

Unit 2: p-BLOCK ELEMENTS-I

Learning Objectives

After studying this unit, the students will be able to

- ❖ Describe the general trends in the properties of p-block elements
- ❖ Explain the anomalous properties of the first element of p-block groups
- ❖ Discuss the preparation, properties and uses of boron
- ❖ Discuss the preparation of important, compounds of boron and aluminum
- ❖ Discuss the preparation and properties of important compounds of carbon and silicon

Important Notes and Points

- ❖ The tendency of an element to form a cation by losing electrons is known as electropositive or metallic character.
- ❖ Boron has the capacity to absorb neutrons. Hence, its isotope ^{10}B is used as moderator in nuclear reactors.
- ❖ Boric acid has a two dimensional layered structure.

- ❖ Boric acid is used in the manufacture of pottery glazes, enamels and pigments.
- ❖ Diborane is used as a high energy fuel for propellant.
- ❖ Unlike graphite the other allotrope **diamond** is very hard.
- ❖ The mineral which contains silicon and oxygen in tetrahedral $[\text{SiO}_4]^{4-}$ units linked together in different patterns are called silicates.
- ❖ The affinity of Boron-10 for neutrons is the basis of a technique known as boron neutron capture therapy (BNCT) for treating patients suffering from brain tumours.
- ❖ It is based on the nuclear reaction that occurs when boron-10 is irradiated with low-energy thermal neutrons to give high linear energy α particles and a Li particle.
- ❖ Boron compounds are injected into a patient with a brain tumour and the compounds collect preferentially in the tumour. The tumour area is then irradiated with thermal neutrons and results in the release of an alpha particle that damages the tissue in the tumour each time a boron-10 nucleus captures a neutron. In this way damage can be limited preferentially to the tumour, leaving the normal brain tissue less affected. BNCT has also been studied as a treatment for several other tumours of the head and neck, the breast, the prostate, the bladder, and the liver.