

UNIT -2 p-BLOCK ELEMENTS-I

BOOK BACK ANSWERS

1. Write the Anomalous properties of the first elements of p – block

1. Small size of the first member
2. High ionisation enthalpy and high electronegativity
3. Absence of d orbitals in their valence shell

* The first member of the group 13, boron is a metalloid while others are reactive metals

* In group 14, the first element carbon is strictly a nonmetal while other elements are metalloids (silicon & germanium) or metals (tin & lead).

* In group 15 Nitrogen is a diatomic gas unlike the other members of the group.

In group 16, the first element, oxygen also exists as a diatomic gas in that group. Due to its high electronegativity it forms hydrogen bonds.

* The first element of group 17, fluorine the most electronegative element. It shows only -1 oxidation state while the other halogens have +1, +3, +5 and +7 oxidation states in addition to -1 state. The fluorine also is the strongest oxidising agent and the most reactive element among the halogens.

2. Describe briefly allotropism in p-block elements with specific reference to carbon.

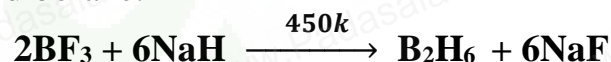
Some elements exist in more than one crystalline or molecular forms in the same physical state. For example, carbon exists as diamond and graphite. This phenomenon is called allotropism (in greek 'allos' means another and 'trophe')

means change) and the different forms of an element are called allotropes.

Allotropes of carbon ;Diamond , graphite , fullerene , carbon nanotubes

3. Boron does not react directly with hydrogen. Suggest one method to prepare diborane from BF_3 .

Boron does not react directly with hydrogen. However, it forms a variety of hydrides called boranes. The simplest borane is diborane - B_2H_6 . Other larger boranes can be prepared from diborane. Treatment of gaseous boron trifluoride with sodium hydride around 450 K gives diborane.



4. Give the uses of Borax

1. Borax is used for the identification of coloured metal ions
2. In the manufacture optical and borosilicate glass, enamels and glazes for pottery
3. It is also used as a flux in metallurgy and also acts as a good preservative

5. What is catenation ? describe the catenation property of carbon

Catenation is an ability of an element to form chain of atoms

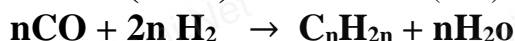
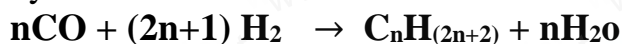
Carbon possesses all the below properties and forms a wide range of compounds with itself and with other elements such as H, O, N, S and halogens

- (i) the valency of element is greater than or equal to two,
- (ii) element should have an ability to bond with itself
- (iii) the self bond must be as strong as its bond with other elements

(iv) kinetic inertness of catenated compound towards other molecules

6. Write a note on Fisher tropsch synthesis.

The reaction of carbon monoxide with hydrogen at a pressure of less than 50 atm using metal catalysts at **500 - 700 K** yields saturated and unsaturated hydrocarbons



7. Give the structure of CO and CO₂

* **CO** has a linear structure. In carbon monoxide, three electron pairs are shared between carbon and oxygen.

Structure ; refer fig 2.9 in text book

*Carbon dioxide has a linear structure with equal bond distance for the both C-O bonds. In this molecule there is one C-O sigma bond. In addition there is 3c-4e bond covering all the three atoms.

Structure ; refer fig 2.10 in text book

8. Give Uses of silicones

1. Silicones are used for **low temperature lubrication** and in vacuum pumps, high temperature oil baths etc...

2. They are used for **making water proofing clothes**

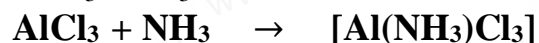
3. They are used as **insulating material** in electrical motor and other appliances

4. They are **mixed with paints and enamels** to make them resistant towards high temperature, sunlight, dampness and chemicals.

9. AlCl₃ behaves like a lewis acid

.Substantiate this statement

It behaves like a Lewis acid and forms addition compounds with ammonia, phosphine and carbonyl chloride etc... Eg. $\text{AlCl}_3 \cdot 6\text{NH}_3$



10. Explain about structure of diborane

*In diborane **two BH₂** units are linked by two bridged hydrogens.

*It has **eight B-H bonds**.

* Diborane has only **12 valance electrons** and are not sufficient to form normal covalent bonds.

*The four terminal B-H bonds are normal covalent bonds (**two centre - two electron bond or 2c-2e bond**).

*The remaining four electrons have to be used for the bridged bonds. i.e. **two three centred B-H-B** bonds utilise two electrons each.

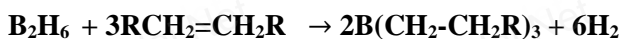
* In diborane, the boron is sp₃ hybridised. Three of the four sp₃ hybridised orbitals contain single electron and the fourth orbital is empty.

* Two of the half filled hybridised orbitals of each boron overlap with the two hydrogens to form four terminal 2c-2e bonds, leaving one empty and one half filled hybridised orbitals on each boron.

*The Three centre - two electron bonds), B-H-B bond formation involves overlapping the half filled hybridised orbital of one boron, the empty hybridised orbital of the other boron and the half filled 1s orbital of hydrogen.

11. Write a short note on hydroboration

Diborane adds on to alkenes and alkynes in ether solvent at room temperature. This reaction is called hydroboration and is highly used in synthetic organic chemistry, especially for anti Markovnikov addition.

**12. Give one example for each of the following**

- i) **Icosogens** – Boron
- ii) **Prictogen** – Nitrogen
- iii) **Tetragen** – Carbon
- iv) **Chalcogens** – Oxygen

13. Write a note on metallic nature of p-block elements

The tendency of an element to form a cation by losing electrons is known as electropositive or metallic character. This character depends on the ionisation energy. Generally on descending a group the ionisation energy decreases and hence the metallic character increases.

In p-block, the elements present in **lower left part** are **metals** while the elements in the **upper right part** are **non metals**.

Elements of **group 13** have metallic character except the first element **boron which is a metalloid**, having properties intermediate between the metal and nonmetals.

The atomic radius of boron is very small and it has relatively high nuclear charge and these properties are responsible for its nonmetallic character.

In the subsequent groups the non-metallic character increases. In group 14 elements, carbon is a nonmetal while silicon and germanium are metalloids. In

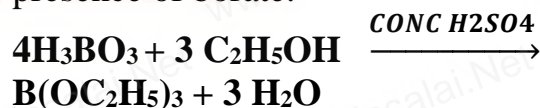
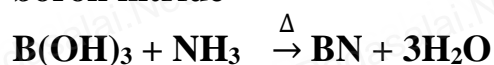
group 15, **nitrogen and phosphorus are non metals** and **arsenic & antimony are metalloids**. In group 16, **oxygen, sulphur and selenium are non metals** and tellurium is a metalloid. All the elements of group 17 and 18 are non metals.

14. Complete the following reactions

- i) $\text{B}(\text{OH})_3 + \text{NH}_3 \xrightarrow{\Delta} \text{BN} + 3\text{H}_2\text{O}$
- ii) $\text{Na}_2\text{B}_4\text{O}_7 + \text{H}_2\text{SO}_4 + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{SO}_4 + 4\text{H}_3\text{BO}_3$
- iii) $\text{B}_2\text{H}_6 + 2\text{NaOH} + 6\text{H}_2\text{O} \rightarrow 2\text{Na}[\text{B}(\text{OH})_4] + 6\text{H}_2$
- iv) $\text{B}_2\text{H}_6 + \text{CH}_3\text{OH} \rightarrow 2\text{B}(\text{OCH}_3)_3 + 6\text{H}_2\text{O}$
- v) $\text{BF}_3 + 3\text{H}_2\text{O} \rightarrow \text{H}_3\text{BO}_3 + 3\text{HF}$
- vi) $\text{HCOOH} + \text{H}_2\text{SO}_4 \rightarrow \text{CO} + \text{H}_2\text{O} + \text{H}_2\text{SO}_4$
- vii) $\text{SiCl}_4 + \text{NH}_3 \xrightarrow{330\text{K}} \text{Cl-Si-NH-SiCl}_3$
- viii) $\text{SiCl}_4 + 6\text{C}_2\text{H}_5\text{OH} \rightarrow \text{Si}(\text{OC}_2\text{H}_5)_4 + 4\text{HCl}$
- ix) $2\text{B} + 6\text{NaOH} \rightarrow 2\text{Na}_3\text{BO}_3 + 3\text{H}_2\text{O}$
- x) $\text{H}_2\text{B}_4\text{O}_7 \xrightarrow{\text{RED HOT}} 2\text{B}_2\text{O}_3 + \text{H}_2\text{O}$

15. How will you identify presence of borate radical

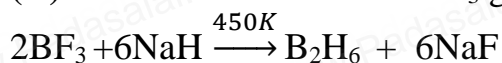
When boric acid or borate salt is heated with ethyl alcohol in presence of conc. sulphuric acid, an ester, trialkylborate is formed. The vapour of this ester burns with a green edged flame and this reaction is used to identify the presence of borate.

**17. How will you convert boric acid to boron nitride**

Fusion of urea with boric acid in the atmosphere of ammonia at 800-1200K gives boron nitride

18. A hydride of 2nd period alkali metal (A) on reaction with compound of Boron (B) to give a reducing agent (C). identify A, B and C.

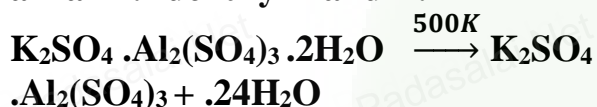
(A) is NaH. It reacts with BF₃ gives B₂H₆



(B) (C)

B-Boron trifluoride C-Diborane

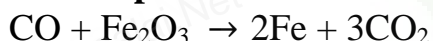
19. A double salt which contains fourth period alkali metal (A) on heating at 500K gives (B). aqueous solution of (B) gives white precipitate with BaCl₂ and gives a red colour compound with alizarin. Identify A and B.



(B)



20. CO is a reducing agent. Justify with an example



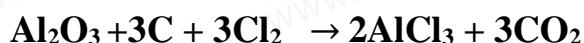
Book Inside

1. What is burnt alum

The aqueous solution is acidic due to the hydrolysis of aluminium sulphate it melts at 365 K on heating. At 475 K loses water of hydration and swells up. The swollen mass is known as burnt alum.

2. Explain McAfee Process

Aluminium chloride is obtained by heating a mixture of alumina and coke in a current of chlorine.



3. What do you mean by prismatic form and other forms of borax with chemical formula

Borax contains, tetranuclear units [B₄O₅(OH)₄]²⁻. This form is known as prismatic form. Borax also exists two other forms namely, jeweller or octahedral borax (Na₂B₄O₇·5H₂O) and borax glass (Na₂B₄O₇).

4. What is inert pair effect

In heavier post-transition metals, the outer s electrons (ns) have a tendency to remain inert and show reluctance to take part in the bonding, which is known as inert pair effect.

5. How does Silicon and boron exist in diagonal relationship. Explain with statement

The oxides of boron and silicon are similar in their acidic nature. Both boron and silicon form covalent hydrides that can be easily hydrolysed. Similarly, except boron trifluoride, halides of both elements are readily hydrolysed

6. Why from aluminium to thallium there is marginal decrease in ionisation energy

This is due to the presence of inner d and f-electrons which has poor shielding effect compared to s and p-electrons. As a result, the effective nuclear charge on the valance electrons increases.

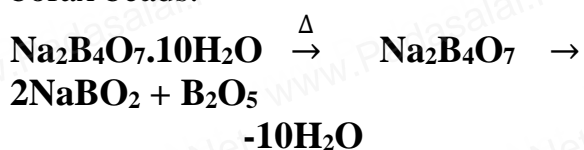
7. What are important ores of boron

Borax - Na₂[B₄O₅(OH)₄]·8H₂O

Kernite - Na₂[B₄O₅(OH)₄]·2H₂O

8. How will you prepare borax beads from borax

On heating Borax forms a transparent borax beads.



9. What are necessary condition for catenation

- (i) the valency of element is greater than or equal to two,
- (ii) element should have an ability to bond with itself
- (iii) the self bond must be as strong as its bond with other elements
- (iv) kinetic inertness of catenated compound towards other molecules

10. Write about producer gas

On industrial scale carbon monoxide is produced by the reaction of carbon with air. The carbon monoxide formed will contain nitrogen gas also and the mixture of nitrogen and carbon monoxide is called producer gas.



11. Difference between graphite and diamond

Diamond	Graphite
It is hard	It is soft
It does not conduct electricity	It conducts electricity due to presence of delocalised electrons
Carbon atom is sp^3 hybridized	Carbon atom is sp^2 hybridized
C-C bond length is 1.54 \AA	C-C bond length is 1.41 \AA
It used for sharpening hard tools, cutting glasses, making bores and rock drilling.	It is used as a lubricant either on its own or as a graphited oil

12. Write about zeolites

13. Explain about fullerene and carbon nanotube

19. Explain about ionisation enthalpy and electronegativity of P block elements

20. Give some examples of allotropes for given p block elements – Boron, Carbon, Tin SEE OTHER ALLOTROPES

21. Explain the types of silicates

22. Explain silicones – preparation, types

Refer Preparation, physical and chemical properties uses of elements given in book

Mainly Action of heat, preparation of alum

Refer table 2.2, 2.3, 2.4

One marks

1. Group no 13 to 18 in the periodic table is ---elements.

a) s block **b) p block** c) d block d) f block

2. -----and ----- made a revolutionary change in the field of modern electronics

a) Si and Al **b) Si and Ge**

c) Cu and Au d) Ag and Au

3.-----block elements which show only positive oxidation state

a) s b) p c) d d) f

4. Group no 13 in the periodic table is called --

a) Tetragens b)

Pnictogens

c) Chalcogens **d) Icosagens**

5. Group no 14 in the periodic table is called --

a) Tetragens b) Pnictogens

c) Chalcogens d) Icosagens

6. Group no 15 in the periodic table is called

a) Tetragens **b)**

Pnictogens

c) Chalcogens d) Icosagens

7. Group no 16 in the periodic table is called --

a) Tetragens b) Pnictogens

c) Chalcogen d) Icosagens

8. Generally on descending a group the IE decreases, metallic character -----

a) increases b) decreases

c) no change d) none of these

9. Which of the following elements is / are metalloid?

a) Arsenic, Tellurium b) Antimony, Silicon c) Boron, Germanium **d) all of these**

10. Which of the following elements is/are non metals?

a) Carbon, Nitrogen b) Phosphorus, Oxygen c) Sulphur and Selenium **d) All of these**

11. Group no -----and ----- are non metals.

a) 15,16 b) 16,17 **c) 17,18** d) 13,14

12. -----compound is not undergoing hydrolysis reaction

a) Boron trifluoride b) Boron trichloride

c) Boron triiodide d) all of these

13. Which one of the following is more stable?

a) Ti^{+4} b) Ti^{+3} **c) Ti^{+}** d) Ti^{+2}

14. The Greek word 'allos' and 'trope' means ----- and -----

a) change & another b) different & similar **c) another and change** d) all of these

15. The simplest borane is -----

a) Diborane b) Triborane

c) Tetra borane d) Mono borane

16. Halo acids have no reaction with -----

a) B b) C c) Zn d) Al

17. Oxidising acids reacts with Boron it gives

a) Boric acid b) H_3BO_3

c) $B(OH)_3$ **d) All of these**

18. ---- is essential for the cell walls of plants

a) B b) C c) Zn d) Al

19. In the manufacture of Pyrex glass, ... is used.

a) boric acid **b) boric oxide**

c) sodium borate d) boric anhydride

20. -----is used for the identification of coloured metal ions

a) Borax b) Boric acid

c) Sodium borate d) Octahedral borax

21. When heated at red hot, Boric acid gives -----glassy mass substance

- a) boric acid b) boric oxide c) sodium borate **d) boric anhydride**

22. When boric acid reacted with ethyl alcohol in presence of conc. Sulphuric acid it gives -----

- a) Borax **b) trialkylborate** c) Sodium borate d) Octahedral borax

23. Boric acid heated with soda ash it gives -----

- a) Borax** b) Boric acid c) Sodium borate d) Octahedral borax

24. -----is used as an antiseptic and as an eye lotion

- a) Borax anhydride b) Boric acid

- c) Sodium borate **d) Borax**

25. Diborane reacts with methyl alcohol to give -----

- a) Borax b) trialkylborate **c) trimethyl borate** d) Octahedral borax

26. Diborane adds on to alkenes and alkynes in ether solvent is called -----reaction

- a) Substitution b) addition **c) hydroboration** d) Markovnikov reaction

27. Diborane reacts with ammonia at high temperature, it gives-----

- a) Borazole b) Borazine c) Inorganic benzene **d) all of these**

28. 3centre and 2 electron bonds present in -----

- a) Borax anhydride **b) Diborane**

- c) Sodium borate d) Borax

29. Thermal decomposition of benzene diazonium tetrafluoro borate, it gives-----

- a) BF₃** b) BCl₃ c) B₂H₆ d) H₃BO₃

30. McAfee process is for the preparation of --

- a) BF₃ **b) AlCl₃** c) B₂H₆ d) H₃BO₃

31. An aqueous solution of aluminium chloride is -----in nature.

- a) acidic** b) basic c) neutral d) none of these

32. In solutions, -----exhibit the properties of constituent ions.

- a) Potash alum b) Sodium alum c) Ammonium alum **d) all of these**

33. At -----K, Potash alum is converted to Burnt alum.

- a) 495 b) 365 **c) 475** d) 500

34. -----is used for purification of water and styptic agent to arrest bleeding

- a) Potash alum** b) Zinc oxide c) Zinc carbonate d) Borax

35. -----is soft and conducts electricity with hexagonal net of sp² hybridisation of Carbon allotrope

- a) Diamond b) Fullerenes c) Graphene **d) Graphite**

36. -----is hard and not conducts electricity with tetrahedral net of sp³ hybridisation of Carbon allotrope

- a) Diamond** b) Fullerenes c) Graphene d) Graphite

37. -----have graphite like tubes with fullerene ends and stronger than steel.

- a) Diamond **b) Carbon nanotubes** c) Graphene d) Graphite

38. The mixture of carbon monoxide and nitrogen is called -----

- a) water gas **b) producer gas** c) both a and b d) none of these

39. Methanoic acid react with sulphuric acid, it gives -----

a) BF_3 b) CO_2 c) B_2H_6

d) CO

40. CO reacts with chlorine, it gives -----

a) carbonyl chloride

b)

Phosgene

c) both a and b

d) none of these

41. At high temperature and pressure a mixture of CO and Hydrogen gives-----

a) ethyl alcohol

b) propanol

c) methyl alcohol

d) 2 butanol

42. Ethene is mixed with CO and Hydrogen gas to produce propanal. This is called-----
process.

a) McAfee process

b) Oxo process

c) Syn process

d) Liquation process

43. In Nickel tetracarbonyl, Iron pentacarbonyl and Chromium hexacarbonyl the oxidation state of transition metal is -----

a) zero

b) one

c) two

d) three

44. The critical temperature of Carbon dioxide is ----- $^{\circ}\text{C}$

a) 51

b) 45

c) 35

d) 31

45. Olivine is an example for -----
type of silicates.

a) Ortho silicates

b) Neso silicates

c) both a and b

d) Ino silicates

46. Beryl is an example for -----type of silicates

a) inosilicates

b) chain silicates

c) amphiboles

d) cyclic silicates

47. Spodumene is an example for -----
type of silicates

a) inosilicates

b) chain silicates

c) amphiboles

d) cyclic silicates

48. Asbestos is an example for -----type of silicates

a) inosilicates

b) chain silicates

c) amphiboles

d) cyclic silicates

49. Talc, Mica are the example for -----
type of silicates

a) Phyllo silicates

b) chain silicates

c) amphiboles

d) cyclic silicates

50. Quartz is an example for -----type of silicates

a) inosilicates

b) tecto silicates

c) amphiboles

d) cyclic silicates

51. ----- act as a molecular sieve for the removal of permanent hardness of water

a) Inosilicates

b) Tecto silicates

c) Amphiboles

d) Zeolites

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**INTENSIVE COACHING TEST – I
(12TH P BLOCK ELEMENTS – I)**

MARKS :115

TIME :2hrs

I. Answer the following questions 30×2=60

1. Write a short note on anomalous properties of the first element of p-block.
2. Describe briefly allotropism in p- block elements with specific reference to carbon
3. Boron does not react directly with hydrogen. Suggest one method to prepare diborane from BF_3
4. AlCl_3 behaves like a lewis acid. Substantiate this statement
5. Write a short note on hydroboration
6. Give one example for each of the following (i) icosogens (ii) tetragen (iii) prictogen (iv) chalcogen
7. Write a note on metallic nature of p-block elements.
8. How will you convert boric acid to boron nitride?
9. A hydride of 2nd period alkali metal (A) on reaction with compound of Boron (B) to give a reducing agent (C). identify A , B and C.
10. What do you meant by burnt alum
11. Write down chemical formula for ammonium and chrome alum
12. Explain McAfee Process
13. How will you identify presence of borate
14. What do you meant by prismatic form and other forms of borax with chemical formula
15. What do you meant by inert pair effect
16. What do you meant by catenation
17. How does Silicon and boron exist in diagonal relationship . Explain with statement
18. Why from aluminium to thallium there is marginal decrease in ionisation energy
19. What are important ores of boron
20. How will you prepare metal boron from boron trichloride
21. How will you prepare boron nitride from boron and boric acid
22. Explain about action of acids on boron
23. How will you prepare borax beads from borax
24. How will you prepare boron trifluoride from boric acid
25. How will you prepare borax from boric acid
26. How will you prepare boric acid from diborane
27. How does diborane reacts with oxygen

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24. How will you prepare boron trifluoride from boric acid
25. How will you prepare borax from boric acid
26. How will you prepare boric acid from diborane
27. How does diborane reacts with oxygen

28. How will you prepare borazine
29. How will you prepare sodium aluminate from AlCl_3
30. How will you prepare aluminium hydroxide from potash alum

II. Answer the following questions 10×5=50

31. Write about uses of i) alum ii) AlCl_3 iii) BF_3 iv) B_2H_6
32. Write about uses of i) boron ii) boric acid iii) borax
33. Explain about preparation of potash alum, borax, boric acid, diborane, boron trifluoride
34. Explain about action heat on diborane
35. Explain about action of alcohol on boric acid & B_2H_6
36. Explain about action heat on boric acid, potash alum, borax
37. A hydride of boron (A) reacts with lithium hydride gives (B). On reaction of A with water gives (C) which is acid. identify A, B and C
(A) only non-metal in group 13 reacts with nitric acid gives acid (B). (B) on reacting with NaOH gives (C) identify A, B and C
38. What are allotropes of sulfur, phosphorous, Tin, silicon, germanium
39. What are general electronic configuration and highest oxidation state of elements from group 13-18 and their group name
40. Complete the reaction
 - i) $\text{Na}_2\text{B}_4\text{O}_7 + \text{H}_2\text{SO}_4 + \text{H}_2\text{O} \rightarrow$
 - ii) $\text{B} + \text{NaOH} \rightarrow$
 - iii) $\text{B(OH)}_3 + \text{NH}_3 \rightarrow$
 - iv) $\text{PhN}_2\text{BF}_4 \rightarrow$
 - v) $\text{Na}_2\text{CO}_3 + \text{B(OH)}_3 \rightarrow$

III. One marks 5×1=5

41. The element that does not show catenation among the following p-block elements is.....
42. The metal which has the largest abundance in the earth's crust.....
43. An aqueous solution of borax is.....
44. The most reactive element among halogens
45. The element and its isotope which is used as moderator in nuclear reactor&.....

28. How will you prepare borazine
29. How will you prepare sodium aluminate from AlCl_3
30. How will you prepare aluminium hydroxide from potash alum

II. Answer the following questions 10×5=50

31. Write about uses of i) alum ii) AlCl_3 iii) BF_3 iv) B_2H_6
32. Write about uses of i) boron ii) boric acid iii) borax
33. Explain about preparation of potash alum, borax, boric acid, diborane, boron trifluoride
34. Explain about action heat on diborane
35. Explain about action of alcohol on boric acid & B_2H_6
36. Explain about action heat on boric acid, potash alum, borax
37. A hydride of boron (A) reacts with lithium hydride gives (B). On reaction of A with water gives (C) which is acid. identify A, B and C
(A) only non-metal in group 13 reacts with nitric acid gives acid (B). (B) on reacting with NaOH gives (C) identify A, B and C
38. What are allotropes of sulfur, phosphorous, Tin, silicon, germanium
39. What are general electronic configuration and highest oxidation state of elements from group 13-18 and their group name
40. Complete the reaction
 - i) $\text{Na}_2\text{B}_4\text{O}_7 + \text{H}_2\text{SO}_4 + \text{H}_2\text{O} \rightarrow$
 - ii) $\text{B} + \text{NaOH} \rightarrow$
 - iii) $\text{B(OH)}_3 + \text{NH}_3 \rightarrow$
 - iv) $\text{PhN}_2\text{BF}_4 \rightarrow$
 - v) $\text{Na}_2\text{CO}_3 + \text{B(OH)}_3 \rightarrow$

III. One marks 5×1=5

41. The element that does not show catenation among the following p-block elements is.....
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SAIVEERA ACADEMY
PEELAMEDU – 8098850809
CHEMISTRY SOLID STATE FIRST
HALF TEST

MARKS : 60
TIME :1hrs30min

I. Choose the best answers $10 \times 1 = 10$

- The cation leaves its normal position in the crystal and moves to some interstitial position, the defect in the crystal is known as a) Schottky defect b) F center c) Frenkel defect d) non-stoichiometric defect
- Schottky defect in a crystal is observed when a) unequal number of anions and anions are missing from the lattice b) equal number of anions and anions are missing from the lattice c) an ion leaves its normal site and occupies an interstitial site d) no ion is missing from its lattice.
- Assertion: due to Frenkel defect, density of the crystalline solid decreases.
Reason: in Frenkel defect cation and anion leaves the crystal.
a) Both assertion and reason are true and reason is the correct explanation of assertion.
b) Both assertion and reason are true but reason is not the correct explanation of assertion.
c) Assertion is true but reason is false.
d) Both assertion and reason are false
- The crystal with a metal deficiency defect is
a) NaCl b) FeO c) ZnO d) KCl
- The yellow colour in NaCl crystal is due to a) excitation of electrons in F centers b) reflection of light from Cl⁻ ion on the surface c) refraction of light from Na⁺ ion d) all of the above
- Graphite and diamond are
a) Covalent and molecular crystals b) ionic and covalent crystals
c) both covalent crystals d) both molecular crystals

SAIVEERA ACADEMY
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c) both covalent crystals d) both molecular crystals

7. Solid CO_2 is an example of
 a) Covalent solid b) metallic solid
 c) molecular solid d) ionic solid
8. The number of carbon atoms per unit cell of diamond is
 a) 8 b) 6 c) 1 d) 4
9. Find the odd one out
 a) naphthalene b) anthracene c) glucose
 d) SiO_2
10. In Hexagonal unit cell
 a) $a=b=c$ b) $a \neq b=c$ c) $a=b \neq c$ d) $a \neq b \neq c$

II. Answer the following questions

6×2=12

1. Define unit cell.
2. Give any three characteristics of ionic crystals.
3. What are point defects?
4. What is meant by the term “coordination number”?
5. Define anisotropy and isotropy
6. The diffraction of crystal of barium with X-ray of wavelength 2.29 \AA gives a first order deflection at 30° . What is the distance between the diffracted planes?

III. Answer the following questions

6×3=18

1. Write about characteristics of solids
2. Two types of unit cell
3. What are seven primitive crystal systems
4. Barium has a body centered cubic unit cell with a length of 508 pm along an edge. What is the density of barium in Kg m^{-3}
5. Write about impurity defect
6. Write about non stoichiometric defects

IV. Answer the following questions

4×5= 20

1. Sketch i. SC ii. BCC iii. FCC & its number of atoms per unit cell
2. Write about i. ionic solids ii. covalent solids iii. metallic solids
3. Explain Schottky and Frenkel defect with neat diagram
4. Explain molecular solids and its types

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**SAIVEERA ACADEMY
REVOLUTION FOR LEARNING
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12TH METTALURGY FULL TEST

MARKS ; 70

TIME ; 2hrs

I .Choose the best answers 10×1=10

1. Roasting of sulphide ore gives the gas (A). (A) is a colourless gas. Aqueous solution of (A) is acidic. The gas (A) is
a) CO₂ b) SO₃ c) SO₂ d) H₂S
2. Which of the metal is extracted by Hall-Heroult process?
a) Al b) Ni c) Cu d) Zn
3. Wolframite ore is separated from tinstone by the process of
a) Smelting b) Calcination
c) Roasting d) Electromagnetic separation
4. Flux is a substance which is used to convert
a) Mineral into silicate b) Infusible impurities to soluble impurities
c) Soluble impurities to infusible impurities d) All of these
5. Which one of the following ores is best concentrated by froth – floatation method?
a) Magnetite b) Hematite
c) Galena d) Cassiterite
6. Zinc is obtained from ZnO by
a) Carbon reduction b) Reduction using silver
c) Electrochemical process d) Acid leaching
7. Extraction of gold and silver involves leaching with cyanide ion. silver is later recovered by
a) Distillation b) Zone refining
c) Displacement with zinc d) liquation
8. In the electrolytic refining of copper, which one of the following is used as cathode?
a) Pure copper b) Impure copper
c) Carbon rod d) Platinum electrode
9. Chlorargyrite is otherwise called as
a) Ruby silver b) Hematite
c) Horn silver d) Tinstone

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10. Van-Arkel is used for refining

- a) Al b) Ni c) Cu d) Zr

II. Answer the following **7×2=14**

1. Difference between metal and ore
2. Give two examples for ores of iron
3. What do you mean by cementation
4. Write about method to concentrate gold and oxide ores
5. Write down steps for extraction of crude metal from concentrated ore
6. Define roasting and calcination
7. What is the role of Limestone in the extraction of Iron from its oxide Fe_2O_3 ?

III. Answer the following **7×3=21**

1. Write about steps involved in electrolytic refining of crude metal
2. How do you concentrate ferromagnetic ores and write down its principle.
3. How will you concentrate ZnS
4. List down ores of zinc, tin, silver
5. Write about aluminothermic process
6. Explain roasting and calcination with example
7. Predict the conditions under which
 - (i) Aluminium might be expected to reduce magnesia.
 - (ii) Magnesium could reduce alumina.
- (B) Carbon monoxide is more effective reducing agent than carbon below 983K but, above this temperature, the reverse is true –Explain. (c) it is possible to reduce Fe_2O_3 by coke at a temperature around 1200K

III. Answer the following **7×5=35**

1. Explain about reduction of metal oxide with its different types
2. Explain about refining based on vapour phase method
3. Explain about method which is based on the solubility of ore in suitable solvent
4. What are the applications of Al, Zn
5. What are the applications of Fe, Cu, Au
6. Describe the role of the following in the process mentioned. (i) Silica in the extraction of copper. (ii) Cryolite in the extraction of aluminium. (iii) Iodine in the refining of Zirconium. (iv) Sodium cyanide in froth floatation.
7. Explain about zone refining

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REVOLUTION FOR LEARNING

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12TH P BLOCK (BOOK BACK , TYPES OF SILICATE , STRUCTURE OF DIBORANE , INTRODUCTION TO P BLOCK ELEMENTS)

Marks: 90

Time: 1 hr 30 min

i. Answer the following questions 15×2=30

1. Write a short note on anomalous properties of the first element of p-block.
2. Describe briefly allotropism in p-block elements with specific reference to carbon.
3. Boron does not react directly with hydrogen. Suggest one method to prepare diborane from BF_3 .
4. Give the uses of Borax.
5. Write a note on Fisher tropisch synthesis.
6. Give the structure of CO and CO_2 .
7. Write a short note on hydroboration
8. Write a note on metallic nature of p-block elements
9. How will you identify borate radical
10. How will you convert boric acid to boron nitride?
11. CO is a reducing agent . justify with an example
12. What is inert pair effect
13. What are the necessary condition for catenation
14. Give Uses of silicones
15. Write about asbestos

ii. Answer the following questions 5×3=15

16. Write about zeolites
17. Explain about fullerene and carbon nanotube
18. Explain about ionisation enthalpy and electronegativity of P block elements
19. Give some examples of allotropes for given p block elements – Boron , Carbon , Tin
20. double salt which contains fourth period alkali metal (A) on heating at 500K gives (B). aqueous solution of (B) gives white precipitate with BaCl_2 and gives a red

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colour compound with alizarin. Identify A and B.

iii. Answer the following questions 9×5=45

21. Explain about structure of diborane
22. Explain the types of silicates
23. What are differences between diamond and graphite
24. Write about Physical properties of group 14 elements
25. Write about Physical properties of group 13 elements
26. Write about uses i) boron ii) Boric acid ii) diborane
27. Write about uses of i) $AlCl_3$ ii) Alum iii) CO
28. Give uses of i) CO_2 ii) silicon tetrachloride iii) allotropes of oxygen, antimony, silicon
29. Complete the following reactions
 - i) $B(OH)_3 + NH_3 \rightarrow$
 - ii) $Na_2B_4O_7 + H_2SO_4 + H_2O \rightarrow$
 - iii) $B_2H_6 + 2NaOH + 2H_2O \rightarrow$
 - iv) $B_2H_6 + CH_3OH \rightarrow$
 - v) $BF_3 + 9H_2O \rightarrow$
 - vi) $HCOOH + H_2SO_4 \rightarrow$
 - vii) $SiCl_4 + NH_3 \rightarrow$
 - viii) $SiCl_4 + C_2H_5OH \rightarrow$
 - ix) $B + NaOH \rightarrow$
 - x) $H_2B_4O_7 \xrightarrow{RED\ HOT}$

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**SAIVEERA ACADEMY -REVOLUTION FOR LEARNING
8098850809 , PEELAMEDU COIMBATORE**

12th P block (Book back ,Types of silicate , Structure of Diborane , Introduction to P block elements)

Marks: 90

Time: 1 hr 30 min

i. Answer the following questions

15×2=30

1. Write a short note on anomalous properties of the first element of p-block.
2. Describe briefly allotropism in p- block elements with specific reference to carbon.
3. Boron does not react directly with hydrogen. Suggest one method to prepare diborane from BF₃.
4. Give the uses of Borax.
5. Write a note on Fisher tropesch synthesis.
6. Give the structure of CO and CO₂.
7. Write a short note on hydroboration
8. Write a note on metallic nature of p-block elements
9. How will you identify borate radical
10. How will you convert boric acid to boron nitride?
11. CO is a reducing agent . justify with an example
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13. What are the necessary condition for catenation
14. Give Uses of silicones
15. Write about asbestos

ii. Answer the following questions

5×3=15

16. Write about zeolites
17. Explain about fullerene and carbon nanotube
18. Explain about ionisation enthalpy and electronegativity of P block elements
19. Give some examples of allotropes for given p block elements – Boron , Carbon , Tin
20. double salt which contains fourth period alkali metal (A) on heating at 500K gives (B). aqueous solution of (B) gives white precipitate with BaCl₂ and gives a red colour compound with alizarin. Identify A and B.

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a) 35^0 b) 36^0 c) 38^0 d) 31^0

20. Which compound on hydrolysis will give boric acid and sodium hydroxide

- a) Borane b) Aluminium silicate c) boron d) Borax

ii. Answer the following questions

6×2=12

21. A hydride of 2nd period alkali metal (A) on reaction with compound of Boron (B) to give a reducing agent (C). identify A, B and C.
 22. Write a short note on hydroboration
 23. What are necessary conditions for catenation
 24. Write about producer gas
 25. What is burnt alum
 26. How will you prepare Boron trifluoride industrially ?

iii. Answer the following questions

6×3=18

27. What are differences between graphite and diamond
 28. Write the anomalous properties of the first elements of p – block
 29. What are silicones. How will you prepare silicones
 30. How will you prepare perchloro siloxanes. What will you get after alcoholysis & ammonolysis on silicon tetrachloride
 31. Write about laboratory preparation, reducing behaviour, acidic behaviour & water gas equilibrium of CO₂
 32. How will you prepare sodium borate, borazole, lithium borohydride
 33. Give uses of i) Boron ii) Boric acid iii) Alum

v. Answer the following questions

6×5=30

34. Explain structure of diborane, Boric acid
 35. What are silicates and explain its types
 36. Describe briefly allotropism in p- block elements with specific reference to carbon & metallic nature of p-block elements & uses of silicones
 37. A compound (A) which is only non-metal in 13th group reacts with fluorine to give (B). Compound (A) on reacting with oxidising acids to give (D). (D) on heating with soda ash gives compound (E). (E) on heating gives borax beads
 38. A compound (A) is colourless and poisonous gas reacting with synthetic gas gives compound (B). B on reaction with compound of boron (C) gives Compound (D). C on heating at red hot gives non-metal (E). (E) on reaction with sodium hydroxide gives compound (F)
 39. Complete the reaction i) $\text{CO} + \text{C}_2\text{H}_6 + \text{H}_2 \rightarrow$ ii) $\text{CO}_2 \xrightleftharpoons{3100\text{K}}$
 iii) $\text{SiCl}_4 + \text{C}_2\text{H}_5\text{OH} \rightarrow$ iv) $\text{SiCl}_4 + \text{NH}_3 \rightarrow$ v) $\text{AlCl}_3 + 3\text{NH}_4\text{OH} \rightarrow$
 40. How will you prepare i) meta aluminate from AlCl₃ ii) BF₃ from boron trioxide
 iii) Diborane from sodium borohydride iv) Boron trifluoride from boric acid
 v) Boron nitride from boric acid

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SAIVEERA ACADEMY PEELAMEDU

8098850809

12TH CHEMISTRY SOLID STATE
TEST

Marks ; 75

Time ; 1hrs 30 min

I. Choose the best answers 25×1=25

- The ratio of close packed atoms to tetrahedral hole in cubic packing is
a) 1:1 b) 1:2 c) 2:1 d) 1:4
- In calcium fluoride, having the fluorite structure the coordination number of Ca^{2+} ion and F^- Ion are
a) 4 and 2 b) 6 and 6 c) 8 and 4 d) 4 and 8
- The number of carbon atoms per unit cell of diamond is
a) 8 b) 6 c) 1 d) 4
- The ionic radii of A^+ and B^- are 0.98×10^{-10} and 1.81×10^{-10} . the coordination number of each ion in AB is
a) 8 b) 2 c) 6 d) 4
- CsCl has bcc arrangement, its unit cell edge length is 400pm, its inter atomic distance is
a) 400pm b) 800pm
c) $\sqrt{3} \times 100\text{pm}$ d) $\sqrt{3/2} \times 400 \text{ pm}$
- The vacant space in bcc lattice unit cell is
a) 48% b) 23% c) 32% d) 26%
- The radius of an atom is 300pm, if it crystallizes in a face centered cubic lattice, the length of the edge of the unit cell is
a) 488.5pm b) 848.5pm
c) 884.5pm d) 484.5pm
- Potassium has a bcc structure with nearest neighbor distance 4.52 \AA . its atomic weight is 39. its density will be
a) 915 kg m^{-3} b) 2142 kg m^{-3}
c) 452 kg m^{-3} d) 390 kg m^{-3}
- crystal with a metal deficiency defect is
a) NaCl b) FeO c) ZnO d) KCl
- The crystal which are good conductor of electricity and heat are
a) ionic b) molecular
c) mettalic d) covalent

- In bragg's equation n represents
a) number of moles b) avagardo number
c) a quantum number d) order of reflection
- A regular three dimensional arrangement of identical points in space is called
a) unit cell b) space lattice
c) primitive d) crystallography
- The smallest repeating unit in space lattice which when repeated over and again results in crystal of the given substance is called
a) unit cell b) space lattice
c) primitive d) crystallography
- The number of close neighbours in a bcc is
a) 6 b) 4 c) 12 d) 8
- In a scc, each point on a corner is shared by
a) one unit cell b) two unit cell
c) 8 unit cell d) 4 unit cell
- The distance between crystals when x ray of wavelength 2.31 \AA gives a first order reflection at 90°
a) 1.31 b) 4.31 c) 5 d) 2.31
- In fcc arrangement, the corner atoms are A type and those at face centers are B type. What is the simplest formula of the compound
a) AB b) A c) B d) AB_2
- The number of unit cell in NaCl crystal when it is arranged in fcc arrangement
a) one unit cell b) two unit cell
c) 8 unit cell d) 4 unit cell
- In bcc the coordination number is
a) 8 b) 6 c) 1 d) 4
- Diamond belongs totype of crystal
- In cubic closed packing, percentage of empty space
a) 50 b) 36 c) 24 d) 26
- A face centered cubic solid of an element (atomic mass 60) has a cube edge of 4 \AA . Calculate its density.
- In triclinic primitive systems, relate intercepts and interfacial angles
- Find the odd one out
glucose, urea, CO_2

25. silicon carbide is the type of
crystal

II. Answer the following questions

5×2=10

26. Distinguish between hexagonal close packing and cubic close packing.

27. Distinguish tetrahedral and octahedral voids.

28. Calculate the number of atoms in a fcc unit cell

29. Why ionic crystals are hard and brittle?

30. Define unit cell.

III. Answer the following questions

5×3=15

31. Calculate the percentage efficiency of packing in case of Simple cubic crystal.

32. Write about impurity defect

33. Calculate number of atoms in SC and BCC

34. Write about characteristics of ionic solids

35. Distinguish crystalline and amorphous solids

IV. Answer the following questions

5×5=25

36. Classify the crystalline solids and add two main points to each type

37. Calculate the percentage efficiency of packing in case of body centered cubic crystal.

38. Calculate the percentage efficiency of packing in case of face centered cubic crystal.

39. Explain about types of stoichiometric defect with neat diagram

40. Explain about two dimensional closed packing