

CHEMISTRY-2

p-Block Elements

[Set-2]

SECTION-A

- In graphite and diamond, the percentage of s-character of the hybrid orbitals in hybridisation are respectively.
 - 33 and 75
 - 50 and 75
 - 33 and 25
 - 67 and 75
- Each of the following is an amphoteric oxide except
 - SnO_2
 - Al_2O_3
 - Ga_2O_3
 - SiO_2
- In diborane, the number of electron that account for bonding in the bridge part of the molecule is
 - 6
 - 2
 - 8
 - 4
- Which of the following boron species does not exist?
 - BH_4^-
 - $\text{B}(\text{OH})_4^-$
 - BF_6^{3-}
 - BO_3^{3-}
- Match the following:

Column-I

- A. BF_4^-
 B. AlF_6^{3-}
 C. $\text{B}(\text{OH})_3$
 D. CO_2

Column-II

1. sp
 2. sp^2
 3. sp^3
 4. sp^3d
 5. sp^3d^2

	A	B	C	D
(i)	4	5	3	1
(ii)	3	5	2	1
(iii)	3	5	2	2
(iv)	5	4	2	1

Assertion-Reason type Questions:

- Both A and R are true and R is the correct explanation of A
- Both A and R are true and R is not the correct explanation of A
- A is true but R is false
- A is false but R is true

6. A: In diborane, there is no boron-boron bond present
 R: The $B_2H_6 \cdot 2NH_3$ adducts on heating gives borazole.
7. A: Out of CCl_4 and $SiCl_4$, only $SiCl_4$ gets hydrolysed by water
 R: $SiCl_4$ is ionic and polar whereas CCl_4 is covalent and non-polar

Passage bases questions:

The heavier elements of group 13 and 14 have a tendency to show an oxidation state two units less than the group oxidation state. This is due to inert pair effect. The stability of the lower oxidation state increases down the group. This stability of the lower oxidation state down the group affects many physical and chemical properties of the elements of these groups.

8. The strongest oxidizing agent amongst the following is
 (i) SnO_2 (ii) GeO_2 (iii) PbO_2 (iv) SiO_2
9. Which of the following group 13 elements shows both +1 and +3 oxidation states?
 (i) B (ii) Al (iii) Ga (iv) All three
10. Which of the following oxides is the strongest acid?
 (i) PbO_2 (ii) SnO_2 (iii) Ti_2O_3 (iv) CO_2

SECTION-B

11. Give reason
 (i) Gallium has much smaller size than aluminum
 (ii) Thallium has much higher ionization enthalpy than indium although thallium has only slightly higher atomic size than that of indium.
12. Complete the following:
 (i) Boron form only _____ compounds while aluminium form both _____ and _____ compounds.
 (ii) The C - C bond length in diamond is _____ than the C - C bond length in graphite.

OR

Give balanced chemical equations for the following reaction

- (i) $NaBH_4$ reacts with iodine
 (ii) Coke reacts with steam

13. Account for following

- (i) Carbon has a strong tendency to catenate than silicon
- (ii) CO_2 is a gas whereas SiO_2 is a high melting solid
- (iii) $[\text{AlF}_6]^{3-}$ exist but $[\text{AlCl}_6]^{3-}$ does not

14. What happens when (given only chemical equations)

- (i) Diborane reacts with sodium hydride
- (ii) Boric acid is heated strongly
- (iii) Aluminium is treated with dilute NaOH

OR

Rationalize the given statements and give chemical reactions

- (i) Lead (II) chloride reacts with Cl_2 to give PbCl_4
- (ii) PbCl_4 is highly unstable towards heat
- (iii) Lead is not known to form an iodide, PbI_4 .

15. (i) A certain salt 'X' give the following results:

- (a) Its aqueous solution is alkaline to litmus
- (b) It swells up to a glassy material Y on strong heating
- (c) 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.

(ii) Give reasons:

- (a) NaOH solution cannot be stored in glass bottles
- (b) HF is used in the etching of glass.

OR

(i) 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 equation to support their identities.

(ii) Give reason

- (a) B – F bond length in BF_3 and BF_4^- are different
- (b) B – Cl bond has a dipole moment but BCl_3 molecule has zero dipole moment.