

Chemistry Study Materials for Class 11

(NCERT Quick Revision Notes of Chapter- 11)

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The p- Block Element

Allotropes of Carbon

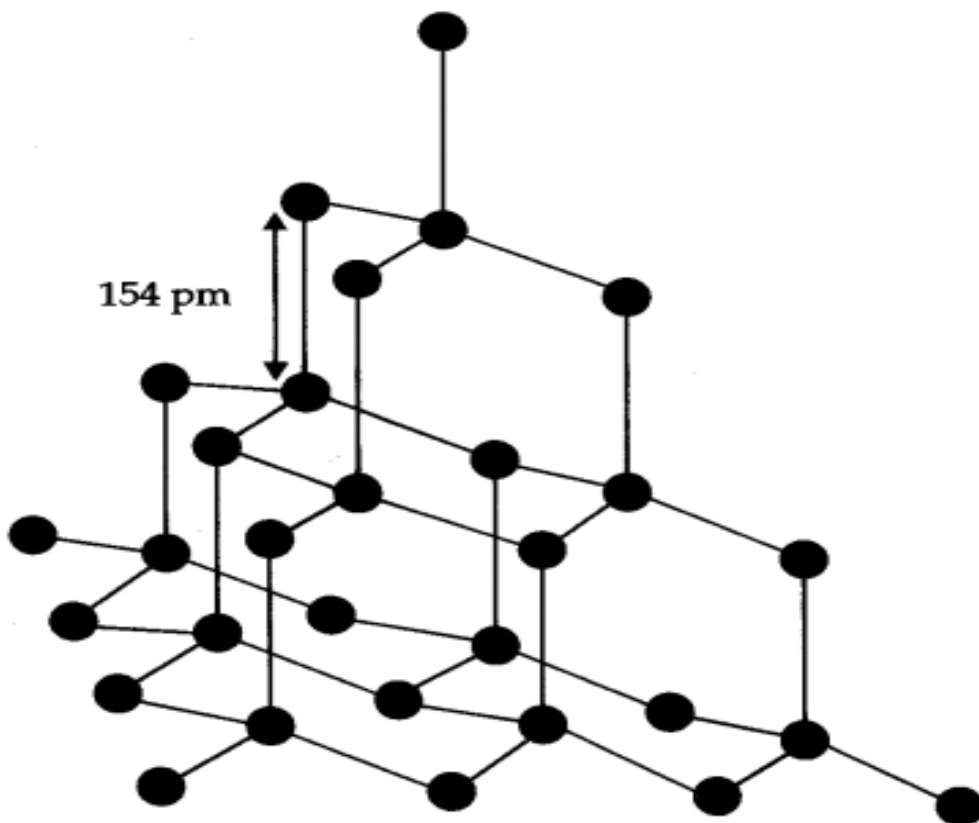
The property of an element to exist in two or more forms which have different physical properties but identical chemical properties is called allotropy and different forms are called allotropes. Carbon exists in two allotropic forms:

(i) Crystalline (ii) Amorphous

Crystalline form of carbon: Diamond, Graphite, Fullerenes
Diamond: In diamond each carbon atom undergoes sp^3 hybridisation. Each carbon is tetrahedrally linked to four other carbon atoms. The C—C bond length is 154 pm.

Properties:

- (i) It is the hardest substance on earth.
- (ii) It is used as an abrasive for sharpening hard tools in making dyes and in manufacture of tungsten filaments.

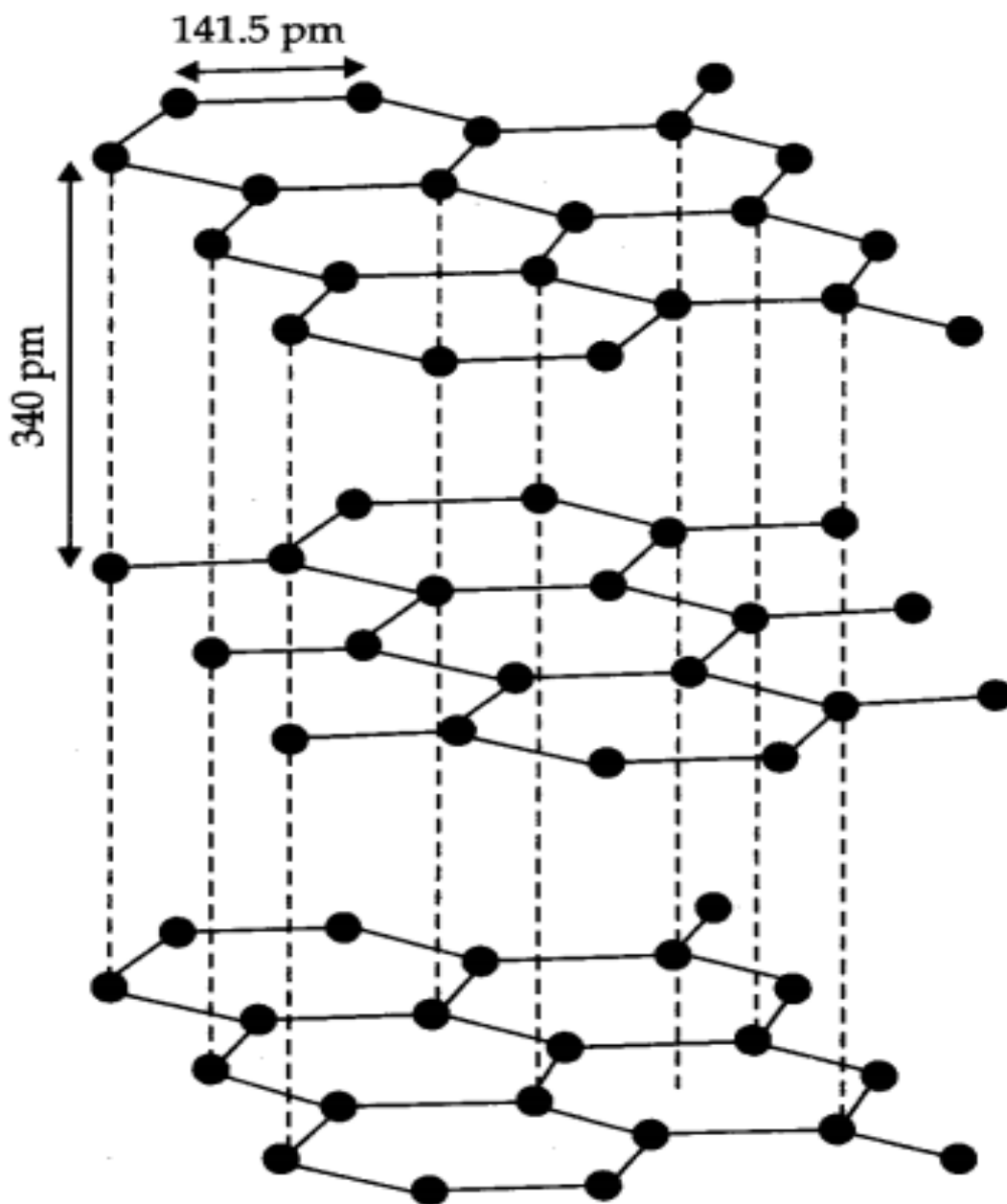


The structure of diamond

Graphite: In graphite, carbon is sp^2 -hybridized. Graphite has a two-dimensional sheet like structure consisting of a number of hexagonal rings fused together. Layers are held by van der Waals forces and distance between two layers is 340 pm.

Properties:

- (i) Graphite conducts electricity along the sheet.
- (ii) It is very soft and slippery.
- (iii) Used as a dry lubricant in machines running at high temperature, where oil cannot be used as a lubricant.



The structure of graphite

Fullerenes: Fullerenes was discovered collectively by three scientists namely E. Smalley, R.F. Curl and H.W. Kroto.

Preparation of Fullerenes:

Fullerenes is prepared by heating of graphite in an electric arc in the presence of inert gas such as helium or argon.

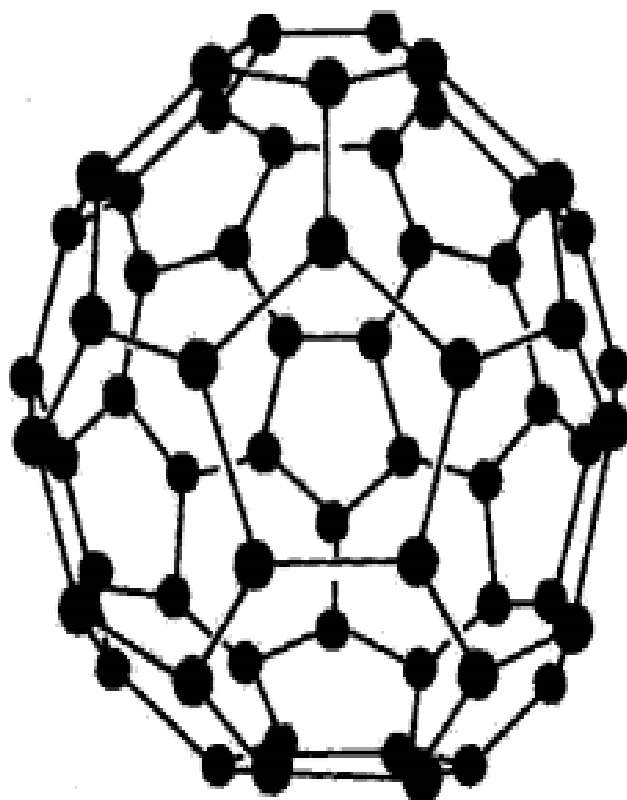
The sooty material formed by the condensation of vaporized C^n small molecules consists of mainly with smaller quantity of C_{70} and traces of other fullerenes consisting of even number of carbon atoms up to 350 or above.

Fullerenes are cage like molecules. C_{60} molecule has a shape like soccer ball and called Buckminsterfullerene. It is the most stable.

It contains 20 six-membered rings and 12 five-membered rings.

Six-membered rings are fused to both the other six-membered rings and five-membered rings but the five-membered rings are connected only to six-membered rings.

All the carbon atoms are equal and they undergo sp^2 -Kybridization.



*The structure of C_{60} Buckminsterfullerene:
Note that molecule has the shape of a soccer ball (football).*
