

ME-463
PETROLEUM ENGINEERING

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1 Lecture 01: Introduction

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Booklist

Introduction of Petroleum Geology & Drilling

Published by BUET

Basics

Latin: **Petra** → Rock or Stone

Latin: **Oleum** → Oil

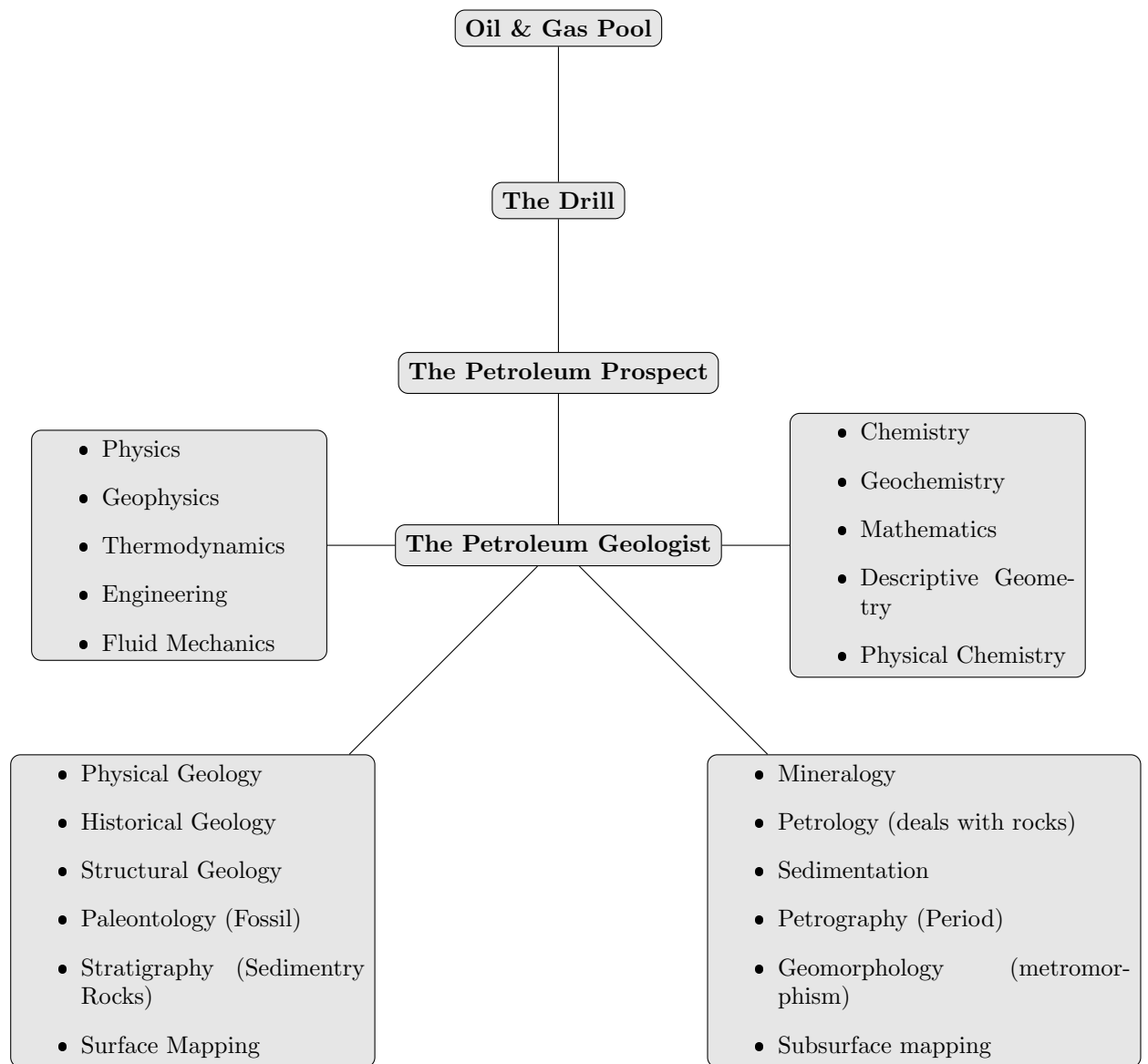
So, Petroleum basically means "Rock Oil"

Petroleum occurs widely in the earth as gas, liquid, semi-solid or solid, or in more than one state in a single place.

Definition

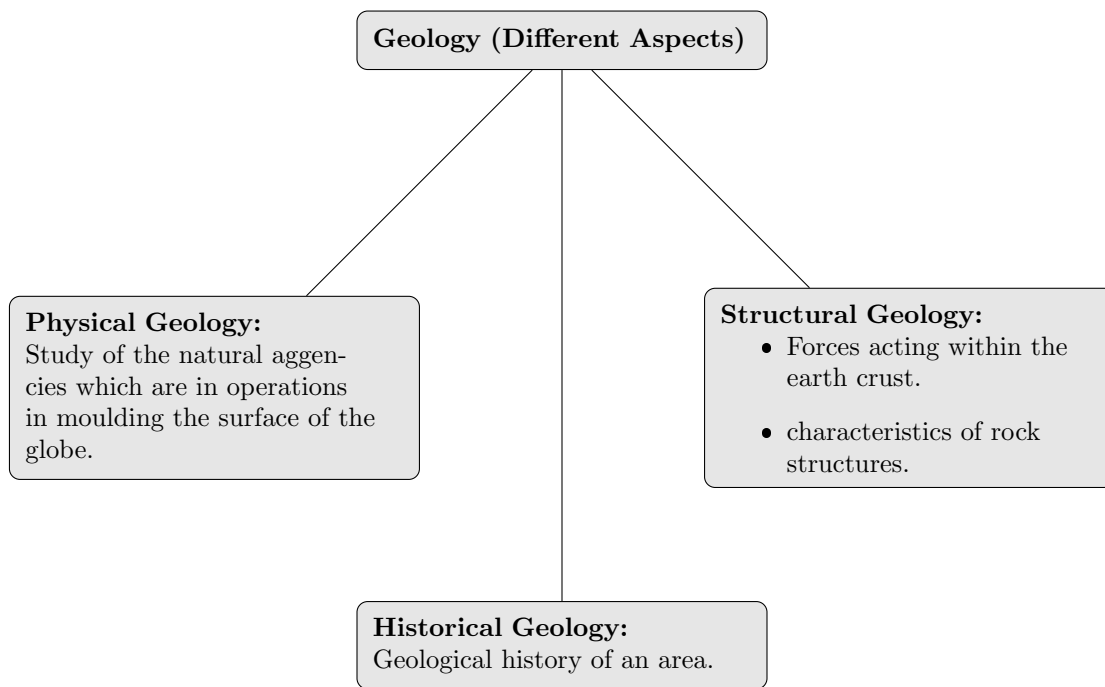
Chemically, any petroleum is an extremely complex mixture of hydrocarbon (hydrogen and carbon) compounds with minor amounts of nitrogen, oxygen, and sulfur as impurities. The weight percentage of petroleum is as follows:

Elements	Amount
Carbon	85%-90%
Hydrogen	10%-15%
Sulfur	0.2%-5%
N_2	0.1%-2%
O_2	0.6%-2%



Petroleum Geology

Geology is the science that deals with the history and structure of the earth and its life forms. It is used to predict where oil accumulation might occur. Geology is based on observation and the knowledge derived from many other sources.



Petroleum Geologist (activities)

- Observes the rock and rock formations.
- Reconstructs the geological history of an area
- Determines whether the formations contains petroleum in the reservoirs.

2 Lecture 2: Petroleum Classification

Date: 17/06/2023

A petroleum deposit must be commercially valuable. it depends on some factors:

1. Amount recoverable
 2. Expected production rate
 3. Cost of drilling and producing well
- ✓ if there is fire in well, then another well should be dug nearby to reach there.

Petroleum Reservoir characteristics

A good reservoir must have:

- Right shape or configuration to hold the oil and some kind of seal or trap to keep it from escaping
 - it must be large enough usually 10 ft thick or more.
 - About 10% porosity or pore space is needed.
 - It must be permeable, that is, pores must be connected so that, oil, gas and water can flow through it from one pore to another.
- ✓ Sandstone → Porous

Petroleum Classification

The petroleum and petroleum like substance may be classified as follows:

1. **Petroleum** : An almost infinitely complex mixture of saturated hydrocarbon with relatively small amounts of S , N_2 , O_2 and many other lesser constituents in combination. Petroleum occurs in solid, liquid and gaseous forms as follows :
 - (a) Asphalt or tar, paraffin waxes, brittle bitumen etc.
 - (b) Crude oils (liquids)
 - (c) Natural Gas
 2. **Tar Sands**: Semi-solid petroleum bearing sands
 3. **Oil Shales**: These are fine grained sediments sometimes known as kerogen shales.
 4. Torbanites, boghead and cannel coal etc all are rich in bitumen
- ✓ Fishing → If drill bit is broken inside well
- ✓ Catwalk → pipe movement through crane

Age of the earth (Structure of the earth)

it is very difficult to ascertain the actual and exact of the earth.

- Darwin fixed the age of the earth at 57 billion years on the basis of the concept of separation of the moon from the body of the earth.
- Through the study of the history of cooling of the earth, calvin estimated that our planet should be as old as 20 to 40 million years
- Study of radioactive materials in meteorites indicate that the members of the solar system must be as old as about 4500 million years
- Modern theory is that the earth is thought to have formed about 4.6 billion years ago out of a cosmic dust. As the planet was pulled together due to its own gravity, the heat of compression and of its radioactive elements caused it to become molten. The heaviest components form the core. Lighter minerals form the thick mantle. The lighter elements form the thin rocky crust.