration and production of oil and gas, understanding fluid phase behavior is crucial. The behavior of fluids under different conditions plays a vital role in determining the feasibility and profitability of oil and gas reservoirs. In this article, we will discuss the fluid phase behavior for both conventional and unconventional oil and gas reservoirs, highlighting the key differences and challenges associated with each.

Conventional Oil and Gas Reservoirs

In conventional oil and gas reservoirs, hydrocarbons exist in a relatively straightforward manner. The fluids are composed of a mixture of oil, gas, and water. The phase behavior of these fluids is primarily governed by pressure and temperature conditions.

At reservoir conditions, hydrocarbons can exist in three phases: gas, liquid, and solid. The phase diagram represents the relationship between pressure, temperature, and the composition of the fluids. It provides critical insights into the behavior of hydrocarbons under varying conditions.



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by Alireza Bahadori(1st Edition, Kindle Edition)

★★★★★ 5 out of 5

Language	: English
File size	: 75617 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled

Word Wise : Enabled
Print length : 540 pages

One of the key parameters to consider in conventional reservoirs is the bubble point pressure. It represents the pressure at which the first gas bubble is formed in the fluid. Above the bubble point pressure, the fluid is considered to be in a single-phase, and below it, two-phase behavior is observed.

In addition to the bubble point pressure, the oil and gas industry also focuses on the dew point pressure. This is the pressure at which the first liquid drop forms in the gas phase. It is important to determine this pressure to prevent condensation and liquid dropout during production and transportation processes.

The study of fluid phase behavior in conventional reservoirs helps engineers and geoscientists determine the producibility of a well. It aids in estimating the recovery factor, which is the proportion of hydrocarbons that can be extracted from the reservoir. Understanding the behavior of fluids under pressure and temperature variations enables more accurate reservoir simulation and production forecasts.

Unconventional Oil and Gas Reservoirs

Unconventional oil and gas reservoirs, on the other hand, have more complex fluid phase behavior due to the presence of resources such as shale gas, tight gas, and oil sands. These resources require different techniques for extraction and have unique challenges when it comes to fluid behavior.

Shale gas, for example, is a form of natural gas trapped within shale formations. The extraction process involves hydraulic fracturing or "fracking." The properties of shale gas, including its phase behavior, are influenced by the organic matter present in the shale rock. The interaction between the fluids, organic matter, and rock matrix affects the flow and production rates.

Tight gas, which is found in low permeability reservoirs, also poses challenges in terms of fluid phase behavior. The small pore spaces and low permeability restrict fluid flow, making it more difficult to extract the gas efficiently. The behavior of fluids in these reservoirs is influenced by the adsorption and desorption of gas on the rock surface. This can alter the composition and behavior of the fluid mixture.

Oil sands, another unconventional resource, contain a mixture of bitumen, water, and solids. The bitumen is too viscous to flow on its own and requires additional processes such as steam-assisted gravity drainage (SAGD) to enhance recovery. The fluid behavior in oil sands is heavily dependent on temperature and the ratio of water to bitumen.

The phase behavior of fluids in unconventional reservoirs is crucial for optimizing production and determining the economic viability of these resources. Understanding the complexities of these reservoirs helps engineers develop appropriate extraction techniques and select the most suitable fluid compositions and pressures for enhanced recovery mechanisms.

Fluid phase behavior is a critical aspect of oil and gas reservoir characterization. Whether dealing with conventional or unconventional resources, understanding how fluids behave under different pressure and temperature conditions is essential for successful exploration and production. Conventional reservoirs have relatively simpler phase behavior, primarily driven by pressure and temperature. Unconventional reservoirs, on the other hand, have more complex fluid behavior due to the unique properties of shale gas, tight gas, and oil sands. Comprehensive understanding and analysis of fluid phase behavior allow engineers to maximize hydrocarbon recovery and optimize production techniques in both conventional and unconventional reservoirs.

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Fluid Phase Behavior for Conventional and Unconventional Oil and Gas Reservoirs delivers information on the role of PVT (pressure-volume-temperature) tests/data in various aspects, in particular reserve estimation, reservoir modeling, flow assurance, and enhanced oil recovery for both conventional and unconventional reservoirs.

This must-have reference also prepares engineers on the importance of PVT tests, how to evaluate the data, develop an effective management plan for flow assurance, and gain perspective of flow characterization, with a particular focus on shale oil, shale gas, gas hydrates, and tight oil making.

This book is a critical resource for today's reservoir engineer, helping them effectively manage and maximize a company's oil and gas reservoir assets.

- Provides tactics on reservoir phase behavior and dynamics with new information on shale oil and gas hydrates
- Helps readers Improve on the effect of salt concentration and application to C02-Acid Gas Disposal with content on water-hydrocarbon systems
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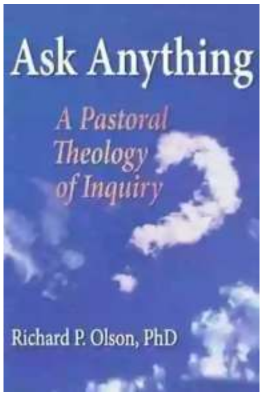

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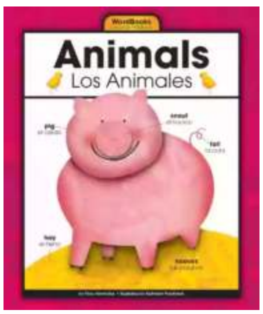

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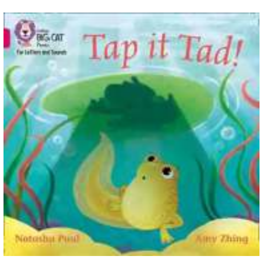

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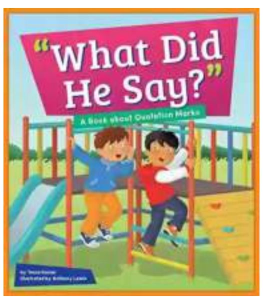

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