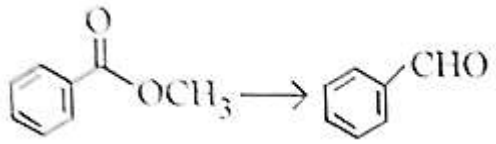
Q.46 Identify the suitable reagent for the following conversion.



(1) $NaBH_4$, (ii) H^+ / H_2O (2) H_2 / Pd_2BaSO_4

(3) (i) $LiAlH_4$, (ii) H^+ / H_2O (4) (i) $AlH(iBu)_2$ (ii) H_2O

Ans. **(4)**

Q.47 The correct order of decreasing acidity of the following aliphatic acids is :

(1) $HCOOH > CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH$

(2) $HCOOH > (CH_3)_3CCOOH > (CH_3)_2CHCOOH > CH_3COOH$

(3) $(CH_3)_3CCOOH > (CH_3)_2CHCOOH > CH_3COOH > HCOOH$

(4) $CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH > HCOOH$

Ans. **(1)**

Q.48 Which one of the following reactions does NOT belong to "Lassaigne's test"?

(1) $Na + X \xrightarrow[\Delta]{} + NaX$ (2) $2CuO + C \xrightarrow[\Delta]{} 2Cu + CO_2$

(3) $Na + C + N \xrightarrow[\Delta]{} NaCN$ (4) $2Na + S \xrightarrow[\Delta]{} Na_2S$

Ans. **(2)**

Q.49 If the rate constant of a reaction is $0.03 s^{-1}$, how much time does it take for $7.2 mol L^{-1}$ concentration of the reactant to get reduced to $0.9 mol L^{-1}$?

(Given: $\log 2 = 0;301$)

(1) 210 s (2) 21.0 s

(3) 69.3 s (4) 23.1 s

Ans. **(3)**

Q.50 Given below are two statements :

Statement I: A hypothetical diatomic molecule with bond order zero is quite stable.

Statement II: As bond order increases, the bond length increases.

In the light of the above statements, choose the most appropriate 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

Ans. **(4)**

Q.51 Out of the following complex compounds, which of the compound will be having the minimum conductance in solution?

(1) $\left[Co(NH_3)_6\right]Cl_3$ (2) $\left[Co(NH_3)_5Cl\right]Cl$

(3) $\left[Co(NH_3)_3Cl_3\right]$ (4) $\left[Co(NH_3)_4Cl_2\right]$

Ans. **(2)**

Q.52 Which of the following aqueous solution will exhibit highest boiling point?

(1) $0.01M Na_2SO_4$ (2) $0.015M C_6H_{12}O_6$

(3) 0.01 M Urea (4) $0.01M KNO_3$

Ans. **(1)**

Q.53 Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A):  I undergoes $^{S}N^{2}$ reaction faster than  Cl.

Reason (R): Iodine is a better leaving group because of its large size.

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 **A** 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**

Ans. **(3)**

Q.54 Consider the following compounds : KO_2, H_2O_2 and H_2SO_4 .

The oxidation states of the underlined elements in them are, respectively,

(1) +1, –2, and +4 (2) +4,–4, and +6

(3) +1,–1, and +6 (4) +2,–2, and +6

Ans. **(3)**

Q.55 Match **List - I** with **List – II**

List-I	**List-II**
A. Haber process	I. Fe catalyst
B. Wacker oxidation	II. $PdCl_2$
C. Wilkinson catalyst	III. $\left[(PPh_3)_3 RhCl\right]$
D. Ziegler catalyst	IV. $TiCl_4$ with $Al(CH_3)_3$

Choose the correct answer from the options given below :

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

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

Ans. **(1)**

Q.56 Given below are two statements :

Statement I : Like nitrogen that can form ammonia, arsenic can form arsine.

Statement II : Antimony cannot form antimony pentoxide.

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

(1) Statement I is correct but Statement II is incorrect

(2) Statement I is incorrect but Statement II is correct

(3) Both Statement I and Statement II are correct

(4) Both Statement I and Statement II are incorrect

Ans. **(1)**

Q.57 Given below are two statements :

Statement I: Ferromagnetism is considered as an extreme form of paramagnetism.

Statement II: The number of unpaired electrons in a Cr^{2+} ion $(Z = 24)$ is the same as that of a Nd^{3+}ion$(Z = 60)$.

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

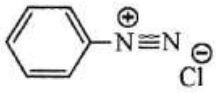
(3) Both Statement I and Statement II are true

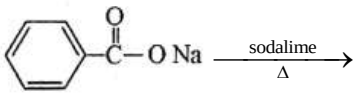
(4) Both Statement I and Statement II are false

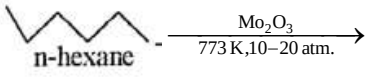
Ans. **(1)**

Q.58 Which one of the following reactions does NOT give benzene as the product?

(1) $H-C\equiv C-H \xrightarrow[\text{at } 873\,K]{\text{red hot Iron Tube}}$

(2)  $\xrightarrow[\text{warm}]{H_2O}$

(3) 

(4) 

Ans. **(2)**

Q.59. Match List - I with List – II

List-I	List-II
A. XeO_3	I. sp^3d ; linear
B. XeF_2	II. sp^3 ; pyramidal
C. $XeOF_4$	III. sp^3d^3 distorted octahedral
D. XeF_6	IV. sp^3d^2 square pyramidal

Choose the correct answer from the options given below :

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

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

Ans. **(3)**

Q.60 How many products (including stereoisomers) are expected from monochlorination of the following compound?

(1) 5 (2) 6

(3) 2 (4) 3

Ans. **(2)**

Q.61 Which of the following statements are true?

A. Unlike Ga that has a very high melting point, Cs has a very low melting point.

B. On Pauling scale, the electronegativity values of N and Cl are not the same.

C. Ar, K^+, Cl^-, Ca^{2+}, and S^{2-} are all isoelectronic species.

D. The correct order of the first ionization enthalpies of Na, Mg, Al, and Si is $Si > Al > Mg > Na$.

E. The atomic radius of Cs is greater than that of Li and Rb.

Choose the correct answer from the options given below :

(1) C and D only (2) A, C, and E only

(3) A, B, and E only (4) C and E only

Ans. **(4)**

Q.62 The standard heat of formation, in kcal / mol of Ba^{2+} is :

[Given : standard heat of formation of SO_4^{2-} ion $(aq) = -216 kcal/mol$, standard heat of crystallisation of $BaSO_4(s) = -4.5 kcal/mol$, standard heat of formation of $BaSO_4(s) = -349 kcal/mol$]

(1) +133.0 (2) +220.5

(3) –128.5 (4) –133.0

Ans. **(3)**

Q.63 Match List - I with List – II

List-I (Example)	List-II (Type of Solution)
A. Humidity	I. Solid in solid
B. Alloys	II. Liquid in gas
C. Amalgams	III. Solid in gas
D. Smoke	IV. Liquid in solid

Choose the correct answer from the options given below :

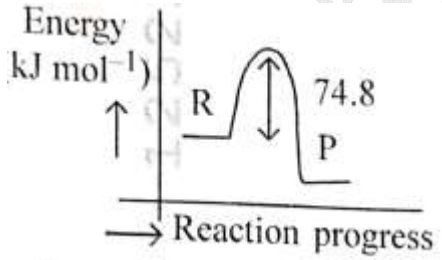
(1) A-III, B-I, C-IV, D-II (2) A-III, B-II, C-I, D-IV

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

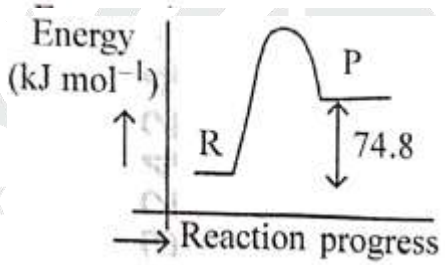
Ans. (4)

Q.64 $C(s) + 2H_2(g) \rightarrow CH_4(g) : \Delta H = -74.8\,kJ\,mol^{-1}$ Which of the following diagrams gives an accurate representation of the above reaction? [R → reactants; P → products]

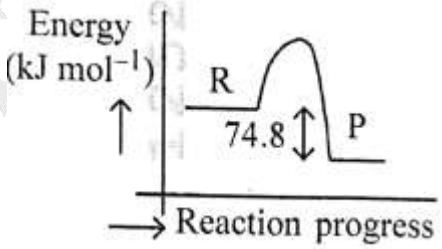
(1)



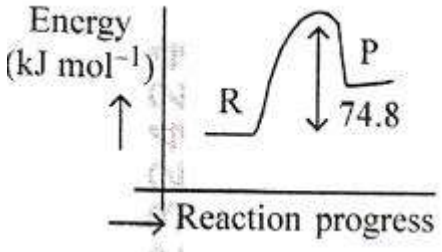
(2)



(3)



(4)



Ans. (3)

Q.65 Sugar ' X '

A. is found in honey. B. is a keto sugar.

C. exists in α and β-anomeric forms. D. is laevorotatory. ' X ' is :

(1) Maltose (2) Sucrose

(3) D-Glucose (4) D-Fructose

Ans. (4)

Q.66 Total number of possible isomers (both structural as well as stereoisomers) of cyclic ethers of molecular formula C_4H_8O is :

(1) 10 (2) 11

(3) 6 (4) 8

Ans. **(1)**

Q.67 For the reaction $A(g) \rightleftharpoons 2B(g)$, the backward reaction rate constant is higher than the forward reaction rate constant by a factor of 2500 , at 1000 K .

K_p for the reaction at 1000 K is

(1) 0.033 (2) 0.021

(3) 83.1 (4) 2.077×10^5

Ans. **(1)**

Q.68 The ratio of the wavelengths of the light absorbed by a Hydrogen atom when it undergoes $n = 2 \rightarrow n = 3$ and $n = 4 \rightarrow n = 6$ transitions, respectively, is

(1) $\frac{1}{9}$ (2) $\frac{1}{4}$

(3) $\frac{1}{36}$ (4) $\frac{1}{16}$

Ans. **(2)**

Q.69 If the molar conductivity (Λ_m) of a 0.050 mol L^{-1} solution of a monobasic weak acid is 90 S cm^2 mol^{-1}, its extent (degree) of dissociation will be

[Assume $\Lambda_+^o = 349.6$ S cm^2 mol^{-1} and $\Lambda_-^o = 50.4$ S cm^2 mol^{-1}]

(1) 0.225 (2) 0.215

(3) 0.115 (4) 0.125

Ans. **(1)**

Q.70 5 moles of liquid X and 10 moles of liquid Y make a solution having a vapour pressure of 70 torr. The vapour pressures of pure X and Y are 63 torr and 78 torr respectively. Which of the following is true regarding the described solution?

(1) The solution is ideal.

(2) The solution has volume greater than the sum of individual volumes.

(3) The solution shows positive deviation.

(4) The solution shows negative deviation.

Ans. **(4)**

Q.71 Among the following, choose the ones with equal number of atoms.

A. 212 g of Na_2CO_3 (s) [molar mass = 106 g]

B. 248 g of Na_2O (s) [molar mass = 62g]

C. 240 g of NaOH(s) [molar mass = 40 g]

D. 12 g of H_2 (g) [molar mass = 2 g]

E. 220 g of CO_2 (g) [molar mass = 44 g]

Choose the correct answer from the options given below :

(1) B, C, and D only (2) B, D, and E only

(3) A, B , and C only (4) A, B, and D only

Ans. **(4)**

Q.72 Which of the following are paramagnetic?

A. $\left[NiCl_4\right]^{2-}$ B. $Ni(CO)_4$

C. $\left[Ni(CN)_4\right]^{2-}$ D. $\left[Ni\left(H_2O\right)_6\right]^{2+}$

E. $Ni\left(PPh_3\right)_4$

Choose the correct answer from the options given below:

(1) A and D only (2) A, D and E only

(3) A and C only (4) B and E only

Ans. **(1)**

Q.73 If the half-life $\left(t_{1/2}\right)$ for a first order reaction is 1 minute, then the time required for 99.9% completion of the reaction is closest to :

(1) 5 minutes (2) 10 minutes

(3) 2 minutes (4) 4 minutes

Ans. **(2)**

Q.74 Energy and radius of first Bohr orbit of He^+ and Li^{2+} are

[Given $R_H = 2.18\times10^{-18}\ J, a_0 = 52.9pm$]

(1) $E_n(Li^{2+}) = -19.62\times10^{-16}\ J$;

$r_n(Li^{2+}) = 17.6pm$

$E_n(He^+) = -8.72\times10^{-16}\ J$;

$r_n\left(He^+\right) = 26.4pm$

(2) $E_n\left(Li^{2+}\right) = -8.72\times10^{-16}\ J$;

$r_n\left(Li^{2+}\right) = 17.6pm$

$E_n\left(He^+\right) = -19.62\times10^{-16}\ J$;

$r_n\left(He^+\right) = 17.6pm$

(3) $E_n\left(Li^{2+}\right) = -19.62\times10^{-18}\ J$;

$r_n\left(Li^{2+}\right) = 17.6pm$

$E_n\left(He^+\right) = -8.72\times10^{-18}\ J$;

$r_n\left(He^+\right) = 26.4pm$

(4) $E_n\left(Li^{2+}\right) = -8.72\times10^{-18}\ J$

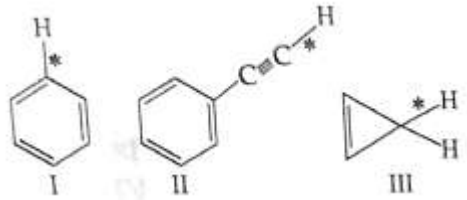
$r_n\left(Li^{2+}\right) = 26.4pm$

$E_n\left(He^+\right) = -19.62\times10^{-18}\ J$;

$r_n\left(He^+\right) = 17.6pm$

Ans. **(3)**

Q.75 Among the given compounds I-III, the correct order of bond dissociation energy of C –H bond marked with * is :



(1) III > II > I (2) II > III > I

(3) II > I > III (4) I > II > III

Ans. **(3)**

Q.76 Dalton's Atomic theory could not explain which of the following?

(1) Law of multiple proportion (2) Law of gaseous volume

(3) Law of conservation of mass (4) Law of constant proportion

Ans. **(2)**

Q.77 Identify the correct orders against the property mentioned

A. $H_2O > NH_3 > CHCl_3$ - dipole moment

B. $XeF_4 > XeO_3 > XeF_2$ - number of lone pairs on central atom

C. $O-H > C-H > N-O$ - bond length

D. $N_2 > O_2 > H_2$ - bond enthalpy

Choose the correct answer from the options given below :

(1) A, C only (2) B, C only

(3) A, D only (4) B, D only

Ans. **(3)**

Q.78 Match List I with List II.

List I (Name of Vitamin)	**List II (Deficiency disease)**
A. Vitamin B_{12}	I. Cheilosis
B. Vitamin D	II. Convulsions
C. Vitamin B_2	III. Rickets
D. Vitamin B_6	IV. Pernicious anaemia

Choose the correct answer from the options given below :

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

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

Ans. **(4)**

Q.79 The correct order of decreasing basic strength of the given amines is :

(1) N-ethylethanamine > ethanamine > N -methylaniline > benzenamine

(2) benzenamine > ethanamine > N -methylaniline > N- ethylethanamine

(3) N -methylaniline > benzenamine > ethanamine > N-ethylethanamine

(4) N -ethylethanamine > ethanamine > benzenamine > N-methylaniline

Ans. **(1)**

Q.80 The correct order of the wavelength of light absorbed by the following complexes is,

A. $\left[Co(NH_3)_6\right]^{3+}$ B. $\left[Co(CN)_6\right]^{3-}$

C. $\left[Cu(H_2O)_4\right]^{2+}$ D. $\left[Ti(H_2O)_6\right]^{3+}$

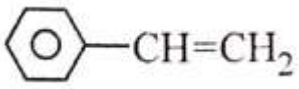
Choose the correct answer from the options given below:

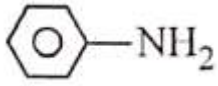
(1) C < D < A < B (2) C < A < D < B

(3) B < D < A < C (4) B < A < D < C

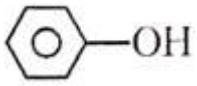
Ans. **(4)**

Q.81 Which one of the following compounds does not decolourize bromine water?

(1) 

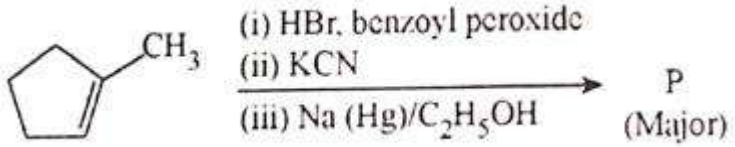
(2) 

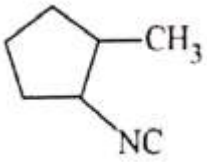
(3) 

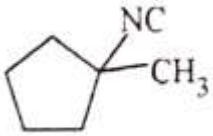
(4) 

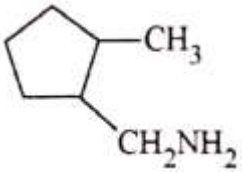
Ans. **(3)**

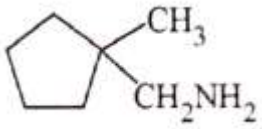
Q.82 Predict the major product ' P ' in the following sequence of reactions –



(1) 

(2) 

(3) 

(4) 

Ans. **(3)**

Q.83 Match List I with List II

List I (Mixture)	**List II (Separation)**
A. $CHCl_3 + C_6H_5NH_2$	1. Distillation under reduced pressure
B. Crude oil in petroleum industry	II. Steam distillation
C. Glycerol from spent-lye	III. Fractional distillation
D. Aniline-water	IV. Simple distillation

Choose the correct answer from the options given below:

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

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

Ans. **(3)**

Q.84 Which among the following electronic configurations belong to main group elements?

A. $[Ne]3s^1$ B. $[Ar]3d^3 4s^2$

C. $[Kr]4d^{10}5s^2 5p^5$ D. $[Ar]3d^{10}4s^1$

E. $[Rn]5f^0 6d^2 7s^2$

Choose the correct answer from the option given below :

(1) D and E only (2) A, C and D only

(3) B and E only (4) A and C only

Ans. **(4)**

Q.85 Which one of the following compounds can exist as cis-trans isomers?

(1) 1,1-Dimethylcyclopropane (2) 1,2-Dimethylcyclohexane

(3) Pent-1-ene (4) 2-Methylhex-2-ene

Ans. **(2)**

Q.86 Phosphoric acid ionizes in three steps with their ionization constant values $K_{a_1} \cdot K_{a_2}$ and K_{a_3}, respectively while K is the overall ionization constant. Which of the following statements are true?

A. $\log K = \log K_{a_1} + \log K_{a_2} + \log K_{a_3}$

B. H_3PO_4 is a stronger acid than $H_2PO_4^-$ and HPO_4^{2-}

C. $K_{a_1} > K_{a_2} > K_{a_3}$

D. $K_{a_1} = \frac{K_{a_3} + K_{a_2}}{2}$

Choose the correct answer from the options given below:

(1) B, C and D only (2) A, B and C only

(3) A and B only (4) A and C only

Ans. **(2)**

Q.87 Match List I with List II

List-I (Ion)	**List-II (Group Number in Cation Analysis)**
A. Co^{2+}	I. Group-I
B. Mg^{2+}	II. Group-III
C. Pb^{2+}	III. Group-IV
D. Al^{3+}	IV. Group-VI

Choose the correct answer from the options given below :

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

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

Ans. **(4)**

Q.88 Higher yield of NO in $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ can be obtained at

[ΔH of the reaction = +180.7 kJ mol^{-1}]

A. higher temperature B. lower temperature

C. higher concentration of N_2 D. higher concentration of O_2

Choose the correct answer from the options given below:

(1) B, C, D only (2) A, C, D only

(3) A, D only (4) B, C only

Ans. **(2)**

Q.89 Given below are two statements :

Statement I : Benzenediazonium salt is prepared by the reaction of aniline with nitrous acid at 273–278 K. It decomposes easily in the dry state.

Statement II : Insertion of iodine into the benzene ring is difficult and hence iodobenzene is prepared through the reaction of benzenediazonium salt with KI.

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

(1) Statement I is correct but Statement II is incorrect

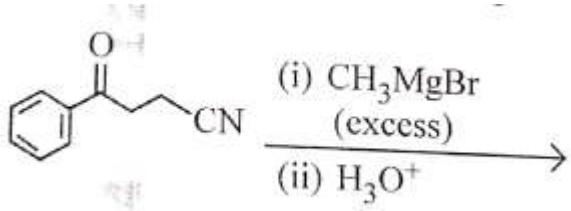
(2) Statement I is incorrect but Statement II is correct

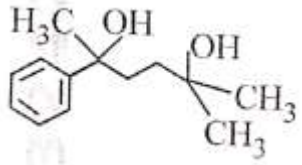
(3) Both Statement I and Statement II are correct

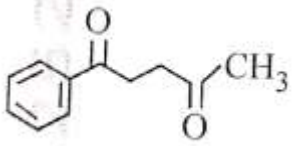
(4) Both Statement I and Statement II are incorrect

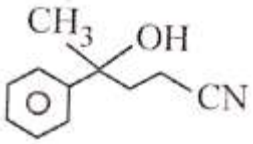
Ans. **(3)**

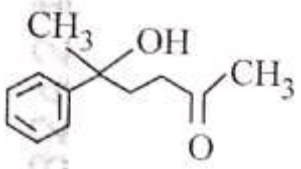
Q.90 The major product of the following reaction is :



(1) 

(2) 

(3) 

(4) 

Ans. (4)