

COAL AND PETROLEUM

Fossil Fuels

- Fuels produced naturally from the dead remains of plants and animals that got buried in soil and rocks are called fossil fuels.
- They are concentrated stores of energy and give off heat and light on burning.

Coal

Coal is a black coloured hard rock which can be burnt as a solid fuel.



Formation

Coal is formed over a period of millions of years from dead plants that gets buried inside the earth. The high temperature and high pressure inside the earth converts the buried vegetation into coal. This process of conversion of wood into coal is called carbonization. The period during which this process of coal formation takes place is called the carboniferous age.

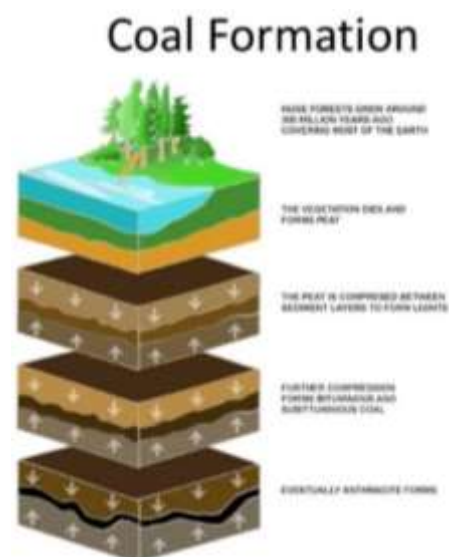
Composition

It mainly consists of carbon. Hydrogen, oxygen and small amount of nitrogen and sulphur are also present.

Varieties

There are three main varieties of coal which vary in their carbon content. They are-

- Anthracite-It contains 96% carbon and is regarded as the best variety of coal.
- Bituminous- It contains 65% carbon.
- Lignite- It contains 38% carbon.

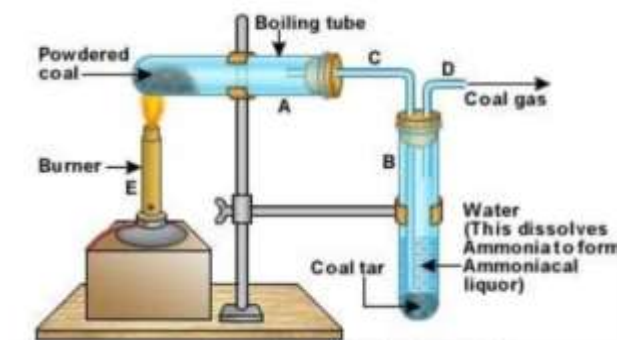


Destructive Distillation of Coal

The process of heating coal in the absence of air at a temperature of 1000°C is called destructive distillation of coal.

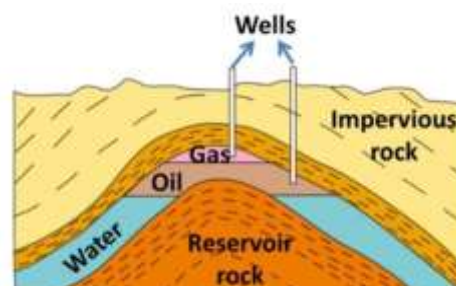
The products obtained during this process are-

- Coke :
 - The residue left behind when destructive distillation of coal is carried out is coke.
 - It is an almost pure form of carbon
 - It is a good fuel and burns with no smoke.
 - It is also used to reduce metal oxides to get the metals.
- Coal gas
 - It is a mixture of hydrogen, methane, carbon monoxide and other gases.
 - It was earlier used for domestic cooking and lighting.
- Coal tar
 - It is a thick viscous liquid.
 - It contains several carbon compounds.
 - It is mainly used for road construction.
 - It is also used to make pesticides, explosives, synthetic fibres perfumes, naphthalene balls to repel moths and insects, dyes and paints.
- Ammonium compounds
 - When dissolved in water, they give ammoniacal liquor.
 - It is used for making nitrogenous fertilizers.



Petroleum or Crude Oil

Crude oil or petroleum is a black liquid which is a mixture of several hydrocarbons formed from buried Dead Sea organisms.



Refining of petroleum

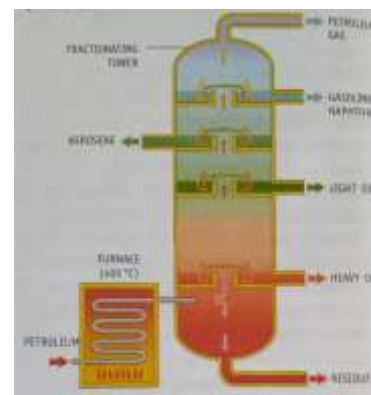
The process of separating the fractions by fractional distillation is known as refining.

Property

Different boiling points of various hydrocarbons is the property on which the separation of different components of petroleum is carried out by fractional distillation. As the number of carbon atoms in a hydrocarbon increase its boiling point also increases.

Procedure

- Refining of petroleum is carried out by first heating the crude oil at about 400°C in a furnace.
- The vapours formed are passed into a tall fractionating tower.
- The hydrocarbons with the highest boiling points condense first and get collected near the base of the fractionating tower.
- As the vapour rises, the hydrocarbons with lower boiling points condense at different heights.
- The hydrocarbons with 1-4 carbon atoms and with boiling point below 40°C, which are gases (petroleum gas), do not condense and escape from the top of the tower.



Some Important Fractions of Petroleum and Their Uses

Fraction	Boiling	No. of Carbon atoms	Products obtained/Uses
Petroleum gas	Below 40°C	1-4	LPG (liquefied petroleum gas)- fuel for home and industry
Gasoline and naphtha	90-165°C	4-10	Petrol-motor fuel, aviation fuel, solvent for dry-cleaning
Kerosene	150-245°C	10-16	Kerosene-domestic fuel, jet engine fuel
Light oil	215-315°C	20-25	Useful organic chemicals
Residue	Over 370°C	Over 25	Lubricating oil-lubricating machinery; Paraffin wax-candles, Vaseline, ointment, etc. ; Asphalt (bitumen) – paints, road surfaces

Natural Gas

Occurrence

Natural gas is found along with petroleum in reservoirs under the ground.

Composition

It is chiefly made up of methane, though butane and propane are also present in small proportions.

Advantages

- It is a clean non-polluting fuel.
- It can be easily transported through pipes.
- It can be pressed and stored under high pressure as compressed natural gas (CNG).

Uses

- CNG is used for power generation.
- In some parts of India, e.g. Vadodara, CNG is supplied to homes and factories through pipes and directly used as a fuel.
- CNG is also now being used as a non-polluting fuel for vehicles.
- Natural gas is used as a starting material for the manufacture of chemicals and fertilizers.

Conservation of fossil fuels

The exhaustible resources like coal and petroleum will be finished soon if we do not manage them properly. Alternate sources of energy such as solar, wind and biomass should be used in place of fossil fuels.

