PART-II_CHEMISTRY **Max Marks : 60**

Section-1
(One or more options correct type)

This section contains 10 Multiple Choice questions. Each Question has Four choices (A), (B), (C) and (D). Out of Which **Only One is correct**

21. $M + C \xrightarrow[\Delta]{} M_2C_2$.'M' can't be

A) Na B) K C) Rb D) All

22. A colourless solid (X) on heating evolved CO_2 and also gave a white residue, soluble in water. Residue also gives CO_2 when treated with dilute acid. (X) is

A) Na_2CO_3 B) $CaCO_3$ C) $Ca(HCO_3)_2$ D) $NaHCO_3$

23. Select incorrect statement

A) Na_2CO_3 thermally stable while $BeCO_3$ decomposes on heating to give BeO and CO_2

B) $NaCl$ and $BeCl_2$ are water soluble

C) Complexing ability of Be^{+2} is greater than Na^+

D) NaCl and $BeCl_2$ both gives colour in the flame test

24. The correct statement is

A) Na_2CO_3 and $CaCO_3$ on thermal decomposition forms corresponding metal oxide and evolves CO_2

B) $MgCl_2.6H_2O$ and $CaCl_2.6H_2O$ on heating forms anhydrous $MgCl_2$ and $CaCl_2$

C) Only LiOH decomposes on heating $\left(2LiOH \xrightarrow[\Delta]{} Li_2O + H_2O\right)$ other alkali metal hydroxides are thermally stable

D) $\underset{(air)}{Ba + O_2} \xrightarrow{heating} BaO$

25. $\underset{(white)}{P_4} + 3NaOH + 3H_2O \xrightarrow[\Delta]{} \underset{(salt)}{X} + \underset{(gas)}{Y}$ correct statement about the products X & Y

A) In salt 'X' the oxidation state of central atom is +1 and 'Y' is non poisonous gas

B) 'X' is a salt of dibasic acid of phosphorus and Y is poisonous gas

C) 'X' is a primary salt Y is commonly called phosgene

D) 'X' is normal salt and Y is phosphine

26. Which of the following is Incorrect

A) Hydration energy of Ba^{+2} greater than Li^{+}

B) Li^{+} Hydration energy is greater than all other alkali metal ions

C) Li^{+} have six water molecules in its primary shell when Li^{+} is hydrated, where as Rb^{+} have four water molecules in its primary shell

D) During hydration of alkali metal ions Li^{+} have higher average number of water molecules

27. The orbitals involved in back bonding of BBr_3

A) 2s – 2p B) 4p – 4p C) 4p – 2p D) 5p – 2p

28. The number of sp^3 Boran atoms in Colemanite is x no.of water molecules associated is y, x + y value is

A) 12 B) 9 C) 5 D)6

29. Three moles of B_2H_6 reacts with methyl alcohol the number of moles of Boron containing product.

A) 3 B) 4 C) 6 D) 2

30. Which of the following metal salt solution cannot gives precipitate of carbonate on reaction with Na_2CO_3 solution

A) $FeCl_3$ B) $AlCl_3$ C) $SnCl_2$ D)All of these

Section-2
(Paragraph Type)

This section contains 3 paragraphs each describing theory, experiment, data etc. Six questions relate to three paragraphs with two questions on each paragraph. Each question pertaining to a particular **paragraph** should have only one correct answer among the four choices A, B, C and D.

Paragraph For Questions 31 & 32

Reaction of $Na[BH_4]$ with iodine in the solvent diglyme a colour less gas (A) along with gas H_2 is formed. Gas (A) catches fire spontaneously in air and explodes with dioxygen. (A) on reaction with $NH_3(excess)$ at low temperature forms a compound (B) which on heating forms compound (C). (A) on reaction with excess of NH_3 at high temperature forms (D).

31. Compound (C) on reaction with hot water slowly hydrolyses liberates gases and forms compound (E). Identify the gases.

A) N_2, NH_3 B) H_2, N_2 C) NH_3, H_2 D) N_2, B_2H_6

32. Compound 'D' can be obtained by reaction of

A) Boron with NH_3 at very high temperature

B) Boron with N_2 at very low temperature

C) Boric acid heated with NH_3

D) all the above

Paragraph For Questions 33 & 34

All alkali metals dissolves in liquid NH_3 to less extent the group two metals except Be and Lanthanides like Eu, Yb. The metals can be recovered by evaporation of liquid ammonia. The alkali metal in liquid ammonia are dark blue mainly contains solvated metal ion and solvated free electrons.

33. Identify the incorrect statement.

A) Impure liquid ammonia alkali metals solution is Paramagnetic

B) The conductivity of alkali metal in liquid ammonia is greater than the salt of same metal in any liquid

C) The solution alkali metal in liquid ammonia is better reducing than corresponding alkali metal in dry state

D) Highly concentrated solution above 3M solution is copper-bronze coloured

34. The metal which is more soluble in liquid ammonia

A) Li B) K C) Sr D) Ca

Paragraph For Questions 35 & 36

i) $CaCO_3 \xrightarrow[\Delta]{} CaO + CO_2$

ii) $CaO + C \xrightarrow{high\ temp} 'A' + CO$

iii) $A + N_2 \xrightarrow{heating} 'B' + C$ (graphite)

35. The compound 'A' on reaction with water liberates a gas the number of σ and π bonds in gas molecule

A) three σ and two π B) four σ one-π

C)One π three σ D) four σ & zero-π

36. The no.of σ bonds around carbon atom of 'B' is

A) 4 B) 2 C) 3 D) 1

Section-3
(Matching List Type)

This section contains four questions, each having two matching lists (List-1 & List-II). The options for the **correct match** are provided as (A), (B),(C) and (D) out of which **ONLY ONE** is correct.

37. Match the reactions given in column I with the products mentioned in column II

	Column I	**Column II**
(A)	$BF_3 + LiAlH_4 \rightarrow$	(P) B_2H_6
(B)	$NaBH_4 + I_2 \rightarrow$	(Q) H_2
(C)	$B_2H_6 + O_2 \rightarrow$	(R) H_3BO_3
(D)	$B_2H_6 + H_2O \rightarrow$	(S) B_2O_3

A) A-P; B-PQ; C-S; D-QR
B) A-P; B-PQ; C-R; D-S
C) A-P; B-Q; C-S; D-R
D) A-P; B-PQ; C-QS;D-RS

38. Match the species given in column I with the hybridization given in column II

	Column I	**Column II**
(A)	Boron in B_2H_6	(P) sp^3
(B)	Al in Al_2Cl_6	(Q) sp^2
(C)	Boron in Borax	(R) sp^3d^2
(D)	Al in $[Al(H_2O)_6]^{3+}$	(S) sp^3d

A) A-P; B-Q; C-P; D-R
B) A-P; B-S; C-Q;D-R
C) A-P; B-P; C-PQ; D-R
D) A-Q; B-P; C-Q;D-R

39.

	Column I	**Column II**
(A)	Ca	(P) Produces H_2 on reaction with H_2O
(B)	CaH_2	(Q) Produces $Ca(OH)_2$ on reaction with H_2O
(C)	CaO	(R) The compound is ionic
(D)	CaC_2	(S) Produces hydrocarbon (sp hybridized) on hydrolysis

A) A-PQ; B-PQR; C-QR; D-RS B) A-PQ; B-PR; C-QR;D-QRS

C) A-PQ; B-PQR; C-Q; D-QRS D) A-PQ; B-PQR; C-QR;D-QRS

40.

	Column I	**Column II**
(A)	$(Al_2Cl_6)_2$	(P) Planar
(B)	$(BeH_2)_n$	(Q) Non-Planar
(C)	$(BeCl_2)_2$	(R) 3 centered - $2\bar{e}$ bond
(D)	$(BeCl_2)_n$	(S) dative bond

A) A-QR; B-QR; C-PR; D-QS B) A-QS; B-QR; C-PS;D-QS

C) A-QR; B-QR; C-PS; D-RS D) A-QR; B-PQ; C-PS;D-QS