

## 9. GROUP 13 ELEMENTS (IIIA)

### PREVIOUS EAMCET BITS

1. Aluminium reacts with NaOH and form compound 'X'. If the coordination of Aluminium in X is 6. The correct formula of X is (2009 E)



Ans: 3

Sol: Oxidation state of Al in  $[\text{Al}(\text{H}_2\text{O})_2(\text{OH})_4]^-$  is +3

∴ Net charge on the complex is  $+3 + 0 - 4 = -1$

2. Boron halides behave as Lewis acids because of their \_\_\_\_\_ nature. (2008 E)

1) Proton donor      2) Covalent                      3) Electron deficient      4) Ionizing

Ans: 3

Sol: Due to electron deficient nature Boron halide acts as Lewis acids.

3. Except B and Al, all other III group elements exhibit +1 oxidation state. This is because (2007 M)

1) they are 'P' block elements                      2) their first ionization energy is less  
3) they have low melting point                      4) due to inert pair effect

Ans: 4

Sol: Due to Inert pair effect except B and Al other III group elements exhibit +1 oxidation state.

4. The chemical formula of Feldspar is (2007 E)

1)  $\text{KAlSi}_3\text{O}_8$                       2)  $\text{Na}_3\text{AlF}_6$                       3)  $\text{NaAlO}_2$       4)  $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 4\text{Al}(\text{OH})_3$

Ans: 1

Sol: Feldspar is  $\text{KAlSi}_3\text{O}_8$

5. The number of sigma and pi ( $\pi$ ) bonds present in inorganic benzene respectively are: (2006 M)

1) 12,6                      2) 6,6                      3) 6,12                      4) 12,3

Ans: 4

Sol: In  $\text{B}_3\text{N}_3\text{H}_6$ ; 12 $\sigma$  & 3  $\pi$  bonds are present.

6. Which of the following reactions does not liberate gaseous product? (2006 E)

1)  $\text{AlCl}_3 + \text{NaOH} \rightarrow$                       2)  $\text{NaOH} + \text{P}(\text{white}) + \text{H}_2\text{O} \rightarrow$   
3)  $\text{Al} + \text{NaOH} \xrightarrow{\Delta}$                       4)  $\text{Zn} + \text{NaOH} \xrightarrow{\Delta}$

Ans: 1

Sol:  $\text{AlCl}_3 + 3\text{NaOH} \rightarrow \text{Al}(\text{OH})_3 + 3\text{NaCl}$

∴ No gaseous product in the above reaction.

7. Observe the following statements regarding purification of bauxite: (2005 E)

I. During Hall's process, silica, is removed as Si (vapour)

II. Bauxite ore contaminated with  $\text{Fe}_2\text{O}_3$  is purified in Baeyer's process.

III. During Serpeck's process,  $\text{AlN}$  is formed

The correct answer is:

(2005 E)

- 1) I, II and are correct  
2) Only I and II are correct  
3) Only I and III are correct  
4) Only II and III are correct

Ans: 4

Sol. Bauxite which contains  $\text{Fe}_2\text{O}_3$  impurity is purified by Baeyer's process and Halls process

8. The molecular formula of potash alum is (2004 E)

1.  $\text{KAl}_2\text{S}_4\text{H}_{48}\text{O}_{40}$     2.  $\text{K}_2\text{Al}_2\text{S}_4\text{H}_{48}\text{O}_{39}$     3.  $\text{K}_2\text{Al}_2\text{S}_4\text{H}_{48}\text{O}_{40}$     4.  $\text{K}_2\text{AlS}_4\text{H}_{48}\text{O}_{40}$

Ans: 3

Sol. Potash alum is  $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$  (or)  $\text{K}_2\text{Al}_2\text{S}_4\text{H}_{48}\text{O}_{40}$

9. An element M reacts with chlorine to form a compound "X". The bond angle in 'X' is  $120^\circ$ . What is 'M'? (2002 M)

1. Be                      2. B                      3. Mg                      4. N

Ans: 2

Sol.  $2\text{B} + 3\text{Cl}_2 \longrightarrow 2\text{BCl}_3$

In  $\text{BCl}_3$  hybridization in boron atom is  $\text{sp}^2$  and shape is trigonal planar, bond angle is  $120^\circ$

10. During electrolytic reduction of Alumina, the reaction at cathode is (2001 E)

1.  $2\text{H}_2\text{O}_2 \rightarrow \text{O}_2 + 4\text{H}^+ + 4\text{e}^-$   
2.  $3\text{F}^- \rightarrow 3\text{F} + 3\text{e}^-$   
3.  $\text{Al}^{+3} + 3\text{e}^- \rightarrow \text{Al}$   
4.  $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$

Ans: 3

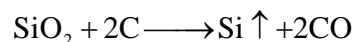
Sol. At cathode reaction is  $\text{Al}^{3+} + 3\text{e}^- \longrightarrow \text{Al}$

11. During serpeck's process Si is eliminated as (2000 E)

- 1) Si(solid)              2) Si (vapour)              3)  $\text{SiO}_2$  (solid)              4)  $\text{SiO}_2$  (vapour)

Ans: 2

Sol. In serpeck's process Si is eliminated as Si (vapour)



12. Which of the following is an electron deficient compound. (2000 E)

- 1) NaCl                      2) NaH                      3)  $\text{B}_2\text{H}_6$                       4) KCl

Ans: 3

Sol. In the formation of diborane only 12 valency electrons only involved instead of 14 like in ethane.

13. Which of the following is used in the preparation of ammonal? (1999 M)

- 1)  $\text{Fe}_2\text{O}_3$                       2) Al powder                      3)  $\text{CaCN}_2 + \text{C}$                       4)  $\text{NaOH} + \text{CaO}$

Ans: 2

Sol. Ammonal is mixture of Ammonium nitrate and Al power.

14. Which of the following is not true? (1999 M)

- 1) Aluminium liberates hydrogen on treating with base.  
2) Aluminium is used in the preparation of duralumin.

3) Aluminium is extracted by the electrolysis of alumina in the presence of cryolite.

4) Aluminium is a strong oxidising agent.

Ans: 4

Sol. Al is strong reducing agent but not oxidizing agent.

15. Inorganic benzene contains (1999 E)

- 1) C,H,Al                      2) C,H,B                      3) B,H,N                      4) C,N,H

Ans: 3

Sol. Formula of inorganic benzene is  $B_3N_3H_6$  therefore it contains B, H, N elements.

16. In the electrolytic extraction of aluminium fused cryolite is added (1998 M)

- 1) To prevent the anode                      2) To increase Al production  
3) To act as a reducing agent                      4) To make a conducting solution of bauxite

Ans: 4

Sol. In the electrolytic extraction of Aluminium cryolite is added to increase the conductivity of bauxite.

17. The molecular formula of cryolite is (1998 E)

- 1)  $3NaF \cdot AlF_3$     2)  $AlF_3$                       3)  $2NaF \cdot AlF_3$                       4)  $NaF \cdot AlF_3$

Ans: 1

Sol. Formula of Cryolite is  $Na_3AlF_6$  (or)  $3NaF \cdot AlF_3$

18. The alum used for purifying water is (1997 E)

- 1) Ammonium alum    2) chrome alum                      3) ferric alum                      4) potash alum

Ans: 4

Sol. Potash alum is used in the purification of water.

19. The chemical formula of diaspor an ore of aluminium is (1997 E)

- 1)  $Al_2O_3 \cdot 3H_2O$     2)  $Al_2O_3 \cdot 2H_2O$                       3)  $Al_2O_3 \cdot H_2O$                       4)  $Al_2O_3$

Ans: 3

Sol. Diaspor formula is  $Al_2O_3 \cdot H_2O$ .

20. In the hybridisation of boron in diborane is (1996 E)

- 1)  $SP$                       2)  $SP^2$                       3)  $SP^3$                       4)  $d \quad sp^2$

Ans: 3

Sol. In diborane boron atom undergoes  $sp^3$  hybridization.

21. Purification of alumina by electrolytic refining is known as (1995 M)

- 1) Hall's process    2) Baeyer's process    3) Hall-Heroult process    4) Hoop's process

Ans: 4

Sol. Aluminium is purified by Hoop's process.

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