

OVERVIEW OF PETROLEUM GEOLOGIST ROLE IN OIL AND GAS INDUSTRY

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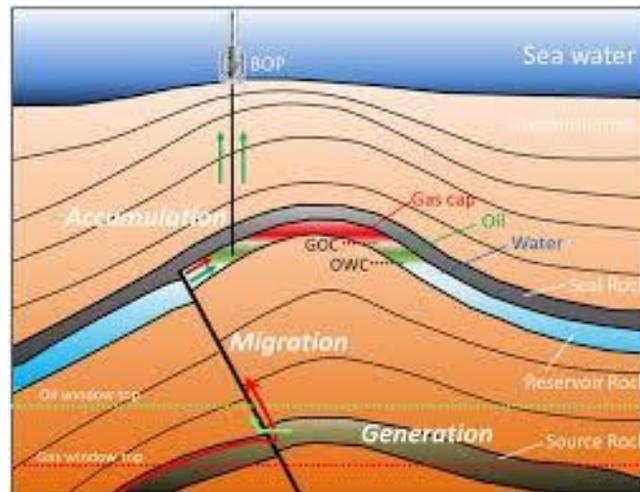
Introduction

Petroleum system is a core concept of petroleum geology-the study of oil and gas formation and exploration with its associated processes such as oil origin, occurrence, migration and their accumulation-which unifies interdependent processes and key elements in the formation of hydrocarbons. The formation of hydrocarbons involves processes such as trap formation, Generation-migration-accumulation of hydrocarbons and key elements which encompass source rock, reservoir rock, and seal or cap rock. Studying petroleum system helps petroleum geophysicists and geochemists knowing and understanding the nature of the trap and petroleum region by basing on paleontology, stratigraphy and sedimentology of a geographic region in order to identify petroleum system

Petroleum System

The element of petroleum system are source rocks, trap, seal and reservoir rock are the key elements of petroleum systems which are provided by the interpretation of data from reflection seismology and electromagnetic geophysical techniques performed in a particular geographic area. Each of these elements is evaluated in a particular way to determine the potentiality of the system. In petroleum system, there has a process in that system. The processes are generation, burial, migration. Migration has 2 process, primary migration and secondary migration.

Primary migration is a process of fluid that migrate in source rock. Meanwhile, secondary migration is a process of fluid that migrate from source rock to reservoir rock.



Source Rock

The source rock is a subsurface sedimentary rock unit which is made of shale or limestone. It contains the precursors of hydrocarbon formation, organic matters (from decays of ancient biological species) which were subjected to high temperature for longtime. The source rock host the processes that involve in the formation oil and gas until they start to immigrate toward the upper or nearer rock named reservoir due to the fluidity of oil and gas. The source rock is evaluated using the geochemistry methods.

In source rock, to be a hydrocarbon, there has some process. The process organic matter will change to be total organic carbon and kerogen type. Which is, kerogen type I, it will produce an oil prone, kerogen type II it will produce gas and oil, kerogen type III it will produce gas prone. Kerogen will face a process a maturation. Maturation is the assessment of the reservoir quality (nature) involves maturation analysis by which they know the length of time of petroleum generation or expulsion. If hydrocarbon has been matured, it will migrate to reservoir.

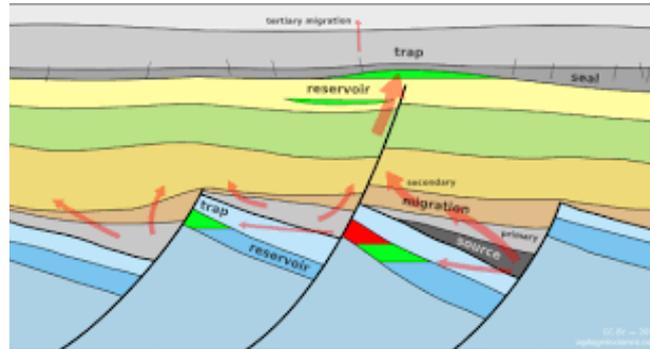
Migration

Migration is the process of moving oil and gas from the source rock to the reservoir pores when it is trapped after its generation. The main factors of the oil and gas migration are compression, buoyancy, chemical potential; thermal expansion, topography, maturation (increase in volume with time), and gravitational separation of hydrocarbons and water from each other.

Reservoir Rock

Reservoir rock is a kind of porous or permeable lithological unit(s) which retains the immigrating oil and gas from source rock. Oil and gas usually accumulate on the top of water and they are always there relatively to their difference of densities. The reservoir rock is basically analyzed by means of assessing their porosity a permeability but also its analysis takes ranges into various fields such as stratigraphy, structural analysis, sedimentology, paleontology and reservoir engineering disciplines. In case the reservoir has yet been identified, key characteristic crucial to hydrocarbons explorer are bulk rock volume and net-to-gross ratio. The bulk rock volume (gross volume of the rock above the water-hydrocarbons contact) is obtained from of sedimentary packages while the net-to-gross ratio (the proportion of sedimentary packages in a reservoir rock) estimations are gotten from analogues and wire lines logs. The net volume of reserves is equal to bulk rock volume multiplied by the net-to-gross ratio. trap is structural or stratigraphic feature that ensures a fixed and firm position of seal and reservoir which avoids the escape of oil and gas.

Cap Rock



Cap rock or seal is a lithological unit with low permeability which restricts hydrocarbons to escape from the reservoir. It is made of chalks, shale or evaporites. Its analysis bases on assessing the extent and thickness to know how much cap rock is efficient to oil and gas retention. According to lithological deformation that might have been happen, the cap rock may be found in various types.

The tectonic movements the crust experiences cause the anticline and syncline seals and the matter of consequences of their shapes; the convex form is more enjoyable to petroleum exploration than concave one. That is why always the seismology experiments are always carried out to assess how well they can reach the reservoir by aiming at seal with a concave shape as to ease and make efficient the petroleum exploration.