

Basic concept

Upstream | Basic Concept

[ww-shortcode-divider style="thin"]Upstream is a term used in the oil industry which refers to the searching for, the recovery and production of crude oil and natural gas.

The upstream sector includes

- *Exploration* – the searching for potential onshore or offshore oil and gas reservoirs, and the drilling of exploratory wells
- *Production and maintenance* of wells and facilities to recover and bring the crude oil and/or raw natural gas to the surface plant and to process the produced hydrocarbons.

The upstream sector in the context of the petroleum industry cycle

Within the upstream sector, a typical oil and gas operating cycle sees several and different phases which aim to target varied goals using specialized technologies.

A schematic representation of the field cycle and the activities generally carried out in each phase is shown in the figure below:

The oil and gas operating cycle and activities – (Treccani – Petroleum Encyclopaedia)

The term “Petroleum” refers to both crude oil and natural gas.

These are mixtures of hydrocarbons which are molecules, in various shapes and sizes, of hydrogen and carbon atoms, and different mixtures of hydrocarbons have different uses and different economic values.

Basic hydrocarbon structures

Crude oil refers to hydrocarbon mixtures produced from underground reservoirs that are liquid at normal atmospheric pressure and temperature.

Natural gas refers to hydrocarbon mixtures that are gaseous, at normal atmospheric pressure and temperature – the gas mixtures consist largely of methane – the smallest natural hydrocarbon molecule (CH_4).

The extremely variable compositional complexity of petroleum reveals the joint effects of all processes involved in the origin of petroleum accumulations and their history during the geological time.

Hydrocarbon reservoirs (porous and permeable host rocks) are thousands of feet below the surface, and oil and gas accumulations form in sedimentary basins if the some geological conditions (Petroleum System) are met:

- Existence of source rocks which generate petroleum under particular subsurface temperature conditions
- Expulsion of petroleum from the source and subsequent migration
- Occurrence of reservoir rocks of sufficient porosity and permeability allowing flow of petroleum through the pore system
- Configurations and arrangement of rock layers to form traps
- Presence of impermeable layers (cap rocks) to confine petroleum accumulations in place
- Correct timing with respect to the sequence by which all the above processes have occurred during the history of a sedimentary basin
- Advantageous conditions for the preservation of petroleum accumulation during the geologic time

The process of origin of oil and gas (Schlumberger)

Common types of petroleum traps (Geology In)

1. Treccani – Petroleum Encyclopaedia
2. Schlumberger – Oilfield Review
3. Geology In