

Fundamentals of Reservoir Engineering IV Semester

Q:1 What do you mean by porosity of a reservoir?

Ans: The porosity of a rock is a measure of the storage capacity (pore volume) that is capable of holding fluids. Quantitatively, the porosity is the ratio of the pore volume to the total volume (bulk volume). This important rock property is determined mathematically by the following generalized relationship:

$$\text{Porosity} = \text{Pore volume} / \text{Bulk volume}$$

Q:2 What are the critical and residual oil saturation?

Ans: For the oil phase to flow, the saturation of the oil must exceed a certain value which is termed critical oil saturation. At this particular saturation, the oil remains in the pores and, for all practical purposes, will not flow.

During the displacing process of the crude oil system from the porous media by water or gas injection (or encroachment) there will be some remaining oil left that is quantitatively characterized by a saturation value that is larger than the critical oil saturation. This saturation value is called the residual oil saturation, S_{or} . The term residual saturation is usually associated with the nonwetting phase when it is being displaced by a wetting phase.

Q:3 What do you mean by surface and interfacial tension?

Ans: In dealing with multiphase systems, it is necessary to consider the effect of the forces at the interface when two immiscible fluids are in contact. When these two fluids are liquid and gas, the term surface tension is used to describe the forces

acting on the interface. When the interface is between two liquids, the acting forces are called interfacial tension.

Q:4 What is the capillary pressure for a reservoir?

Ans: The capillary forces in a petroleum reservoir are the result of the combined effect of the surface and interfacial tensions of the rock and fluids, the pore size and geometry, and the wetting characteristics of the system. Any curved surface between two immiscible fluids has the tendency to contract into the smallest possible area per unit volume. This is true whether the fluids are oil and water, water and gas (even air), or oil and gas. When two immiscible fluids are in contact, a discontinuity in pressure exists between the two fluids, which depend upon the curvature of the interface separating the fluids. We call this pressure difference the capillary pressure and it is referred to by p_c .

Q:5 What is the permeability for a reservoir?

Ans: Permeability is a property of the porous medium that measures the capacity and ability of the formation to transmit fluids. The rock permeability, k , is a very important rock property because it controls the directional movement and the flow rate of the reservoir fluids in the formation. This rock characterization was first defined mathematically by Henry Darcy in 1856. In fact, the equation that defines permeability in terms of Darcy's Law.