



# CHEMISTRY

## BOOKS - A N EXCEL PUBLICATION

### THE P-BLOCK ELEMENTS

#### Question Bank

1. Discuss the pattern of variation of oxidation states of B to Tl



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2. Discuss the pattern of variation of oxidation states of (ii) C to Pb



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3. Boron, Aluminium, Gallium, Indium and Thallium belong to group 13 of the periodic table of elements. How can you explain a higher stability of  $BCl_3$  as compared to  $TlCl_3$ ?



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4. Consider the compounds,  $BCl_3$  and  $CCl_4$ .

How will they behave with water?



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5. Explain the shapes of  $BF_3$  and  $BH_4^-$ .

Assign hybridisation of Boron in these species.



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6. Write reactions to justify the amphoteric nature of Al.



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7. What are electron deficient compounds? Are  $BCl_3$  and  $SiCl_4$  electron deficient?



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8. Write down the resonance structures of  $CO_3^{2-}$  and  $HCO_3^-$



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9. Rationalise the statements and give chemical reactions. (i) Lead (II) Chloride reacts with  $Cl_2$  to give  $PbCl_4$



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10. Rationalise the statements and give chemical reactions. (ii) Lead (IV) chloride is unstable towards heat



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11. Rationalise the statements and give chemical reactions. (iii) Lead is known not to form an iodide  $Pbl_4$



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12. Suggest a reason why B-F bond length in  $BF_3$  (130 pm) and  $BF_4^-$  (143 pm) differ?



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**13.** Define dipole moment. The dipole moment of  $BF_3$  is zero. Why?



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**14.** What happens when Borax is heated



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**15.** What happens when Boric acid is added to water



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16. What happens when Al treated with dilute NaOH



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17. What happens when  $BF_3$  reacted with  $NH_3$



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18. Explain the reaction Si is heated with methyl chloride at high temperature in presence of copper



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19. Explain the reaction  $SiO_2$  is treated with HF



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20. Explain the reaction CO is heated with ZnO



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21. Explain the reaction Hydrated alumina is mixed with aqueous NaOH



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22. Give reasons (i) Con. $HNO_3$  can be transported in Al containers



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23. Give reasons (ii) A mixture of Al pieces and dilute NaOH is used to open drains



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24. Give reasons (iii) Graphite is used as a lubricant



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**25.** Give reasons (iv) Diamond is used as an abrasive



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**26.** Give reasons (v) Al alloys are used to make aircraft body



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**27.** Give reasons (vi) Aluminium utensils cannot be kept in water overnight



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**28.** Give reasons (vii) Aluminium wire is used to make transmission cables.



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**29.** Explain why is there a phenomenal decrease in ionisation enthalpy from carbon to silicon?



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**30.** Classify the oxides as neutral, acidic amphoteric and basic

*CO, B<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, PbO<sub>2</sub>, Tl<sub>2</sub>O<sub>3</sub>*



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**31.** A certain salt X gives the following reactions (i) Its aqueous solution is alkaline to litmus



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**32.** A certain salt X gives the following reactions (ii) It swells up to a glassy matter Y on heating



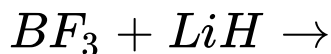
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33. A certain salt X gives the reaction, When  $\text{Con. } H_2SO_4$  is added to a hot solution of X, white crystals of an acid Z separates out. Identify X, and Z.



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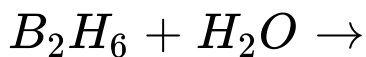
34. Write balanced equation for



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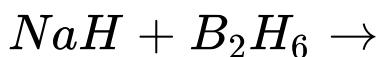


35. Write balanced equation for



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36. Write balanced equation for



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37. Write balanced equation for  $H_3BO_3 \rightarrow$



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38. Write balanced equation for



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39. Write balanced equation for  $B_2H_6 + NH_3$

gives



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40. The aqueous solution of borax is



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41. Boric acid is polymeric due to ----



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42. Hybridisation of boron in  $B_2H_6$  is ----



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**43.** Thermodynamically, the most stable allotrope of carbon is.....



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**44.** The Elements of group 14 show ---- oxidation states



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**45.** Boron, Aluminium, Gallium, Indium and Thallium belong to group 13 of the periodic table of elements. How can you explain a higher stability of  $BCl_3$  as compared to  $TlCl_3$ ?



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**46.** Boron, Aluminium, Gallium, Indium and Thallium belong to group 13 of the periodic table of elements. While Aluminium can be

form the ion  $[AlF_6]^{3-}$ , Boron is unable to form  $[BF_6]^{3-}$  ion. Explain.



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**47.** Boron, Aluminium, Gallium, Indium and Thallium belong to group 13 of the periodic table of elements. State whether the compound  $BCl_3$  is acidic or basic



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**48.** Explain the shapes of  $BF_3$  and  $BH_4^-$ .

Assign hybridisation of Boron in these species.



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**49.** Two Important oxides of carbon are carbon monoxide and carbon dioxide. Why is CO called a poisonous gas?



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50. Two important oxides of carbon are carbon monoxide and carbon dioxide.

a) How is  $CO_2$  responsible for global warming?



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51. Two Important oxides of carbon are carbon monoxide and carbon dioxide. What are producer gas and water gas? Mention their uses.







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**52.** Some elements can exist in different Crystalline forms and are called allotropes, What are the three important allotropic forms of carbon?



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**53.** Some elements can exist in different Crystalline forms and are called allotropes, Which allotropic form of carbon is used as a

dry lubricant in machines running at high temperature



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**54.** When sodium borohydride ( $NaBH_4$ ) is treated with iodine ( $I_2$ ), two gaseous products were obtained. One is hydrogen and the other is a highly toxic gas X, which catches fire upon exposure to air. When the gas X is heated with ammonia for a long time, a compound Y of

ring structure is obtained. Identify X and Y.

(Name and molecular formula are expected)



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**55.** Borax, orthoboric acid and diborane are some useful compounds of boron. Write the chemical formula of borax.



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**56.** Borax, orthoboric acid and diborane are some useful compounds of boron Boric acid Is not a protonic acid but acts as a Lewis acid. Justify.



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**57.** Borax, orthoboric acid and diborane are some useful compounds of boron. Explain the structure of diborane using a diagram.



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**58.** Diborane is an electron deficient compound. Name the special bonds that present in diboron.



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**59.** Diborane is an electron deficient compound. How will you convert Diborane into inorganic benzene?



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60. What are silicones? Write its General formula.



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61. The group 14 elements have four electrons in the outermost shell.  $SiCl_4$ , can be easily hydrolyzed by water while  $CCl_4$  cannot be hydrolyzed.



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**62.** The group 14 elements have four electrons in the outermost shell. How are fullerenes prepared?



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**63.** The group 14 elements have four electrons in the outermost shell. Distinguish between silicones and Silicates.



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**64.** Boric acid ( $H_3BO_3$ ) is considered as a weak acid Why?



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**65.** Carbon monoxide is highly poisonous. Why?



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**66.** What is dry ice?



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67. Why does  $BF_3$  behave as a Lewis acid?



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68. Carbon forms millions of compounds due to its self-linking property to form long chains and big rings. Give the reason for the above property of carbon.



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**69.** Carbon forms millions of compounds due to its self-linking property to form long chains and big rings. Name the above property of carbon.



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**70.** Carbon forms millions of compounds due to its self-linking property to form long chains and big rings. Give the reason for the above property of carbon.



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71. Thermodynamically, the most stable allotrope of carbon is.....



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72. Carbon is the first member of group 14 in the periodic table, Write any two anomalous properties of carbon



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**73.** Carbon is the first member of group 14 in the periodic table, Why does carbon differ from the rest of the members of this group?



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**74.** Carbon is the first member of group 14 in the periodic table, Write any two anomalous properties of carbon



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**75.** Carbon has many allotropes. Write the name of any two allotropic forms of carbon.



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**76.** Carbon has many allotropes. Briefly explain the structure of any one of the allotrope.



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77. Carbon has many allotropes.  $CCl_4$  does not undergo hydrolysis. Give a reason.



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78. When  $BF_3$  is treated with LiH at 450 K, a hydride of boron is formed. Identify the hydride of boron formed in the above reaction.



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**79.** When  $BF_3$  is treated with LiH at 450 K, a hydride of boron is formed. Identify the hydride of boron formed in the above reaction.



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**80.** When  $BF_3$  is treated with LiH at 450 K, a hydride of boron is formed. Briefly explain the structure of the above mentioned hydride.



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**81.** When  $BF_3$  is treated with LiH at 450 K, a hydride of boron is formed. Boron compounds behave as Lewis acids. Why?



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