

Competitive Exams: Allotropes of Carbon

Allotropy

- A phenomenon in which an element is found in different forms having different physical properties but similar chemical properties is known as allotropy.
- Phosphorus, sulphur, carbon etc. are elements which occur in different allotropic forms.

Carbon

It has various allotropic forms but these can be classified into crystalline form (diamond, graphite) and amorphous form (coke, coal, lamp - soot, carbon black, animal charcoal, gas carbon, wood charcoal etc.)

Diamond

Diamond is the purest form of carbon. It is found very deep inside the Earth, in South Africa, Congo, Angola.

Properties of Diamond

- It is the hardest natural substance.
- It is insoluble in any solvent.
- It is of specific gravity 3.5.
- It is non-conductor of heat and electricity.
- It burns in air at 900°C and gives out CO_2 .
- It occurs as octahedral crystals.
- It is transparent and has refractive index of 2.45.

Uses of Diamond

- It is used in making jewellery.
- It is used for cutting hand tools.

Graphite

Also called as black lead. As compared to diamond, it is widely available in nature in countries like India, Sri Lanka, Canada, Russia etc.

Properties of Graphite

- It is soft.
- Its specific gravity is 2.3.
- It is good conductor of heat and electricity.
- It is black in colour.
- It is insoluble in ordinary solvents.
- It burns in air at 700-800°C and gives out CO₂.
- It is of hexagonal crystals.

Uses of Graphite

- It is used in writing pencils and lead.
- It is used as a lubricant for high temperature.
- It is used as refractory material for designing crucibles and electrodes for high temperature.

Coal

- Its common variety is bituminous which is like hard stone and burns with smoky flame. The superior quality coal burns without smoke and is called anthracite.
- It is formed out of carbonization of organic and fossil matter buried deep into the Earth, under high pressure and high temperature with very-very limited supply of air, during centuries.

Uses of Coal

- It is used as a fuel.
- It is also used in manufacturing fuel gases like producer gas, water gas and semi-water gas.
- It is used for manufacturing of synthetic petrol by catalytic hydrogenation of coal.

Coke

- It is a coal deprived of volatile constituents such as coal gas, ammonia, benzene, phenol, tar etc.
- It is manufactured from coal by destructive distillation by heating in the absence of air due to which volatile constituents are left back in the coal.

Uses of Coal

- It is used as a fuel.
- It is used for making graphite and water gas.

- It is used as reducing agent in iron and steel industry.

Wood Charcoal

When wood is suitably stocked, encased in an earthy/clay cover and ignited with a very limited supply of air, the volatile products are allowed to escape, and wood charcoal is obtained.

Uses of Wood Charcoal

- It is used as a fuel.
- It is used a constituent of gun-powder.
- It is used for purification of water.

Bone Black or Animal Charcoal

When bones are subjected to destructive distillation in a retort, the residue obtained is bone black or animal charcoal.

Lamp Black

When tar or vegetable oil rich in carbon is burnt in an insufficient supply of air, black soot is deposited on the wet blankets hung in the room.

Uses of Lamp Black

- It is used in making Indian ink.
- It is used in making printers ink.