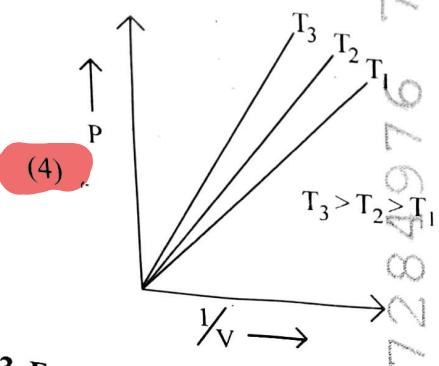
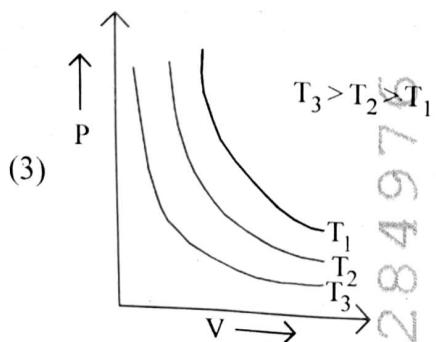
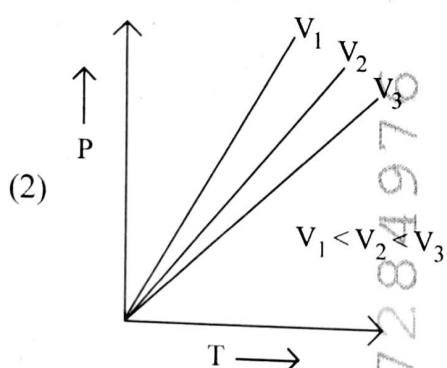
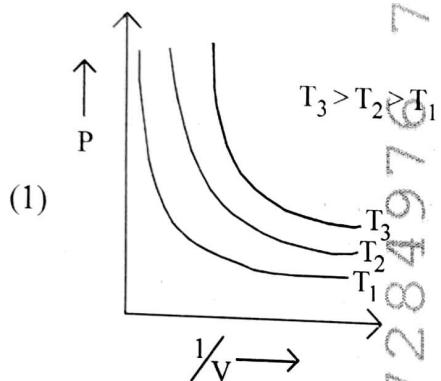


Chemistry : Section-A (Q. No. 51 to 85)

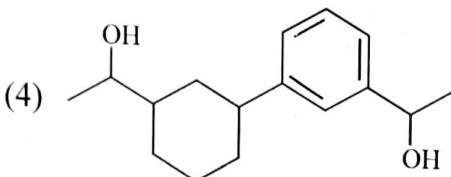
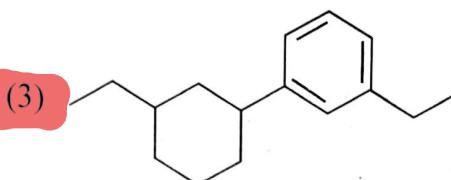
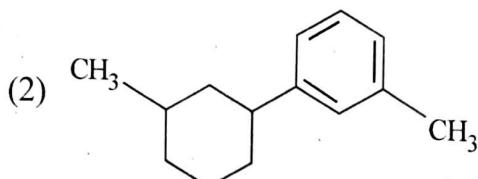
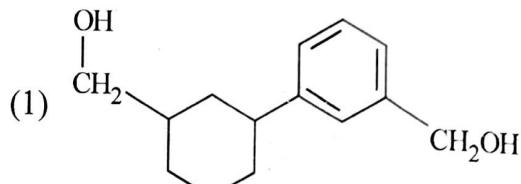
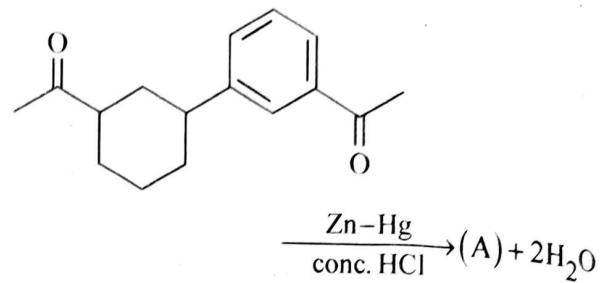
51 Amongst the given options which of the following molecules / ion acts as a Lewis acid?

- (1) BF_3 (2) OH^-
 (3) $\cdot\text{NH}_3$ (4) H_2O

52 Which amongst the following options is **correct** graphical representation of Boyle's Law?



53 Identify product (A) in the following reaction:



54 Which of the following statements are **NOT** correct?

- A. Hydrogen is used to reduce heavy metal oxides to metals.
- B. Heavy water is used to study reaction mechanism.
- C. Hydrogen is used to make saturated fats from oils.
- D. The H-H bond dissociation enthalpy is lowest as compared to a single bond between two atoms of any element.
- E. Hydrogen reduces oxides of metals that are more active than iron.

Choose the **most appropriate** answer from the options given below :

- (1) D, E only
- (2) A, B, C only
- (3) B, C, D, E only
- (4) B, D only

55 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

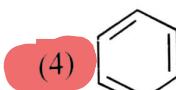
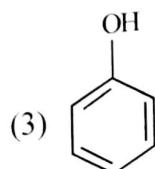
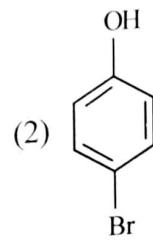
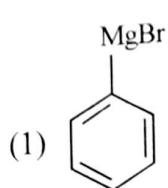
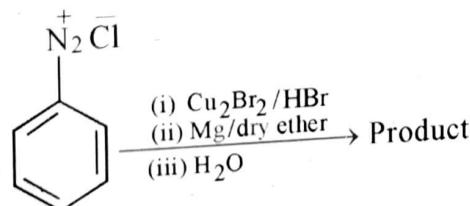
Assertion A : In equation $\Delta_r G = -nFE_{cell}$, value of $\Delta_r G$ depends on n.

Reasons R : E_{cell} is an intensive property and $\Delta_r G$ is an extensive property.

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) A is true but R is false.
- (2) A is false but R is true.
- (3) Both A and R are true and R is the correct explanation of A.
- (4) Both A and R are true and R is NOT the correct explanation of A.

56 Identify the product in the following reaction:



57 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Helium is used to dilute oxygen in diving apparatus.

Reasons R : Helium has high solubility in O_2 .

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) A is true but R is false.
- (2) A is false but R is true.
- (3) Both A and R are true and R is the correct explanation of A.
- (4) Both A and R are true and R is NOT the correct explanation of A.

58 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : A reaction can have zero activation energy.

Reasons R : The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) A is true but R is false.
- (2) A is false but R is true.
- (3) Both A and R are true and R is the correct explanation of A.
- (4) Both A and R are true and R is NOT the correct explanation of A.

[Contd...]

67 Which one of the following statements is correct?

- (1) The bone in human body is an inert and unchanging substance.
- (2) Mg plays roles in neuromuscular function and interneuronal transmission.
- (3) The daily requirement of Mg and Ca in the human body is estimated to be 0.2 - 0.3 g.
- (4) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor.

68 Match List - I with List - II :

List - I

- | | |
|--------------|--|
| A. Coke | I. Carbon atoms are sp^3 hybridised. |
| B. Diamond | II. Used as a dry lubricant |
| C. Fullerene | III. Used as a reducing agent |
| D. Graphite | IV. Cage like molecules |

List - II

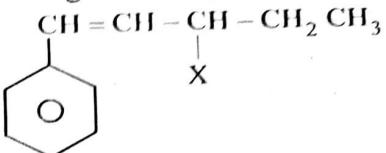
Choose the correct answer from the options given below :

- (1) A-III, B-I, C-IV, D-II
- (2) A-III, B-IV, C-I, D-II
- (3) A-II, B-IV, C-I, D-III
- (4) A-IV, B-I, C-II, D-III

69 The stability of Cu^{2+} is more than Cu^+ salts in aqueous solution due to -

- (1) hydration energy.
- (2) second ionisation enthalpy.
- (3) first ionisation enthalpy.
- (4) enthalpy of atomization.

70 The given compound



is an example of _____.

- (1) allylic halide
- (2) vinylic halide
- (3) benzylic halide
- (4) aryl halide

71 Given below are two statements :

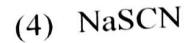
Statement I : A unit formed by the attachment of a base to 1' position of sugar is known as nucleoside

Statement II : When nucleoside is linked to phosphorous acid at 5'-position of sugar moiety, we get nucleotide.

In the light of the above statements, choose the correct answer from the options given below :

- (1) Statement I is true but Statement II is false.
- (2) Statement I is false but Statement II is true.
- (3) Both Statement I and Statement II are true.
- (4) Both Statement I and Statement II are false.

72 In Lassaigne's extract of an organic compound, both nitrogen and sulphur are present, which gives blood red colour with Fe^{3+} due to the formation of -



73 The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are:

- | | |
|--------------|--------------|
| (1) 11, 3, 1 | (2) 12, 2, 1 |
| (3) 11, 2, 0 | (4) 12, 3, 0 |

[Contd...]

- 75** The **correct** order of energies of molecular orbitals of N_2 molecule, is :

$$(1) \sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y)$$

$$(2) \sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < \\ (\pi^* 2p_x = \pi^* 2p_y) < \sigma 2p_z < \sigma^* 2p_z$$

$$\sigma 2p_z < \left(\pi^* 2p_x = \pi^* 2p_y \right) < \sigma^* 2p_z$$

$$(4) \quad \sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \\ (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$$

- 76 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Metallic sodium dissolves in liquid ammonia giving a deep blue solution, which is paramagnetic.

Reasons R : The deep blue solution is due to the formation of amide.

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) A is true but R is false.
 - (2) A is false but R is true.
 - (3) Both A and R are true and R is the correct explanation of A.
 - (4) Both A and R are true but R is NOT the correct explanation of A.

- 77 Which one is an example of heterogenous catalysis?

- (1) Decomposition of ozone in presence of nitrogen monoxide.
 - (2) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron.
 - (3) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen.
 - (4) Hydrolysis of sugar catalysed by H^+ ions.

- 78** For a certain reaction, the rate = $k[A]^2[B]$, when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would

- (1) increase by a factor of nine.
 - (2) increase by a factor of three.
 - (3) decrease by a factor of nine.
 - (4) increase by a factor of six.

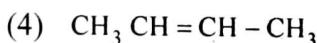
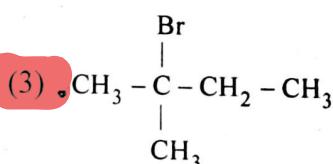
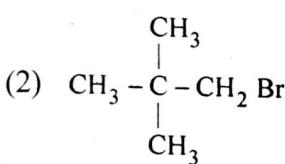
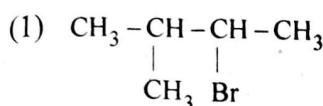
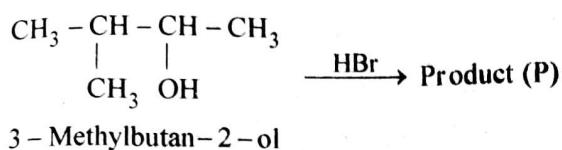
- 79** Select the **correct** statements from the following :

- A. Atoms of all elements are composed of two fundamental particles.
 - B. The mass of the electron is 9.10939×10^{-31} kg.
 - C. All the isotopes of a given element show same chemical properties.
 - D. Protons and electrons are collectively known as nucleons.
 - E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

Choose the **correct** answer from the options given below :

- (1) A and E only
 - (2) B, C and E only
 - (3) A, B and C only.
 - (4) C, D and E only

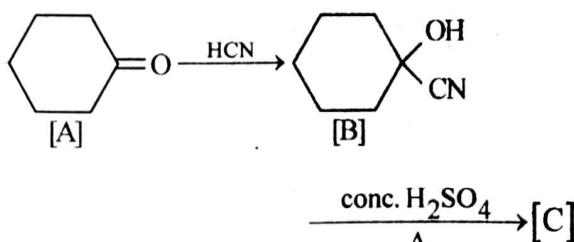
- 80 Consider the following reaction and identify the product (P).



- 81 Taking stability as the factor, which one of the following represents correct relationship?

- (1) $\text{AlCl} > \text{AlCl}_3$ (2) $\text{TlI} > \text{TlI}_3$
 (3) $\text{TiCl}_3 > \text{TiCl}$ (4) $\text{InI}_3 > \text{InI}$

- 82 Complete the following reaction :



[C] is _____.

- (1) (2)
 (3) (4)

- 83 The conductivity of centimolar solution of KCl at 25°C is $0.0210 \text{ ohm}^{-1} \text{ cm}^{-1}$ and the resistance of the cell containing the solution at 25°C is 60 ohm. The value of cell constant is -

(1) 1.26 cm^{-1}

(2) 3.34 cm^{-1}

(3) 1.34 cm^{-1}

(4) 3.28 cm^{-1}

- 84 The element expected to form largest ion to achieve the nearest noble gas configuration is :

- (1) N (2) Na
 (3) O (4) F

- 85 Intermolecular forces are forces of attraction and repulsion between interacting particles that will include :

- A. dipole - dipole forces.
- B. dipole - induced dipole forces.
- C. hydrogen bonding.
- D. covalent bonding.
- E. dispersion forces.

Choose the most appropriate answer from the options given below :

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

Chemistry : Section-B (Q. No. 86 to 100)

86 The reaction that does NOT take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is :

- (1) $C + CO_2 \rightarrow 2CO$
- (2) $CaO + SiO_2 \rightarrow CaSiO_3$
- (3) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$
- (4) $FeO + CO \rightarrow Fe + CO_2$

87 Match List - I with List - II :

| | |
|---------------------------|-------------------------|
| List - I (Oxoacids | List - II (Bonds |
| of Sulphur) | |

- | | |
|---------------------------|--------------------------------------|
| A. Peroxodisulphuric acid | I. Two S-OH, Four S=O, One S-O-S |
| B. Sulphuric acid | II. Two S-OH, One S=O |
| C. Pyrosulphuric acid | III. Two S-OH, Four S=O, One S-O-O-S |
| D. Sulphurous acid | IV. Two S-OH, Two S=O |

Choose the **correct** answer from the options given below :

- (1) A-I, B-III, C-IV, D-II
- (2) A-III, B-IV, C-II, D-I
- (3) A-I, B-III, C-II, D-IV
- (4) A-III, B-IV, C-I, D-II

88 Pumice stone is an example of -

- (1) solid sol
- (2) foam
- (3) sol
- (4) gel

89 Given below are two statements :

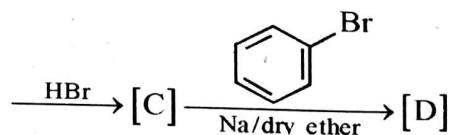
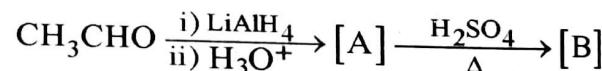
Statement I : The nutrient deficient water bodies lead to eutrophication.

Statement II : Eutrophication leads to decrease in the level of oxygen in the water bodies.

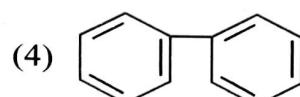
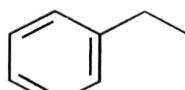
In the light of the above statements, choose the **correct** answer from the options given below :

- (1) **Statement I** is correct but **Statement II** is false.
- (2) **Statement I** is incorrect but **Statement II** is true.
- (3) Both **Statement I** and **Statement II** are true.
- (4) Both **Statement I** and **Statement II** are false.

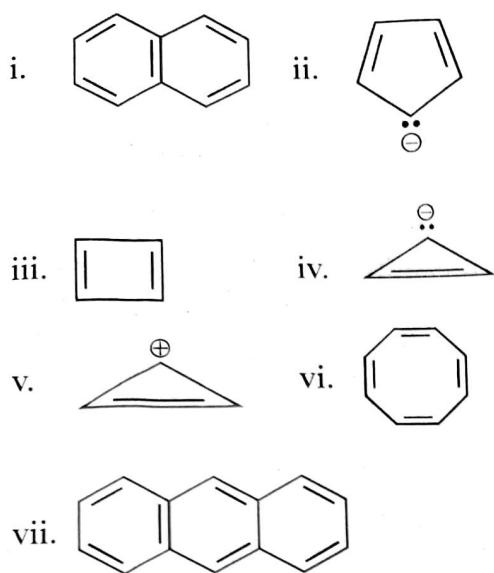
90 Identify the final product [D] obtained in the following sequence of reactions.



- (1) C_4H_{10}
- (2) $HC \equiv C^\ominus Na^+$

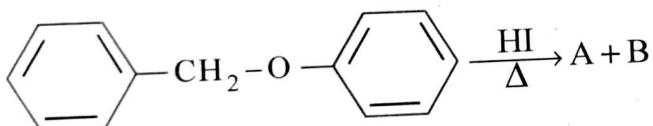


91 Consider the following compounds/species:

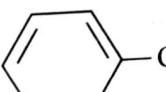


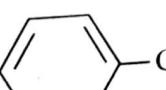
The number of compounds/species which obey Huckel's rule is _____.

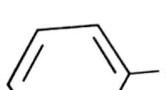
92 Consider the following reaction :

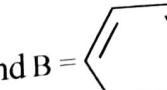


Identify products A and B.

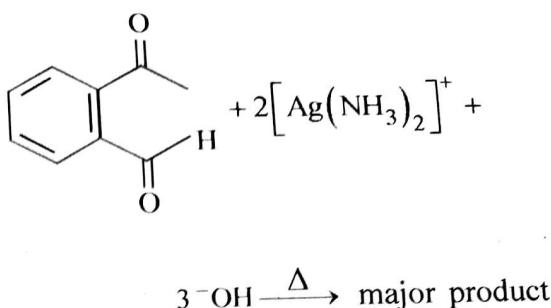
- (1) A =  and B = 

(2) A =  and B = 

(3) A =  and B = 

(4) A =  and B = 

93 Identify the major product obtained in the following reaction :



- (1) 

- (2) 

- (3)  A chemical structure showing a benzene ring with two methyl groups at positions 3 and 4, and a hydroxymethyl group (-CH₂OH) at position 2.

- (4) 

94 Which complex compound is most stable?

- (1) $\left[\text{CoCl}_2(\text{en})_2 \right] \text{NO}_3$

(2) $\left[\text{Co}(\text{NH}_3)_6 \right]_2(\text{SO}_4)_3$

(3) $\left[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})\text{Br} \right] (\text{NO}_3)_2$

(4) $\left[\text{Co}(\text{NH}_3)_3(\text{NO}_3)_3 \right]$

- 95** The equilibrium concentrations of the species in the reaction $A + B \rightleftharpoons C + D$ are 2, 3, 10 and 6 mol L⁻¹, respectively at 300 K. ΔG° for the reaction is ($R = 2 \text{ cal} / \text{mol K}$)
- (1) - 1381.80 cal
 - (2) - 13.73 cal
 - (3) 1372.60 cal
 - (4) - 137.26 cal
- 96** What fraction of one edge centred octahedral void lies in one unit cell of fcc?
- (1) $\frac{1}{4}$
 - (2) $\frac{1}{12}$
 - (3) $\frac{1}{2}$
 - (4) $\frac{1}{3}$
- 97** Which amongst the following options is the **correct** relation between change in enthalpy and change in internal energy?
- (1) $\Delta H - \Delta U = -\Delta nRT$
 - (2) $\Delta H + \Delta U = \Delta nR$
 - (3) $\Delta H = \Delta U - \Delta n_g RT$
 - (4) $\Delta H = \Delta U + \Delta n_g RT$
- 98** On balancing the given redox reaction,
- $$a \text{Cr}_2\text{O}_7^{2-} + b \text{SO}_3^{2-}(\text{aq}) + c \text{H}^+(\text{aq}) \rightarrow 2a \text{Cr}^{3+}(\text{aq}) + b \text{SO}_4^{2-}(\text{aq}) + \frac{c}{2} \text{H}_2\text{O}(\ell)$$
- the coefficients a, b and c are found to be, respectively -
- (1) 1, 8, 3
 - (2) 8, 1, 3
 - (3) 1, 3, 8
 - (4) 3, 8, 1
- 99** Which of the following statements are **INCORRECT**?
- All the transition metals except scandium form MO oxides which are ionic.
 - The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7 .
 - Basic character increases from V_2O_3 to V_2O_4 to V_2O_5 .
 - V_2O_4 dissolves in acids to give VO_4^{3-} salts.
 - CrO_4^{2-} is basic but $\text{Cr}_2\text{O}_7^{2-}$ is amphoteric.
- Choose the **correct** answer from the options given below :
- (1) C and D only
 - (2) B and C only
 - (3) A and E only
 - (4) B and D only
- 100** Which amongst the following will be most readily dehydrated under acidic conditions?
- -
 -
 -