



III. Long Answer Type Questions

Question 1. Explain the differences in properties of diamond and graphite based upon their structures.

Answer:

Diamond	Graphite
(i) Diamond is the hardest substance on earth.	(i) Graphite is soft and slippery
(ii) In diamond carbon is sp^3 – hybridised	(ii) In Graphite carbon is sp^2 – hybridized.
(iii) Since all the electrons in diamond are firmly held in C – C, 6 bonds there are no free electrons in diamond crystal. Therefore diamond is bad conductor of electricity.	(iii) Since only three electrons of each carbon are used in making hexagonal rings of graphite, fourth valence electron is free to move thus graphite is a good conductor of electricity.
(iv) Because of high refractive index diamond can reflect and refract the light.	(iv) Graphite is a black substance and possess a metallic lustre.

Question 2. Give reasons:

(a) Why do Boron halides form addition compound with NH_3 ?

(b) The tendency for catenation decreases down the group in Group 14.

(c) PbO_2 is a stronger oxidising agent than SnO_2 .

Answer: (a) It is because BX_3 is an electron deficient compound and NH_3 is an electron rich compound.

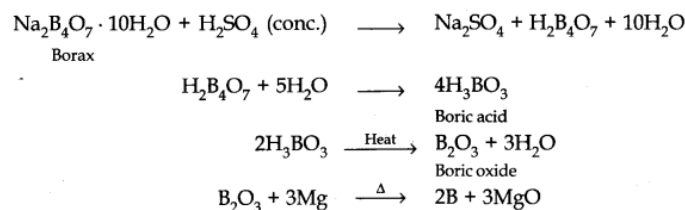
(b) As we move down the group 14, the atomic size increases and thus the strength of the element decreases down the group thus the bond dissociation enthalpy decreases steadily consequently the tendency for catenation decreases down the group.

(c) PbO_2 and SnO_2 both are present in +4 oxidation state. But due to stronger inert pair effect Pb^{2+} ion is more stable than Sn^{2+} ion.

In other way Pb^{4+} ions is more easily reduced to Pb^{2+} ions. Thus PbO_2 acts as a stronger oxidising agent than SnO_2 .

Question 3. How is boron obtained from borax? Give chemical equations with reaction conditions.

Answer:



IV. Multiple Choice Questions

Question 1. Boron has an extremely high melting point because of

- (a) its ionic crystal structure
- (b) the strong binding forces in the covalent polymer
- (c) atomic size
- (d) allotropy

Question 2. Which of the following compound is an important catalyst as well as a Lewis acid?

- (a) Al_2S_2
- (b) BF_3

(c) S_4N_4

(d) N_2H_4

Question 3. Carbon-60 contains

(a) 20 pentagons and 12 hexagons

(b) 12 pentagons and 20 hexagons

(c) 30 pentagons and 30 hexagons

(d) 24 pentagons and 36 hexagons

Question 4. The diamond molecule contains

(a) sp^2 -hybridized carbon atoms connected by single bonds

(b) sp^2 -hybridized carbon atoms connected by double bonds

(c) sp^3 -hybridized carbon atoms connected by single bonds

(d) sp^3 -and sp^2 -hybridized carbon atoms connected by single bonds

Question 5. Which of the following is the most ionic?

(a) CCl_4

(b) $PbCl_2$

(c) $PbCl_4$

(d) $SiCl_4$

Question 6. Silicon carbide (SiC) is known as

(a) quartz

(b) tridynite

(c) corundum

(d) carborundum

Question 7. Which of the following is a purely acidic oxide?

(a) SiO_2

(b) SnO_2

(c) PbO

(d) MnO_2

Question 8. Silicones are a group of organosilicon polymers containing

(a) Si - O - Si linkages

(b) O - Si - O linkages

(c) Si - C - Si linkages

(d) Si - Si - O linkages

Question 9. Which of the following molecules have zero dipole moment?

(a) CS_2

(b) CO_2

(c) CCl_2

(d) CH_2Cl_2

Question 10. Silicon shows a diagonal relation with

(a) magnesium

(b) phosphorous

(c) carbon

(d) boron

Answer:

1.(b)

2.(d)

3.(b)

4.(c)

5.(b)

6.(d)

7.(a)

8.(a)

9.(a) and (b)

10.(d)

V. Hots Questions

Question 1. Give reason for the following observations:-

(a) The tendency for catenation decrease down the group in Group 14.13.

(b) The decreasing stability of +3 oxidation state with increasing

atomic number in group

(c) Molten aluminium bromide is a poor conductor of electricity.

Answer:

(a) It is due to decrease in bond dissociation energy which is due to increase in atomic size.

$C-C > Si-Si > Ge-Ge > Sn-Sn > Pb-Pb$

(b) It is due to inert pair effect.

(c) Molten $AlBr_3$ is poor conductor of electricity because it is covalent compound.

Question 2. (a) Why do Boron halides form addition compound with NH_3 ?

(b) Assign appropriate reason for each of the following observations:-

(i) Anhydrous $AlCl_3$ is used as a catalyst in many organic reactions.

(ii) No form of elemental silicon is comparable to graphite.

Answer:

(a) It is because BX_3 is electron deficient whereas NH_3 is electron rich.

(b) (i) It is Lewis acid.

(ii) It cannot form $p\pi-p\pi$ bond due to large size.

Question 3. Give the chemical reaction as an evidence for each of the following observations.

(i) Tin (II) is a reducing agent whereas lead (II) is not.

(ii) Gallium (I) undergoes disproportionation reaction.

Answer:

(i) Due to inert pair effect Pb^{2+} is more stable than Pb^{4+} . Whereas Sn^{4+} is more stable than Sn^{2+} .

(ii) $3Ga^+ \rightarrow 2Ga + Ga^{3+}$

This is because Ga^{3+} is more stable than Ga^+ .

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