

# p-Block Elements – II Summary

- ❖ **Occurrence:** About 78 % of earth atmosphere contains dinitrogen ( $N_2$ ) gas. It is also present in earth crust as sodium nitrate (Chile saltpetre) and potassium nitrates (Indian saltpetre).
- ❖ **Nitrogen**, the principle gas of atmosphere (78 % by volume) is separated industrially from liquid air by fractional distillation
- ❖ Ammonia is formed by the hydrolysis of urea.
- ❖ Nitric acid is prepared by heating equal amounts of potassium or sodium nitrate with concentrated sulphuric acid.
- ❖ In most of the reactions, nitric acid acts as an oxidising agent. Hence the oxidation state changes from +5 to a lower one. It doesn't yield hydrogen in its reaction with metals.
- ❖ The reactions of metals with nitric acid are explained in 3 steps as follows:
  - Primary reaction:** Metal nitrate is formed with the release of nascent hydrogen
  - Secondary reaction:** Nascent hydrogen produces the reduction products of nitric acid.
  - Tertiary reaction:** The secondary products either decompose or react to give final products.
- ❖ Phosphorus has several allotropic modification of which the three forms namely white, red and black phosphorus are most common.
- ❖ yellow phosphorus is poisonous in nature and has a characteristic garlic smell. It glows in the dark due to oxidation which is called phosphorescence.
- ❖ Yellow phosphorus readily catches fire in air giving dense white fumes of phosphorus pentoxide.

- ❖ Phosphine is prepared by action of sodium hydroxide with white phosphorous in an inert atmosphere of carbon dioxide or hydrogen.
- ❖ Phosphine is used for producing smoke screen as it gives large smoke.
- ❖ When a slow stream of chlorine is passed over white phosphorous, phosphorous trichloride is formed.
- ❖ phosphorus trichloride: and Phosphorous pentachloride are used as a chlorinating agent
- ❖ Oxygen is paramagnetic. It exists in two allotropic forms namely dioxygen ( $O_2$ ) and ozone or trioxygen ( $O_3$ ).
- ❖ Ozone is commonly used for oxidation of organic compounds.
- ❖ Sulphur exists in crystalline as well as amorphous allotropic forms. The crystalline form includes rhombic sulphur ( $\alpha$  sulphur) and monoclinic sulphur ( $\beta$  sulphur). Amorphous allotropic form includes plastic sulphur ( $\gamma$  sulphur), milk of sulphur and colloidal sulphur.
- ❖ Sulphuric acid can be manufactured by lead chamber process, cascade process or contact process.
- ❖ When dissolved in water, it forms mono ( $H_2SO_4 \cdot H_2O$ ) and dihydrates ( $H_2SO_4 \cdot 2H_2O$ ) and the reaction is exothermic.
- ❖ Halogens are present in combined form as they are highly reactive.
- ❖ Chlorine is manufactured by the electrolysis of brine in electrolytic process or by oxidation of HCl by air in Deacon's process.
- ❖ Chlorine is a strong oxidising and bleaching agent because of the nascent oxygen.

- ❖ When three parts of concentrated hydrochloric acid and one part of concentrated nitric acid are mixed, Aquaregia (Royal water) is obtained. This is used for dissolving gold, platinum etc...
- ❖ Hydrogen halides are extremely soluble in water due to the ionisation.
- ❖ Each halogen combines with other halogens to form a series of compounds called inter halogen compounds.
- ❖ Fluorine reacts readily with oxygen and forms difluorine oxide ( $F_2O$ ) and difluorine dioxide ( $F_2O_2$ ) where it has a -1 oxidation state.
- ❖ All the noble gases occur in the atmosphere.
- ❖ They are extremely stable and have a small tendency to gain or lose electrons.
- ❖ Sodium per xenate is very much known for its strong oxidizing property.
- ❖ The inertness of noble gases is an important feature of their practical uses.