SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

P–Block elements [IIIA Group]

1. **IIIA group element with highest density is**

   1) B   2) Al   3) In   4) Tl

2. **The ionisation energies from Ga to Tl do not decrease due to**

   1) Shielding effect   2) Improper shielding effect

   3) Increase in atomic size   4) Decrease in nuclear charge

3. **The correct order of melting point of IIIA group element is**

   1) $B > Al > Tl > In > Ga$ 2) $B > Al > Ga > In > Tl$

   3) $B > Al > Tl > Ga > In$ 4) $B > Al > In > Tl > Ga$

4. **Which one of the following has the lowest melting point**

   1) B   2) Al   3) Ga   4) Tl

5. **The compound of boron formed when borax is treated with hot conc. HCl is**

   1) H_3BO_3 2) BCl_3 3) B_2Cl_6 4) B_2H_6

6. $H_3BO_3 \xrightarrow{Red\ heat} X$ **Then "X" in that equations is …**

   1) $H_2B_4O_7$ 2) HBO_2 3) B_2O_3 4) B

7. **The reactants in the industrial method of preparation of diborane are**

   1) $BCl_3 + LiAlH_4$ 2) $BF_3 + LiAlH_4$ 3) $BF_3 + LiH$ 4) $BF_3 + H_2$

8. **Methylation of diborane gives [Me = Methyl group]**

   1) $B_2(Me)_6$ 2) $B_2H(Me)_5$ 3) $B_2H_2(Me)_4$ 4) All of the above

9. **In borax bead test, which compound of the bead reacts with basic radical to form metaborate**

   1) B_2O_3 2) Na_2BO_3 3) $Na_2B_4O_7$ 4) $Na_2B_4O_7.10H_2O$

10. **The no. of sp^3 hybridised orbitals taking part in the bond formation of diborane molecule are**

    1) 6   2) 2   3) 8   4) 4

11. $2X + 6LiH \xrightarrow{450K} B_2H_6 + Y$. **The X and Y are**

    1) $X = BCl_3, Y = LiCl$ 2) $X = BBr_3, Y = LiBr$

    3) $X = BF_3, Y = LiF$ 4) $X = B_2H_5Cl, Y = LiCl$

12. $Na_2B_4O_7.10H_2O$ can also represented as

1) $Na_2\left[B_4O_5.(OH)_4\right]8H_2O$

2) $2NaBO_2.Na_2B_2O_3.10H_2O$
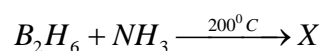
3) $Na_2\left[B_4(H_2O)_4.O_7\right]6H_2O$

4) All the above

13. The number of σ and π bonds present in inorganic benzene

1) $9\sigma,6\sigma$

2) $6\sigma,3\pi$

3) $9\sigma,3\pi$

4) $12\sigma,3\pi$

14. The number of 2-electron – 3 centred bonds in diboran are

1) 2

2) 4

3) 6

4) 3

15. The empirical formula of "X" in the following reaction

$B_2H_6 + NH_3 \xrightarrow{200^0 C} X$

1) B_2NH

2) BNH_2

3) BNH

4) CH

16. $A\xrightarrow[\Delta]{375K} H_3BO_3 \xrightarrow[\Delta]{435K} B$. A and B respectively in the reaction are

1) $H_2B_4O_7, B_2O_3$

2) HBO_2, B_2O_3

3) $H_2B_4O_7, HBO_2$

4) $HBO_2, H_2B_4O_7$

17. Formulae of metaborate and borate ions respectively

1) BO_3^{2-} and BO_2^-

2) BO_2^- and BO_3^{3-}

3) BO_2^- and BO_3^-

4) BO_2^{2-} and BO_3^{3-}

18. Aluminium reacts with HCl and concentration NaOH solution to liberate the gases respectively

1) H_2 and H_2

2) O_2 and O_2

3) H_2 and O_2

4) O_2 and H_2

19. The percentage of "Al" is least in

1) Magnalium

2) Duralumin

3) Aluminimum bronze

4) Y-alloy

20. AlO_2^- ion in aqueous solution exists as

1) $\left[Al(OH)_4\right]^-$

2) $\left[Al(OH)_4 H_2O\right]^-$

3) $\left[Al(OH)_4(H_2O)_2\right]^-$

4) $\left[Al(OH)_6\right]^-$

21. Aqueous solution of atom is acidic due to hydrolysis of

1) K^+

2) Al^{3+}

3) both K^+ and Al^{3+}

4) SO_4^{2-}

22. The formula $K_2SO_4Al_2(SO_4)_3.4Al(OH)_3$ indicates

1)Pseudo alum

2) Alunite

3) alum

4) pyrite stone

23. Duraluminium is an alloy of

1) Al and Mg

2) Al, Mg and Ni

3) Al, Mg, Mn and Cu

4) Al and Ni

24. **Be and Al exhibit many properties which are similar but the two elements differ in**

1) Exhibit maximum covalence in compounds   2) Forming polymeric hydrides

3) Forming covalent halides   4) Exhibiting amphoteric nature in their oxidation

25. **A: If Al atoms replace a few silicon atoms in three dimensional network of silicon dioxide, the overall structure acquires a negative charge.**

R: Al is trivalent while silicon is tetravalent

1) Both (A) and (R) are true and (R) is the correct explanation of (A)

2) Both (A) and (R) are true and (R) is not the correct explanation of (A)

3) Both (A) and (R) are true

4) Both (A) and (R) are false

26. **A: Boron always forms covalent bond**

R: The small size of B^{3+} favours formation of covalent bond

1) Both (A) and (R) are true and (R) is the correct explanation of (A)

2) Both (A) and (R) are true and (R) is not the correct explanation of (A)

3) Both (A) and (R) are true

4) (A) is true (R) is false

27. **A: Boric acid is a weak monobasic acid**

R: Boric acid contains three hydroxyl groups

1) Both (A) and (R) are true and (R) is the correct explanation of (A)

2) Both (A) and (R) are true and (R) is not the correct explanation of (A)

3) Both (A) and (R) are true   4) (A) is true (R) is false

28. **Which of the process is used in thermite welding ?**

1) $TiO_2 + 4Na \rightarrow Ti + 2Na_2O$ 2) $2Al + Fe_2O_3 \rightarrow Al_2O_3 + 2Fe$

3) $SnO_2 + 2C \rightarrow Sn + 2CO$ 4) $Cr_2O_3 + 2Al \rightarrow 2Cr + Al_2O_3$

29. **The chemical formula of feldspar is**

1) $KAlSi_3O_8$ 2) Na_3AlF_6 3) $NaAlO_2$ 4) $K_2SO_4.Al_2(SO_4)_3 4Al(OH)_3$

30. Al_2O_3 **can be converted to anhydrous** $AlCl_3$ **by heating**

1) A mixture Al_2O_3 and carbons dry Cl$_2$ gas   2) Al_2O_3 with Cl$_2$ gas

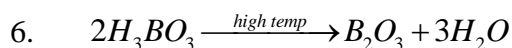3) Al_2O_3 with HCl gas   4) Al_2O_3 with NaCl in solid state

Integer type questions

31. The number of isomers possible for disubstituted borazine $B_3N_2H_4X_2$ is

32. Borax is represented as $Na_2\left[B_4O_5(OH)_4\right]8H_2O$ How many tetrahedral boran atoms are present in the structure of borax

33. How many moles of methane obtained by hydrolysis of one mole of aluminium carbide ?

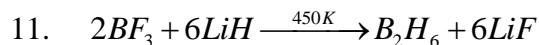34. Colemanite is an important mineral of boron. It is represented $Ca_2B_6O_{11}.xH_2O$ What is the value of "*x*"?

KEY

1.	4	2.	2	3.	1	4.	3	5.	1	6.	3	7.	3	8.	3	9.	1	10.	3
11.	3	12.	1	13.	4	14.	1	15.	2	16.	4	17.	2	18.	1	19.	3	20.	3
21.	2	22.	2	23.	3	24.	1	25.	4	26.	1	27.	2	28.	2	29.	1	30.	1
31.		32.	2	33.	3	34.	6												

Solutions

6. $2H_3BO_3 \xrightarrow{high\ temp} B_2O_3 + 3H_2O$
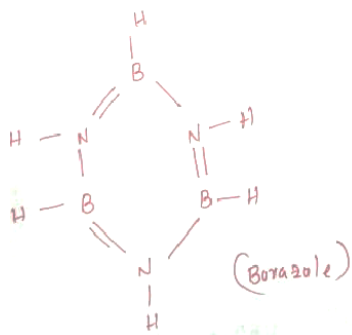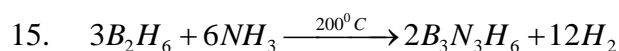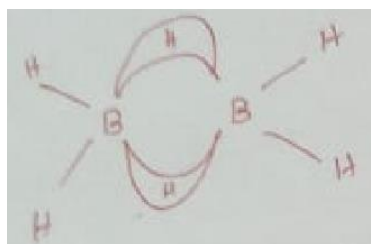
9. B_2O_3 combined with metal oxides to form metal metaborated as coloured beads.

11. $2BF_3 + 6LiH \xrightarrow{450K} B_2H_6 + 6LiF$

13.

14.

15. $3B_2H_6 + 6NH_3 \xrightarrow{200^0C} 2B_3N_3H_6 + 12H_2$

16. $H_3BO_3 \xrightarrow{375K} HBO_2 + H_2O$

   $4H_3BO_3 \xrightarrow{435K} H_2B_4O_7 + 5H_2O$

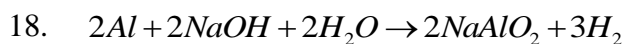18. $2Al + 2NaOH + 2H_2O \rightarrow 2NaAlO_2 + 3H_2$

   $2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$
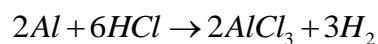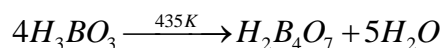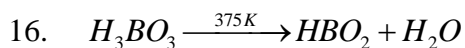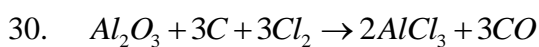
19. Aluminium bronze contains 10-12% Al, 88-90% Cu.

23. It contains 95% Al, 4% Cu, 0.5% Mg and 0.5% Mn

24. Due to diagonal relationship, Be and Al exhibits similar properties but covalency of Be is '4' because it has an absence of d-orbital whereas, covalency of Al is is upto '6' due to the presence of vacant d-orbitals.

30. $Al_2O_3 + 3C + 3Cl_2 \rightarrow 2AlCl_3 + 3CO$

32. Borax has two tetrahedral and two triangular units joined together

33. $Al_4C_3 + 12H_2O \rightarrow 4Al(OH)_3 + 3CH_4$

34. $Ca_2B_6O_{11}.6H_2O$