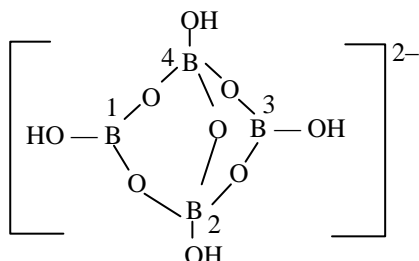
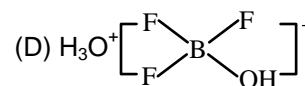
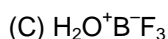
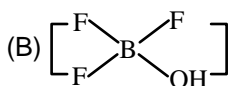
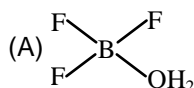


Single Correct Answer Type:

- The order of increasing Lewis acid strength in  
 (A)  $\text{BF}_3 < \text{BCl}_3 < \text{BBr}_3 < \text{BI}_3$  (B)  $\text{BI}_3 < \text{BBr}_3 < \text{BCl}_3 < \text{BF}_3$   
 (C)  $\text{BCl}_3 < \text{BF}_3 < \text{BBr}_3 < \text{BI}_3$  (D)  $\text{BI}_3 < \text{BF}_3 < \text{BBr}_3 < \text{BCl}_3$
- In  $\text{B}_2\text{H}_6$   
 (A) There is a direct boron – boron bond.  
 (B) the structure is similar to  $\text{C}_2\text{H}_6$   
 (C) boron atoms are linked through hydrogen bridges.  
 (D) all the atoms are in one plane.
- In borazole, the bonds present are  
 (A)  $12\sigma, 3\pi$  (B)  $9\sigma, 9\pi$  (C)  $6\pi, 6\sigma$  (D)  $9\sigma, 6\pi$
- The melting point of graphite layer is extremely higher because -  
 (A) it is a crystalline substance  
 (B) it is an allotrope of diamond  
 (C) it is soft solid used as lubricant  
 (D) in graphite the C-atoms are arranged in large plates of hexagonal rings of strongly bonded carbon atoms
- The structure of Borax ion is-

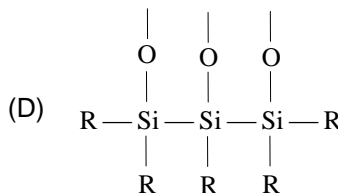
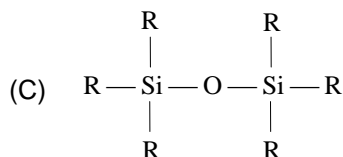
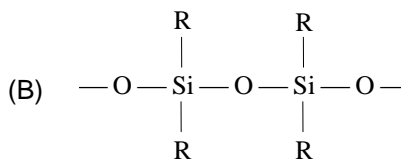
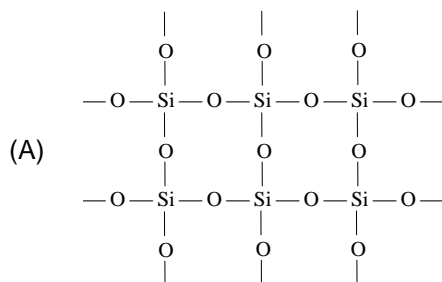


- The oxidation state of B = + 3 ; 1, 2, 3, 4 are  $\text{sp}^2$  hybridised.  
 (B) The oxidation state of B = + 3 ; 1, 4 are  $\text{sp}^3$  hybridised whereas 2, 3 are  $\text{sp}^2$  hybridised.  
 (C) The oxidation state of B = +3 ; 1, 3 are  $\text{sp}^2$  hybridised whereas 2, 4 are  $\text{sp}^3$  hybridised.  
 (D) The oxidation state of B = + 3 ; 1, 2, 3, 4 are  $\text{sp}^3$  hybridised
- $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$  is correctly represented as -  
 (A)  $\text{Na}_2[\text{B}_4\text{O}_5(\text{OH})_4] \cdot 8\text{H}_2\text{O}$  (B)  $2\text{NaBO}_2 \cdot \text{Na}_2\text{B}_2\text{O}_3 \cdot 10\text{H}_2\text{O}$   
 (C)  $\text{Na}_2[\text{B}_4(\text{H}_2\text{O})_4\text{O}_7] \cdot 6\text{H}_2\text{O}$  (D) All of the above
- When Borax is heated with solid salt metal metaborate is produced. Which of the following reaction actually involve the metal metaborate formation -  
 (A) Acid base reaction between metal oxide and  $\text{B}_2\text{O}_3$   
 (B) Oxidation reduction reaction between metal oxide and  $\text{B}_2\text{O}_3$   
 (C) Substitution reaction between  $\text{NaBO}_2$  & metal oxide  
 (D) Complex formation reaction between metal oxide and  $\text{B}_2\text{O}_3$
- $\text{BCl}_3$ ,  $\text{BBr}_3$  and  $\text{BI}_3$  undergo rapid and complete hydrolysis but the fluoride are not completely hydrolysed due to formation of -



9. Which of the following is the purest form of carbon ?  
 (A) Charcoal (B) Coal (C) Diamond (D) Graphite
10. Which is/are incorrect statements ?  
 (A) diamond is unaffected by conc. acids but graphite reacts with hot conc.  $\text{HNO}_3$  forming mellitic acid  $\text{C}_6(\text{COOH})_6$   
 (B) CO is toxic because it forms a complex with haemoglobin in the blood  
 (C)  $\text{C}_3\text{O}_2$ , carbon suboxide, is a foul-smelling gas  
 (D)  $\text{COCl}_2$  is called phosphine gas
11. Which of the following statement is/are true -  
 (I) borazine is aromatic  
 (II) there are four isotopic disubstituted borazine molecules  $\text{B}_3\text{N}_3\text{H}_4\text{X}_2$   
 (III) borazine is more reactive towards addition reactions than benzene  
 (IV) banana bonds in  $\text{B}_2\text{H}_6$  are longer but stronger than normal B-H bonds  
 (A) I, II and III (B) I, II and IV (C) I, II, III and IV (D) Only II
12. Boron has an exceptionally high melting point in the group 13<sup>th</sup> elements, because -  
 (A) boron has the smallest size in the group  
 (B) boron atoms are joined together by vanderwaals force  
 (C) boron is covalent solid  
 (D) boron has higher ionisation energy
13. Which of the following is the correct order of boiling point ?  
 (A)  $\text{Al} > \text{Ga} > \text{In} > \text{Tl}$  (B)  $\text{Al} < \text{Ga} < \text{In} < \text{Tl}$  (C)  $\text{Ga} > \text{Al} > \text{In} > \text{Tl}$  (D)  $\text{In} > \text{Tl} > \text{Ga} > \text{Al}$
14. Alumina is insoluble in water because -  
 (A) it is a covalent compound  
 (B) it has high lattice energy and low heat of hydration  
 (C) it has low lattice energy and high heat of hydration  
 (D)  $\text{Al}^{3+}$  and  $\text{O}^{2-}$  ions are not excessively hydrated
15. Which of the following do not have B — B bond ?  
 (A)  $\text{Ni}_3\text{B}$  (B)  $\text{FeB}$  (C)  $\text{V}_3\text{B}_2$  (D)  $\text{NaB}_{15}$
16. The melting point of graphite layer is extremely higher because -  
 (A) it is a crystalline substance  
 (B) it is an allotrope of diamond  
 (C) it is soft solid used as lubricant  
 (D) in graphite the C-atoms are arranged in large plates of hexagonal rings of strongly bonded carbon atoms
17. The reaction between alkali and  $\text{CO}_2(\text{g})$  is slow. Because -  
 (A) small amount of  $\text{CO}_2$  exist in aqueous solution as  $\text{H}_2\text{CO}_3$   
 (B) inter conversions of hydrated  $\text{CO}_2$  to various species are slower  
 (C)  $\text{OH}^-$  repel the electron rich  $\text{CO}_2$   
 (D) alkali and  $\text{CO}_2$  both act as Lewis base
18.  $\text{SF}_4 + \text{BF}_3 \longrightarrow (\text{A})$  ; the compound (A) is -  
 (A)  $[\text{SF}_5]^- [\text{BF}_2]^+$  (B)  $[\text{SF}_3]^+ [\text{BF}_4]^-$  (C)  $\text{SF}_6$  (D)  $\text{B}_2\text{F}_2$

19. Which of the following bonds is/are present in silicones polymers ?



20. Coal gas-

(A) Burns with a smoky flame

(B) Burns with non-smoky flame

(C) Is not used for lighting purposes

(D) Is not a good fuel

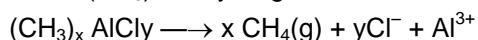
**Numerical Type:**

21. In borax ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ) the number of B-O-B bonds is .....

22. The basicity of boric acid is .....

23. 1 mole of  $\text{B}_2\text{H}_6$  (g) on hydrolysis yields ..... moles of  $\text{H}_2$ (g)

24. When  $(\text{CH}_3)_x\text{AlCl}_y$  is ignited  $\text{CH}_4$ ,  $\text{Cl}^-$  and  $\text{Al}^{3+}$  are produced as follows:



The ignition of 0.643 gm of  $(\text{CH}_3)_x\text{AlCl}_y$  yields  $1.39 \times 10^{-2}$  moles of  $\text{CH}_4$ (g). The resulting solution on reaction with excess  $\text{AgNO}_3$  yields  $6.94 \times 10^{-3}$  moles of  $\text{AgCl}$ (s)

Atomic wts. : Al – 27; Cl = 35.5

Determine the minimum molecular mass of  $(\text{CH}_3)_x\text{AlCl}_y$  in nearest possible integers.

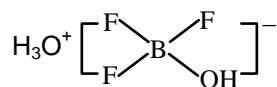
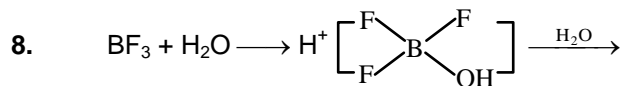
25.  $\text{BCl}_3 \xrightarrow{\text{hydrolysis}} (\text{G})$

The no. of replacable hydrogens in (G) dissolved in water is/are\_\_\_\_\_

**KEY**

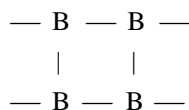
1. A	2. C	3. A	4. D	5. C
6. A	7. A	8. D	9. C	10. D
11. C	12. C	13. A	14. B	15. A
16. D	17. B	18. B	19. B	20. B
21. 5	22. 1	23. 6	24. 0092	25. 1

**SOLUTIONS**



10. It is phosgene. Phosphene is  $\text{PH}_3$

12. Crystalline boron have very high melting point because it has covalent polymeric network



15.  $\text{Na}_3\text{B}$  having isolated boron atoms

In  $\text{V}_3\text{B}_2$ , B — B bond is present

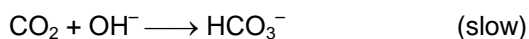
In  $\text{FeB}$ ,  $\text{B} \diagdown \text{B} \diagup$  bonds are present.

In  $\text{B}_{15}^-$ , icosahedron arrangements of boron atoms are present.

17.  $\text{pH} < 8$ ,  $\text{CO}_2$  reacts as follows

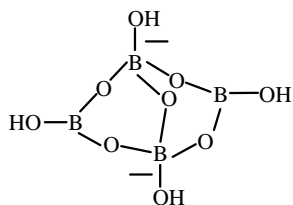


At  $\text{pH} > 8$ ,  $\text{CO}_2$  reacts as follows



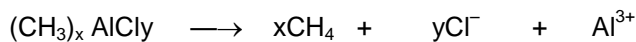
21.  $\text{Na}_2\text{B}_4\text{O}_7$ , 10  $\text{H}_2\text{O}$  exist as  $\text{Na}_2 [\text{B}_4\text{O}_5(\text{OH})_4]$ , 8  $\text{H}_2\text{O}$

It contain



22.  $\text{B}_2\text{H}_6 + 6\text{H}_2\text{O} \rightarrow 2\text{H}_3\text{BO}_3 + 6\text{H}_2$

24. Let mol wt of the salt = M



$$\frac{0.643}{M} \quad x \times \frac{0.643}{M} \quad y \times \frac{0.643}{M}$$

$$\therefore x \times \frac{0.643}{M} = 1.39 \times 10^{-2}$$

$$\text{or } x = \frac{1.39 \times 10^{-2}}{0.643} \times M$$

$$y \times \frac{0.643}{M} = 6.94 \times 10^{-3}$$

$$\text{or } y = \frac{6.94 \times 10^{-3} \times M}{0.643}$$

$$\therefore x : y = 2 : 1$$

$\therefore$  minimum molecular wt

$$= 2 \times 15 + 27 + 35.5 = 92.5 \quad \text{Ans. 92}$$

25. Hint:  $\text{BCl}_3 + 3\text{HOH} \longrightarrow \text{B}(\text{OH})_3 + 3\text{HCl}$