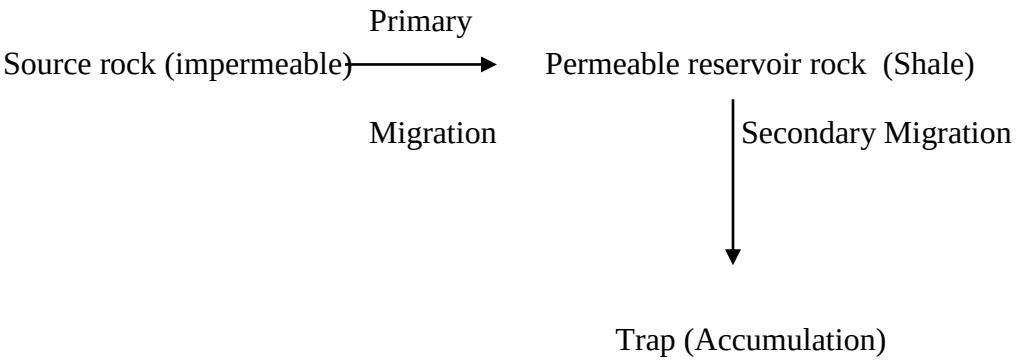
Migration and Accumulation



Kerogen : is the ultimate organic source material which is transformed into oil.

Therefore primary migration is process by which hydrocarbons are expel from the source rock into an adjacent permeable carrier bed. The movement which brought the petroleum from the source into the reservoir rock is termed as **PRIMARY MIGRATION,** while the final movement of petroleum from the reservoir rock into pool is called **SECONDARY MIGRATION.**

Secondary migration is the movement of hydrocarbons along the carrier beds to the trap. Migration mostly takes place as one or more separated hydrocarbon facies. Gas or liquid phase migrate in a different way depending upon the pressure and temperature conditions. During the migration process there is also minor dissolution of methane and short chain hydrocarbons.

Nearly every petroleum pool exists within an environment of water. Thus the problem of migration is intimately related to :

1. Hydrology
2. Hydraulics
3. Groundwater movements

Probably the petroleum that entered the water saturated reservoir rock was dispersed in minute particles possibly of colloidal size and some might even be insolution in the water. In the absence of any unbalanced forces such petroleum might remain more or less stationary for a longtime and might be buried deep.

Local pressure and temperature gradation might cause local movements but it would require some regional change to upset the equikibrium and cause a regional move (folding, faulting, mountain building etc). This might be regional folding, tilting, mountain building or warming up possibly due to igneous activity or to various changes in the hydrodynamic gradients.

The theories attempting to explain the migration of petroleum through reservoir rocks until it accumulates in sufficient quantities to form pools may be divided into 2 general processes:

1. Those that call for the movement of petroleum along with moving water.

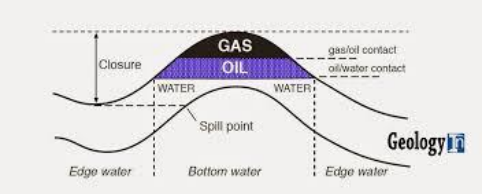
2. Those that explain the movement of oil and gas as independent of any movement of water.
    1. **Theories that call for movement of petroleum along with moving water :**
    All suggests movement of large quantities of water which carries that dispersed oil and gas are concentrated. The evidence consists of seepages and springs from which large quantities of water escape together with small quantities of either oil or gas or both.
    2. **Movement of oil and gas independent of any movement of water :**
    The fact that oil and gas may be produced from pools in which the interstitial water content is as much as 50 % proves that petroleum can migrate independently of water. The reason why it is able to do so is that rock particles are water wet. The rock particles are envolved by a thin film of water. The water remains in place while the gas and oil are prohibited to pass through the rocks several theories have been proposed that permit oil and gas to migrate through the interstitial space independently of any movement of water and some of the theories are –
        a. Those that rely on Capillary phenomenon.
        b. Those that rely on buoyancy
        c. Those that rely on gas expansion.

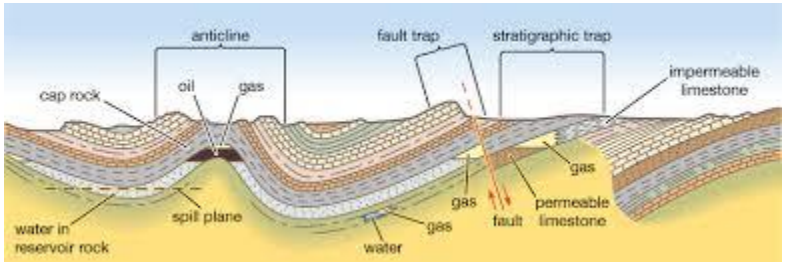
Theories of Accumulation

The concentration of oil and gas from a disseminated state in a reservoir rock into an accumulation of commercial soil held in a trap is the final step in the formation of pool.

In some reservoir there is more collecting free water and presumably there had been little movement of petroleum, the source area and accumulation area coincide. Most traps however are collected to free water either moving or stationary whether the petroleum is carried along by moving water whether it moves independently of the water movement it moves along upper surface of the permeable reservoir rock probably as a thin film.

Where the reservoir water is under hydrostatic condition, oil and gas comes to rest at the highest position. The deposition of lowest pressure in the trap. The underlying contact with the free water is approximately level. The oil water contact is always a level surface. The trap not only obstructs the lateral movement of oil and gas but also is a point of lower hydrostatic pressure than the surrounding region. A trap is thus as area of low potential energy towards which petroleum will tend to move from area of higher energy.





The chief force which causes concentration of petroleum is the buoyancy which moves the oil and gas to the highest place in the reservoir rocks. Folding not only forms local area of hydrostatic pressure but also for the decrease of their pressure when the clastic rock is folded the bending of formation causes fracturing and the rearrangement of any loose grain so the volume of the rock is increased. The increased in volume is called ‘ Dilatancy’ is due to an increase in the pore space which results in the lowering of pressure.