

NCERT EXERCISES

- 11.1 Discuss the pattern of variation in the oxidation states of
(i) B to Tl and (ii) C to Pb.
- 11.2 How can you explain higher stability of BCl_3 as compared to TlCl_3 ?
- 11.3 Why does boron trifluoride behave as a Lewis acid ?
- 11.4 Consider the compounds, BCl_3 and CCl_4 . How will they behave with water ? Justify.
- 11.5 Is boric acid a protic acid ? Explain.
- 11.6 Explain what happens when boric acid is heated .
- 11.7 Describe the shapes of BF_3 and BH_4^- . Assign the hybridisation of boron in these species.
- 11.8 Write reactions to justify amphoteric nature of aluminium.
- 11.9 What are electron deficient compounds ? Are BCl_3 and SiCl_4 electron deficient species ? Explain.
- 11.10 Write the resonance structures of CO_3^{2-} and HCO_3^- .
- 11.11 What is the state of hybridisation of carbon in (a) CO_3^{2-} (b) diamond (c) graphite?
- 11.12 Explain the difference in properties of diamond and graphite on the basis of their structures.
- 11.13 Rationalise the given statements and give chemical reactions :
 - Lead(II) chloride reacts with Cl_2 to give PbCl_4 .
 - Lead(IV) chloride is highly unstable towards heat.
 - Lead is known not to form an iodide, PbI_4 .
- 11.14 Suggest reasons why the B-F bond lengths in BF_3 (130 pm) and BF_4^- (143 pm) differ.
- 11.15 If B-Cl bond has a dipole moment, explain why BCl_3 molecule has zero dipole moment.
- 11.16 Aluminium trifluoride is insoluble in anhydrous HF but dissolves on addition of NaF. Aluminium trifluoride precipitates out of the resulting solution when gaseous BF_3 is bubbled through. Give reasons.
- 11.17 Suggest a reason as to why CO is poisonous.
- 11.18 How is excessive content of CO_2 responsible for global warming ?
- 11.19 Explain structures of diborane and boric acid.
- 11.20 What happens when
 - (a) Borax is heated strongly,
 - (b) Boric acid is added to water,
 - (c) Aluminium is treated with dilute NaOH,
 - (d) BF_3 is reacted with ammonia ?
- 11.21 Explain the following reactions
 - (a) Silicon is heated with methyl chloride at high temperature in the presence of copper;
 - (b) Silicon dioxide is treated with hydrogen fluoride;
 - (c) CO is heated with ZnO;
 - (d) Hydrated alumina is treated with aqueous NaOH solution.

11.22 Give reasons :

- (i) Conc. HNO_3 can be transported in aluminium container.
- (ii) A mixture of dilute NaOH and aluminium pieces is used to open drain.
- (iii) Graphite is used as lubricant.
- (iv) Diamond is used as an abrasive.
- (v) Aluminium alloys are used to make aircraft body.
- (vi) Aluminium utensils should not be kept in water overnight.
- (vii) Aluminium wire is used to make transmission cables.

11.23 Explain why is there a phenomenal decrease in ionization enthalpy from carbon to silicon ?

11.24 How would you explain the lower atomic radius of Ga as compared to Al ?

11.25 What are allotropes? Sketch the structure of two allotropes of carbon namely diamond and graphite. What is the impact of structure on physical properties of two allotropes?

11.26 (a) Classify following oxides as neutral, acidic, basic or amphoteric:



(b) Write suitable chemical equations to show their nature.

11.27 In some of the reactions thallium resembles aluminium, whereas in others it resembles with group I metals. Support this statement by giving some evidences.

11.28 When metal X is treated with sodium hydroxide, a white precipitate (A) is obtained, which is soluble in excess of NaOH to give soluble complex (B). Compound (A) is soluble in dilute HCl to form compound (C). The compound (A) when heated strongly gives (D), which is used to extract metal. Identify (X), (A), (B), (C) and (D). Write suitable equations to support their identities.

11.29 What do you understand by (a) inert pair effect (b) allotropy and (c) catenation?

11.30 A certain salt X, gives the following results.

- (i) Its aqueous solution is alkaline to litmus.
- (ii) It swells up to a glassy material Y on strong heating.
- (iii) When conc. H_2SO_4 is added to a hot solution of X, white crystal of an acid Z separates out.

Write equations for all the above reactions and identify X, Y and Z.

11.31 Write balanced equations for:

- (i) $\text{BF}_3 + \text{LiH} \rightarrow$
- (ii) $\text{B}_2\text{H}_6 + \text{H}_2\text{O} \rightarrow$
- (iii) $\text{NaH} + \text{B}_2\text{H}_6 \rightarrow$
- (iv) $\text{H}_3\text{BO}_3 \xrightarrow{\Delta}$
- (v) $\text{Al} + \text{NaOH} \rightarrow$
- (vi) $\text{B}_2\text{H}_6 + \text{NH}_3 \rightarrow$

11.32. Give one method for industrial preparation and one for laboratory preparation of CO and CO_2 each.

- 11.33 * An aqueous solution of borax is
(a) neutral (b) amphoteric
(c) basic (d) acidic
- 11.34 * Boric acid is polymeric due to
(a) its acidic nature (b) the presence of hydrogen bonds
(c) its monobasic nature (d) its geometry
- 11.35 * The type of hybridisation of boron in diborane is
(a) sp (b) sp^2 (c) sp^3 (d) dsp^2
- 11.36 * Thermodynamically the most stable form of carbon is
(a) diamond (b) graphite
(c) fullerenes (d) coal
- 11.37 * Elements of group 14
(a) exhibit oxidation state of +4 only
(b) exhibit oxidation state of +2 and +4
(c) form M^{2-} and M^{4+} ion
(d) form M^{2+} and M^{4+} ions
- 11.38 * If the starting material for the manufacture of silicones is $RSiCl_3$, write the structure of the product formed.