

Answer Key

1. (C)	2. (A)	3. (B)	4. (A)	5. (A)
6. (B)	7. (D)	8. (D)	9. (ABD)	10. (AC)
11. (B)	12. (A)	13. (C)	14. (B)	15. (A)
16. (B)	17. (C)	18. (D)	19. (A)	20. (A)

Solution

1. Which of the following compounds is consumed during the preparation of Na_2CO_3 by Solvay's process?

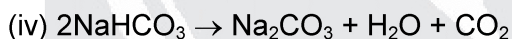
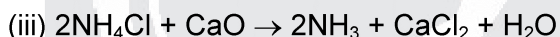
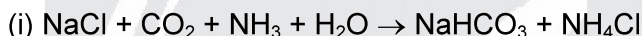
(A) NH_3 , CaCO_3 , NaCl (B) NH_4Cl , CaO , NaCl
 (C) CaCO_3 , NaCl (D) NaCl , NH_4HCO_3

Ans. (C)

Sol. The Solvay process results in soda ash (Na_2CO_3) from brine (source of NaCl) and from limestone (source of CaCO_3). The overall process is:



Steps are –

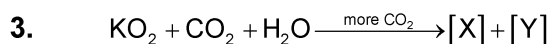


2. II A (alkaline earth metals) and II B (zinc family) resemble

(A) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is isomorphous with $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$
 (B) II A and II B cations are not precipitated by H_2S in acidic medium
 (C) both (a) and (b)
 (D) none of the above

Ans. (A)

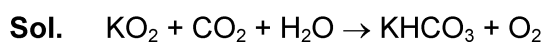
Sol. Facts



Products [X] and [Y] are respectively:

(A) K_2CO_3 , O_2 (B) KHCO_3 , O_2 (C) KOH , K_2CO_3 (D) KHCO_3 , H_2O

Ans. (B)

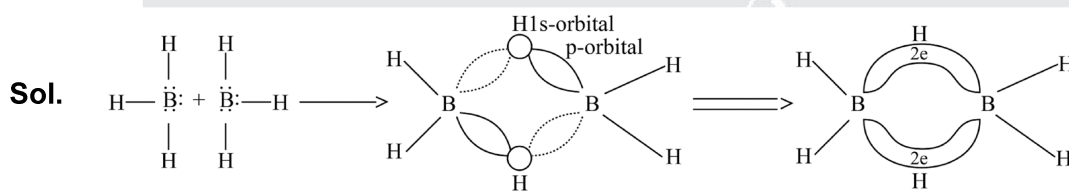


4. Consider the following statements for diborane:
1. Boron is approximately sp^3 hybridized
 2. B–H–B angle is 180°
 3. There are two terminal B–H bonds for each boron atom
 4. There are only 12 bonding electrons available

Of these statements:

- (A) 1, 3 and 4 are correct (B) 1, 2 and 3 are correct
(C) 2, 3 and 4 are correct (D) 1, 2 and 4 are correct

Ans. (A)



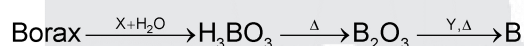
From figure it can be seen that:

Boron is approximately sp^3 hybridized.

There are two terminal B–H bonds for each boron atom.

There are only 12 bonding electrons available.

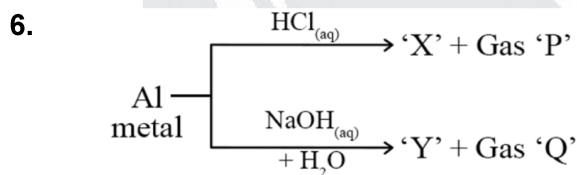
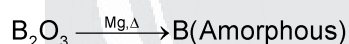
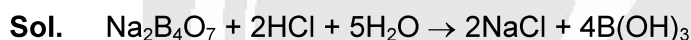
5. Borax is converted into amorphous boron by the following steps:



X and Y are respectively:

- (A) HCl, Mg (B) HCl, C (C) C, Al (D) HCl, Al

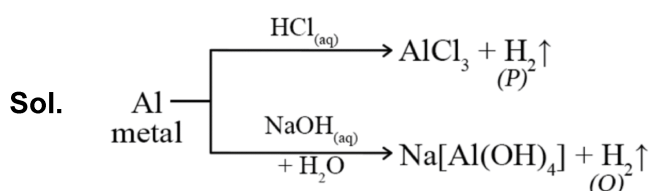
Ans. (A)



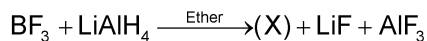
The incorrect statement regarding above reactions is:

- (A) Al shows amphoteric character (B) Gas 'P' and 'Q' are different
(C) Both X and Y are water soluble (D) Gas Q is inflammable

Ans. (B)

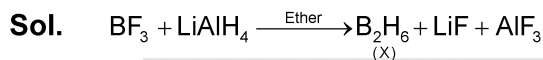


7. The incorrect statement regarding 'X' in given reaction is:

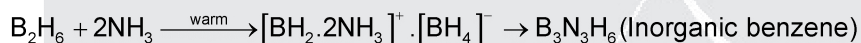


- (A) Twelve electrons are involved in bonding
(B) Four, two centre-two electron bonds
(C) Two, three centre-two electron bonds
(D) X does not react with NH_3

Ans. (D)



NH_3 can react with B_2H_6 .



8. In which of the following silicates, only two corners per tetrahedron are shared?

- | | |
|-----------------------------|----------------------------|
| (i) Pyro silicate | (ii) Cyclic silicate |
| (iii) Double chain silicate | (iv) Single chain silicate |
| (v) 3D silicate | (vi) Sheet silicate |
| (A) (i), (ii) and (v) | (B) (iv) and (vi) only |
| (C) (i) and (vi) only | (D) (ii) and (iv) only |

Ans. (D)

- Sol.** (i) Pyro silicate: (1 corner O-atoms per tetrahedron is shared)
(ii) Cyclic silicate: (2 corner O-atom per tetrahedron is shared)
(iii) Double chain silicate: (One unit shares two corner O-atom while one unit shares three corner O-atom)
(iv) Single chain silicate: (2 corner O-atom are shared)
(v) 3D silicate: (4 corner O-atom are shared)
(vi) Sheet silicate: (3 corner O-atom are shared)

MULTIPLE CHOICE QUESTIONS

9. Which of the following will release CO_2 when heated to 1000°C ?

- (A) KHCO_3 (B) Li_2CO_3 (C) K_2CO_3 (D) PbCO_3

Ans. (ABD)

Sol. K_2CO_3 thermally decomposes at 1200°C .

10. Heating of oxalic acid with conc. H_2SO_4 evolves:

- (A) CO (B) SO_2 (C) CO_2 (D) SO_3

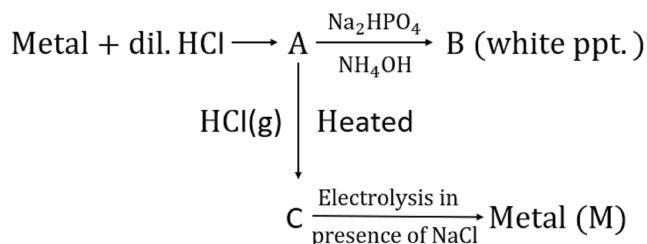
Ans. (AC)

Sol. Reaction is:



It's a method for preparation of CO.

COMPREHENSION # 1 (FOR Q. 11 TO Q. 13)



11. The compound A is:

- (A) $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ (B) $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ (C) $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ (D) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

Ans. (B)

12. The compound B is:

- (A) $\text{Mg}(\text{NH}_4)\text{PO}_4$ (B) $\text{Ca}_3(\text{PO}_4)_2 + \text{NH}_3$ (C) $\text{Na}(\text{NH}_4)\text{HPO}_4$ (D) both (a) and (b)

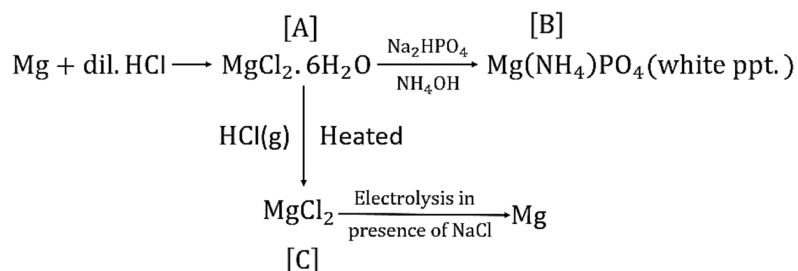
Ans. (A)

13. The compound C and metal M are:

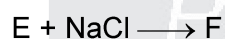
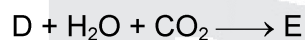
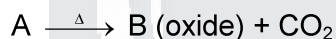
- (A) NaCl, Na (B) CaCl_2 , Ca (C) MgCl_2 , Mg (D) BeCl_2 , Be

Ans. (C)

Sol. (11,12,13)



COMPREHENSION # 4 (FOR Q. 14 TO Q. 16)



14. A is

- (A) $\text{Ca}(\text{HCO}_3)_2$ (B) CaCO_3 (C) CaO (D) Na_2CO_3

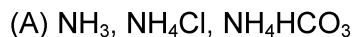
Ans. (B)

15. B and C are

- (A) CaO, $\text{Ca}(\text{OH})_2$ (B) $\text{Ca}(\text{OH})_2$, CaCO_3
(C) CaCO_3 , $\text{Ca}(\text{OH})_2$ (D) $\text{Ca}(\text{OH})_2$, CaO

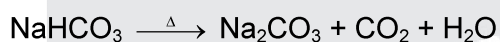
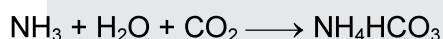
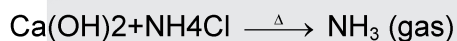
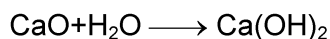
Ans. (A)

16. D, E and F are

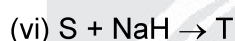
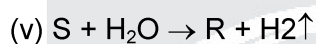
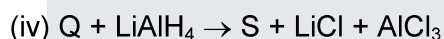
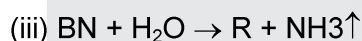
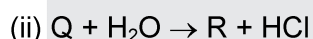
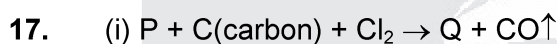


Ans. (B)

Sol. (14, 15, 16)



COMPREHENSION # 1 (FOR Q. 17, 18, 19)



(P, Q, R, S and T do not represent their chemical symbols)

Compound Q has:

I. zero dipole moment

II. a planar trigonal structure

III. an electron deficient compound

IV. a Lewis base

Choose the correct code:

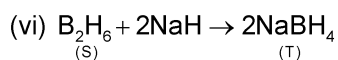
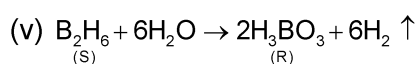
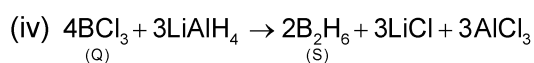
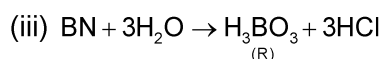
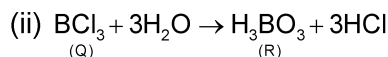
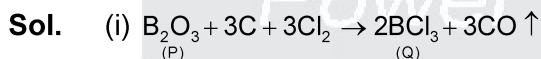
(A) I, IV

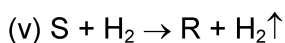
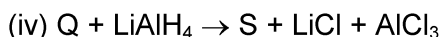
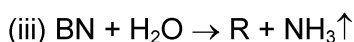
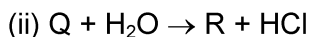
(B) I, II, IV

(C) I, II, III

(D) I, II, III, IV

Ans. (C)



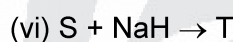
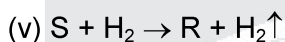
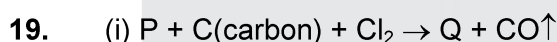
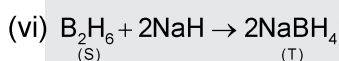
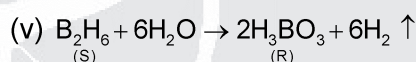
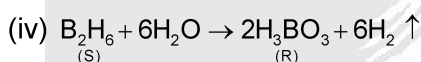
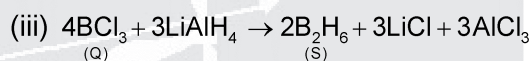
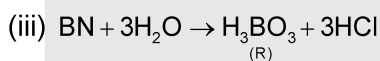
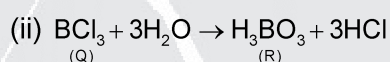
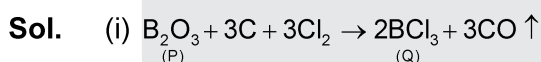


(P, Q, R, S and T do not represent their chemical symbols)

Compound T is used as a/an:

(A) oxidizing agent (B) complexing agent (C) bleaching agent (D) reducing agent

Ans. (D)



(P, Q, R, S and T do not represent their chemical symbols)

Compound S is:

I. an odd- e^- compound

II. $(2c - 3e^-)$ compound

III. a electron deficient compound

IV. a sp^2 hybridized compounds.

Choose the correct code

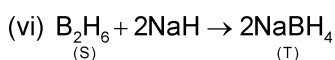
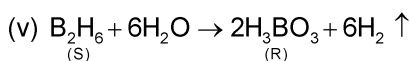
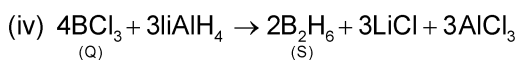
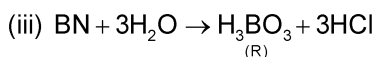
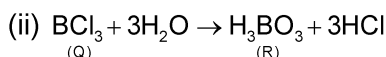
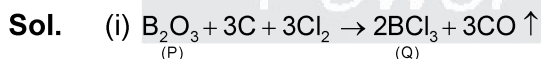
(A) III

(B) I, III

(C) II, III, IV

(D) I, II, IV

Ans. (A)



MATRIX TYPE QUESTIONS

20. Entries of Column-I are to be matched with entries of Column-II. Each entry of Column-I may have the matching with one or more than one entries of Column-II.

Column-I (Prop. of metals)	Column-II (Metals)
(A) Yellow flame colour	(P) Ca
(B) Most reactive with water	(Q) Mg
(C) Gives carbide with 'C'	(R) Na
(D) Metal nitrate $\xrightarrow{\Delta}$ metal oxide + NO ₂ + O ₂	(S) Li
(A) A → R; B → R; C → P, Q, S; D → P, Q, S	
(B) A → P; B → Q; C → R, S; D → P, Q, S	
(C) A → Q; B → P; C → S; D → Q, R, S	
(D) A → S; B → P; C → Q, R; D → P, Q, R	

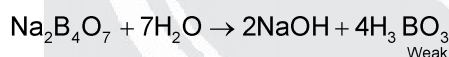
Ans. (A)

Sol. Fact

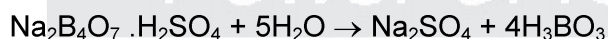
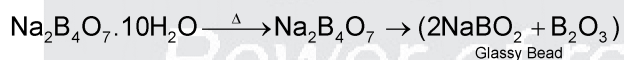
SUBJECTIVE ANSWER TYPE

21. A certain salt 'X' gives the following test.
- Its aqueous solution is alkaline to litmus.
 - On strongly heating it swells to give glassy bead.
 - When concentrated H₂SO₄ is added to solution of 'X', white crystals of a weak acid. separate out. Identify 'X' and write down all reaction.

Sol. Na₂B₄O₇ · 10H₂O

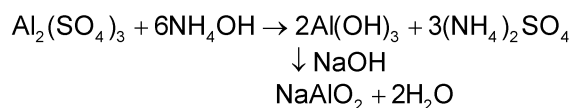


Due to presence of NaOH. the aqueous solution is alkaline to litmus.



22. A white crystalline comp. 'A' Swell up on heating and gives violet coloured flame on bunsen flame Its, aq. solution gives the following reaction.
- A white ppt. with BaCl₂ in presence of HCl.
 - When treated with excess of NH₄OH it gives white gelatinous ppt., which dissolve in NaOH.

Sol. A: K₂SO₄ · Al₂(SO₄)₃ · 24H₂O



23. A binary salt (A) on reaction with H_2O gives (B) aq. and (C) hydrocarbon. (C) gas on passing into ammonical AgNO_3 gives white ppt. (D). CO_2 gas turns (B) aq. milky. Identify (A), (B), (C) and (D).

Sol. (A) : CaC_2 (Ca^{2+} , C_2^{2-} binary)

(B) : $\text{Ca}(\text{OH})_2$

(C) : C_2H_2

(D) : C_2Ag_2

24. Arrange the following in order of increasing

- | | |
|--|--|
| (i) Thermal stability | BeSO_4 , MgSO_4 , CaSO_4 |
| (ii) Polarising power | Be^{2+} , Mg^{2+} , Ca^{2+} |
| (iii) Solubility in H_2O | $\text{Be}(\text{OH})_2$, $\text{Mg}(\text{OH})_2$, $\text{Ca}(\text{OH})_2$ |
| (iv) Covalent nature | BeCl_2 , MgCl_2 , CaCl_2 |
| (v) Hydrolysis nature | BeCl_2 , MgCl_2 , CaCl_2 |
| (vi) Lattice energy | CaF_2 , MgF_2 , BaF_2 |
| (vii) Hydration energy | Be^{2+} , Mg^{2+} , Ba^{2+} |
| (viii) Basic nature | Be , Mg , Ca , Sr |

Sol. (i) $\text{BeSO}_4 < \text{MgSO}_4 < \text{CaSO}_4$

(ii) $\text{Ca}^{2+} < \text{Mg}^{2+} < \text{Be}^{2+}$

(iii) $\text{Be}(\text{OH})_2 < \text{Mg}(\text{OH})_2 < \text{Ca}(\text{OH})_2$

(iv) $\text{CaCl}_2 < \text{MgCl}_2 < \text{BeCl}_2$

(v) $\text{CaCl}_2 < \text{MgCl}_2 < \text{BeCl}_2$

(vi) $\text{BaF}_2 < \text{CaF}_2 < \text{MgF}_2$

(vii) $\text{Ba}^{2+} < \text{Mg}^{2+} < \text{Be}^{2+}$

(viii) $\text{Be} < \text{Mg} < \text{Ca} < \text{Sr}$

Power of real gurus