

---

## PVT Properties of Reservoir Fluids

Sub-Discipline	Fluid Properties
Discipline	Reservoir Engineering
Modality	Classroom
Course Level	Foundation
Course duration	5 Day

### Course Description

This course will present the methods for obtaining values of reservoir fluid properties from laboratory data and correlations. Chemical properties of hydrocarbons, conventional laboratory PVT (Pressure-Volume-Temperature) tests and quality control will also be covered. Participants will learn about phase diagrams, mixing rules, EOS, EOS tuning, and fluid properties while attending this course. Each day participants will be given examples and problems to solve.

This course will help participants gain a better understanding of the relationship between the five reservoir fluids and how to manage problem concerning reservoir fluid properties with increased confidence.

### Course Objective

This course will present the methods for obtaining values of reservoir fluid properties from laboratory data and correlations. Chemical properties of hydrocarbons, conventional laboratory PVT (Pressure-Volume-Temperature) tests and quality control will also be covered. Participants will learn about phase diagrams, mixing rules, EOS, EOS tuning, and fluid properties while attending this course. Each day participants will be given examples and problems to solve.

This course will help participants gain a better understanding of the relationship between the five reservoir fluids and how to manage problem concerning reservoir fluid properties with increased confidence.

### Audience

Operations, production, and reservoir engineers.

---

## Prerequisite

Participants should have a degree in engineering or science and some experience in the petroleum industry.

## Activities

### Day 1

#### Fundamentals of PVT (Pressure-Volume-Temperature)

- Overview of PVT Analysis
- Hydrocarbon Chemistry
- Phase Behaviour of single and multi-component systems
- Miscibility concept
- Reservoir Fluids

On the first day of the course, participants will learn about the basic fundamentals of PVT analysis, along with object of PVT analysis and the hydrocarbon chemistry. Phase behavior of single and multi-component systems will be covered. Miscibility concept and minimum miscibility pressure will also be covered. The day will end with a discussion on type of reservoir fluids.

### Day 2

#### PVT Fluid Properties, Reporting and Evaluating

- Equations of State for Ideal and Real Gases
- PVT Properties of Natural Gas
- PVT Properties of Black Oil
- Reservoir Fluid Studies Reports

The day will start with learning the equations of states for ideal and real gases and PVT properties of natural gas. Participants will discuss the conventional experimental procedures used to generate PVT data such as constant volume depletion and differential liberation. The day will end with participants learning about the PVT reports and evaluation of the reported data and their application.

---

## Day 3

### Development of Equation of State (EoS) Models

- Black Oil Correlations
- Ideal and Non-Ideal Gas-Liquid Equilibrium
- Evaluation of phase boundaries and flash equilibrium with EoS

Day three will start with black oil correlations and then will focus on Equations of State (EoS). Participants will learn about the Development of the EoS models along with the different types of EoS. Comparisons of EoS results, evaluation of phase boundaries and flash equilibrium with EoS, K-value correlations and the tuning of EoS will also be covered. Other topics that will be discussed on this day include, volume translation concepts for improved volumetric predictions using EoS, compositional gradients and variation, and compositional processes.

## Day 4

### Tuning and Data Requirements

- Cubic Equation of State
- Solution of van der Waals EOS
- Fugacity Evaluations
- PVT-VLE Evaluation
- Tuning of Equations of State

Tuning and data requirements will be the main focus on this day. Cubic EoS and its solution will be discussed first. Then the participants will learn how fugacity and K-value evaluations are done from an EoS. The day will end with an EoS tuning example.

## Day 5

### Oil Field Applications

- Surface Separation and example separator Calculations
- Properties of Oilfield Water
- Gas Hydrates and Hydrate Prediction correlations

---

The last day of the course will cover examples on surface separator calculations, phase properties of gas hydrates and their correlations. The day will end with participants learning about the properties of oilfield waters.