

UNIT 11

p BLOCK ELEMENTS

Answer the questions. (1 Score each)

1) The element which exists in liquid state for a wide range of temperature and can be used for measuring high temperature is.....

- (i) B (ii) Al (iii) Ga (iv) In

Answer – iii)Ga

2) Self linking property of Carbon is known as.....

Answer - Catenation

3) What is called Inorganic benzene ?

Answer - Borazine, (B₃N₃H₆)

4) Three centered two electron bonds in diborane are also known as.....

Answer - Banana bonds

5) Thermodynamically the most stable form of carbon is.....

- (a)diamond (b) graphite (c) fullerenes (d) coal

Answer – b) Graphite

6)What is dry ice?

Answer - Solid carbon di oxide

7) Write the general formula of Silicones?

Answer :- (R₂SiO)_n

8)Why is CO called a poisonous gas?

Answer -Carbon monoxide reacts with haemoglobin to form carboxy haemoglobin.

9)Write the chemical formula of Diborane?

Answer :-B₂H₆

10)What is the state of hybridisation of carbon in Diamond?

Answer:- sp³

11.General outer electronic configuration of P block elements is.....

Answer: ns² np¹⁻⁶ (except Helium)

12 Hybridisation of carbon in Graphite is.....

Answer: sp²

13. Which allotrope of carbon has layered structure. ?

Answer: **Graphite**

14. The allotrope of carbon used as an abrasive for sharpening hard tools is.....

Answer: **Diamond**

15. Allotrope of carbon is used as a dry lubricant in machine ?

Answer: **Graphite**

16 All carbon atoms of fullerene undergohybridisation

Answer: **sp²**

17. Buckminster fullerene is

Answer: **Allotrope of carbon or C- 60**

18. What is water gas or syngas ?

Answer : **Mixture of CO and H₂**

Answer the questions. (2 Score each)

19) Write any two uses of Silicones?

Answer. – 1) They are used as sealant, greases, electrical insulators and for water proofing of fabrics.

2) Being biocompatible they are also used in surgical and cosmetics.

20) Write any two difference in properties of diamond and graphite on the basis of their structures.

Answer: Since diamond exists as a three dimensional network solid, it is the hardest substance known with high density and high melting point. Whereas in graphite, any two successive layers are held together by weak forces of attraction. This makes graphite soft. In graphite, carbon atom is sp² hybridized whereas in diamond, carbon atom is sp³ hybridized.

21) Write any method for the preparation of Diborane.

Answer - The industrial synthesis of diborane involves the reduction of BF₃ by sodium hydride, lithium hydride or lithium aluminium hydride:



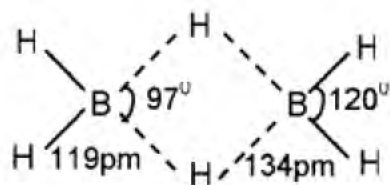
22) Write any two uses of carbon monoxide.

Answer:- a) Reducing agent in metallurgy

b)Used in the manufacture of methanol

23) Briefly describe the structure of diborane.

Answer.



Two Boron atoms and four terminal hydrogen atoms are co-planar whereas two bridging hydrogen are present in perpendicular plane. One bridging hydrogen is above the plane and other bridging H atom is below the plane

24) How are fullerenes prepared?

Answer -Fullerenes are made by heating of graphite in an electric arc in the presence of inert gases such as helium or argon.

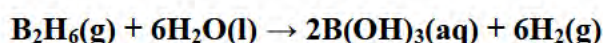
25) How diborane reacts with

1. Oxygen?
2. Water?

Answer:-1. Diborane catches fire spontaneously upon exposure to air. It burns in oxygen releasing an enormous amount of energy.

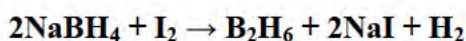


2. Diborane is readily hydrolysed by water to give boric acid.



26) How is diborane prepared in the laboratory?

Answer - Diborane can be conveniently prepared in the laboratory by the oxidation of sodium borohydride with iodine.



27) What are silicones?

Answer:-Silicones are polymeric organosilicon compound having C-Si and Si-O-Si bonds or R_2SiO units General formula – $R_2(SiO)_n$

R → methyl or phenyl group.

28) Explain why Graphite is used as a lubricant in machines.

Answer: Graphite has a layered structure. It cleaves easily between the layers and, therefore, it is very soft and slippery. For this reason graphite is used as a dry lubricant in machines running at high temperatures, where oil cannot be used as a lubricant.

29. Explain why diborane is an electron deficient compound.

Answer: Diborane (B_2H_6) has 4 terminal B-H bonds and two bridge B-H-B bonds which are three centered two electron ($3C\ 2e$) bonds or banana bonds. Thus diborane is an electron deficient compound.

30. Explain the structure of Buckminsterfullerene.

Answer: It contains twelve five membered rings and twenty six membered rings of carbon. The six membered rings are fused to other five and six membered rings. All the carbon atoms are SP^2 hybridised

Answer the questions. (3 Score each)

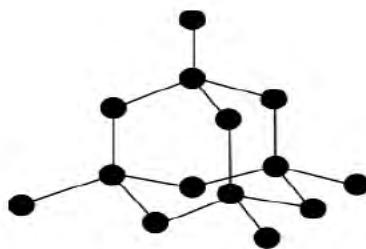
31. Diamond is hard and non conducting but graphite is soft and conducting . why ?

Answer: In diamond each carbon atom is sp^3 hybridised and is joined tetrahedrally to four neighbouring carbon atoms. This three dimensional network of strong covalent bonds make diamond very hard and is a bad conductor of electricity.

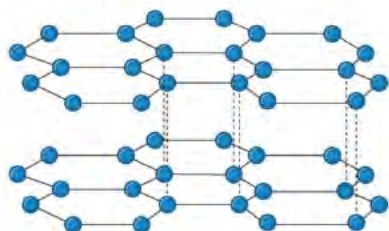
In graphite each carbon atom is sp^2 hybridised and is linked to three neighbouring carbon atoms in the same plane to form hexagonal rings. The fourth electron present in the unhybridised p orbital on each carbon atom form pi bonds. These π electrons are delocalised to make graphite electrically conducting.

32. sketch the structures of diamond, graphite and fullerene. what are hybridisation of carbon atoms in each.

Answer: diamond (hybridisation :SP³)



Graphite (hybridisation :SP²)

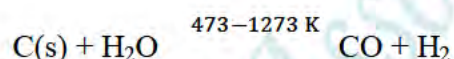


fullerene (hybridisation : SP²)

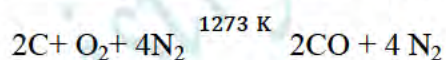


33. What are producer gas and water gas. Give preparation mentioning their use.

Answer: The mixture of CO and H₂ is known as water gas or syngas. It is prepared by passing steam over hot coke. Water gas is used to remove carbon monoxide from fuel cell.



The Mixture of CO and N₂ is known as producer gas. If air is passed over hot coke producer gas is formed. Producer gas was used primarily as an industrial fuel.



34 Define allotropy. What are the allotropic forms of carbon?

Answer: The existence of an element in two or more forms with same chemical properties but different physical properties is known as allotropy. The important crystalline allotropes of carbon are diamond, graphite and fullerene. Amorphous forms of carbon are carbon black, charcoal and coke