FINAL NEET(UG)–2023 (EXAMINATION)

(Held On Sunday 7th MAY, 2023)

CHEMISTRY

TEST PAPER WITH ANSWER & SOLUTIONS

Chemistry : Section-A (Q. No. 051 to 085)

51. 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.

Reason 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) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**.

(2) **A** is true but **R** is false

(3) **A** is false but **R** is true

(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

Ans. **(2)**

Sol. Assertion is correct because all Alkali metals gives deep blue solution by giving electrons.

Reason : is incorrect because deep blue solution appears due to the presence of ammoniated electron or solvated electrons.

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

(1) 3.28 cm^{-1} (2) 1.26 cm^{-1}

(3) 3.34 cm^{-1} (4) 1.34 cm^{-1}

Ans. **(2)**

Sol. Centimolar solution $= \frac{1}{100}M = 0.01M$

Conductivity (k) = 0.0210 ohm^{-1} cm^{-1}

Resistance (R) = 60 ohm

$$k = \frac{1}{R}\left(\frac{\ell}{A}\right)$$

$$\Rightarrow 0.0210 = \frac{1}{60}\left(\frac{\ell}{A}\right) \Rightarrow \frac{\ell}{A} = 1.26\,cm^{-1}$$

53. 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 six

(2) increase by a factor of nine

(3) increase by a factor of three

(4) decrease by a factor of nine

Ans. **(2)**

Sol. Rate = k $[A]^2$ [B]

If [A] is tripled and [B] is kept constant.

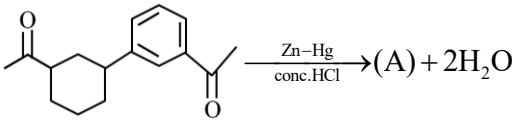
$r^1 = k\,[3A]^2\,[B]$

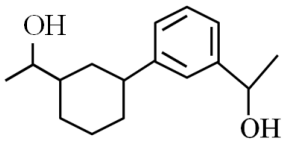
$r^1 = 9k\,[A]^2\,[B]$

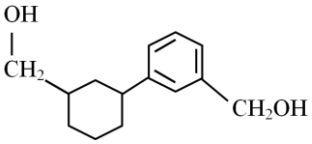
$r^1 = 9r$

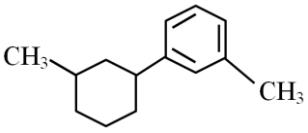
Increased by a factor of nine

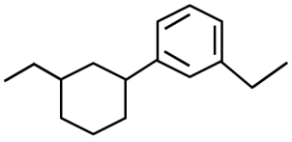
54. Identify product (A) is the following reaction :



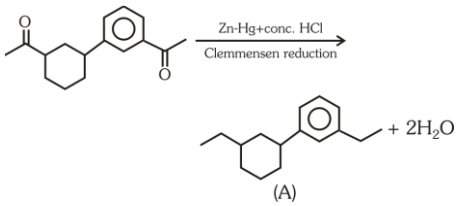
(1) 

(2) 

(3) 

(4) 

Ans. **(4)**

Sol. 

55. Which one is an example of heterogenous catalysis ?

(1) Hydrolysis of sugar catalysed by H^+ ions.

(2) Decomposition of ozone is presence of nitrogen monoxide.

(3) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron.

(4) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen.

Ans. (3)

Sol.

(1) $C_{12}H_{22}O_{11(aq)} + H_2O \xrightarrow{H^+} C_6H_{12}O_{6(aq)} + C_6H_{12}O_{6(aq)}$ (Homogeneous reaction)

(2) $2O_{3(g)} \xrightarrow{NO\ (g)} 3O_{2(g)}$ (Homogeneous reaction)

(3) $N_{2(g)} + 3H_{2(g)} \xrightarrow{Fe\ (s)} 2NH_{3(g)}$
(Reactants and catalyst are in different phase)
It is heterogeneous reaction

(4) $SO_{2(g)} + \frac{1}{2}O_{2(g)} \xrightarrow{NO\ (g)} SO_{3(g)}$

56. 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) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**.

(2) **A** is true but **R** is false

(3) **A** is false but **R** is true

(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

Ans. (2)

Sol. Assertion is true because He has low solubility in blood. (NCERT)

57. Amongst the following, the total number of species NOT having eight electrons around central atom in its outer most shell, is

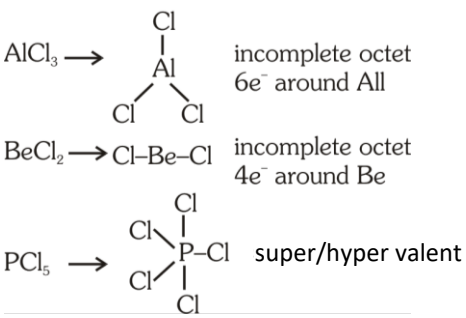
NH_3, $AlCl_3$, $BeCl_2$, CCl_4, PCl_5 :

(1) 2 (2) 4

(3) 1 (4) 3

Ans. (4)

Sol. Total number of species = 3



58. The **correct** order of energies of molecular orbitals of N_2 molecule, is

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

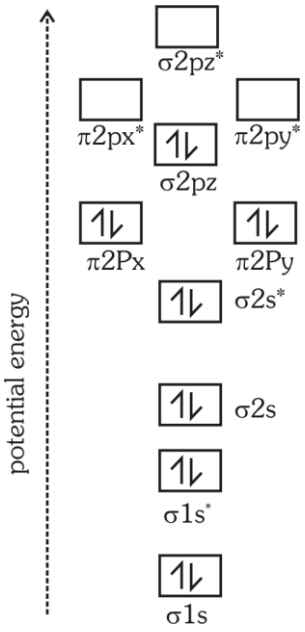
(2) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y)$

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

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

Ans. (4)

Sol. Molecular orbital (energy) diagram / sequence of N_2



59. Match **List-I** with **List-II**.

List-I	**List-II**
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

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

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

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

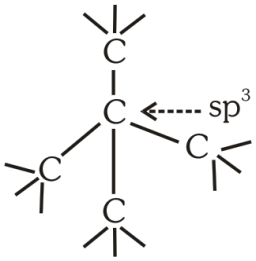
(3) A-III, B-IV, C-I, D-II

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

Ans. (2)

Sol. **Coke** : It is used as reducing agent in carbon reduction methods. (in metallurgical process)

Diamond : It is a allotrope of carbon in which each carbon is sp^3 hybridised.



Fullerene **:** It contains pentagonal & hexagonal rings (cage like structure)

Graphite : It is soft solid because graphite layers are bonded with weak Vander Wall attractions.

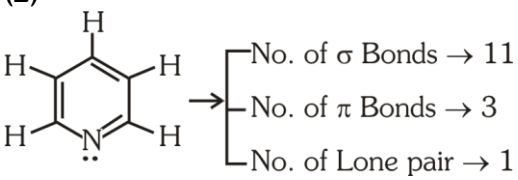
60. The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are :

(1) 12, 3, 0 (2) 11, 3, 1

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

Ans. **(2)**

Sol.



61. The element expected to form largest ion to achieve the nearest noble gas configuration is

(1) F (2) N

(3) Na (4) O

Ans. **(2)**

Sol. F^{-1}, N^{-3}, Na^{+} & O^{-2}

all ions are isoelectronic containing 10 e^-

$Z_{eff} \rightarrow Na^{+} > F^{-} > O^{-2} > N^{-3}$

order of radius $\rightarrow N^{-3} > O^{-2} > F^{-} > Na^{+}$

$\rightarrow$ Nitrogen to achieve Noble gas configuration it gain 3 e^- , & form N^{-3}

62. 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) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**.

(2) **A** is true but **R** is false

(3) **A** is false but **R** is true

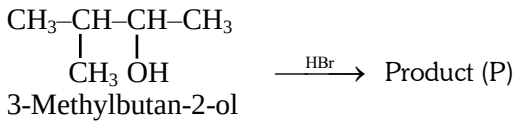
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

Ans. **(3)**

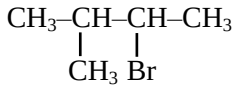
Sol. A reaction cannot have zero activation energy.

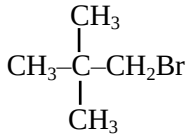
E_a is minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value.

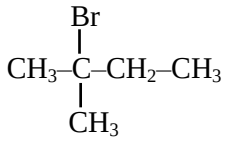
63. Consider the following reaction and identify the product (P).



(1) $CH_3CH=CH-CH_3$

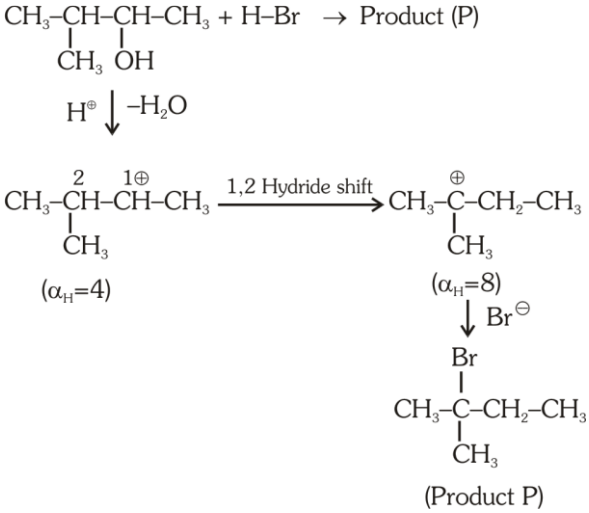
(2) 

(3) 

(4) 

Ans. **(4)**

Sol.



64. 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) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.

(2) **A** is true but **R** is false

(3) **A** is false but R is true

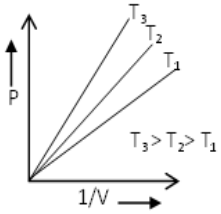
(4) Both **A** and **R** are true and **R** is the correct explanation of **A.**

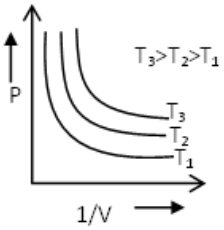
Ans. (4)

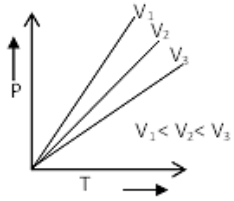
Sol. $\Delta_r G = -nFE_{cell}$

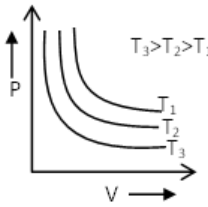
E_{cell} is an intensive property and $\Delta_r G$ is an extensive property as it depends on number of e^{Θ} transferred in cell reaction

65. Which amongst the following options is correct graphical representation of Boyle's Law?

(1) 

(2) 

(3) 

(4) 

Ans. (1)

Sol. Boyle's law is defined at constant temperature for an ideal gas.

$$P \propto \frac{1}{V}$$

$$P = (nRT)\left(\frac{1}{V}\right) \text{ [straight line equation]}$$

slope of P versus $\frac{1}{V}$ curve is nRT

$\Rightarrow$ Slope $\uparrow \Rightarrow T \uparrow \therefore T_3 > T_2 > T_1$

66. 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-

(1) NaSCN (2) $\left[Fe(CN)_5 NOS\right]^{4-}$

(3) $\left[Fe(SCN)\right]^{2+}$ (4) $Fe_4\left[Fe(CN_6)\right]_3 .xH_2O$

Ans. (3)

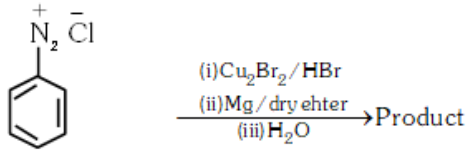
Sol. In case nitrogen and sulphur both are present in an organic compound, sodium thiocyanate is formed, it give blood red colour and no prussian blue since there are no free cyanide Ions

$Na + C + N + S \rightarrow NaSCN$

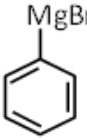
$$Fe^{+3} + SCN^{\Theta} \longrightarrow \left[Fe(SCN)\right]^{2+}$$

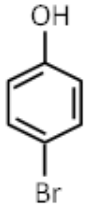
Blood red

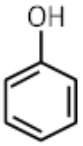
67. Identify the product in the following reaction :



(1) 

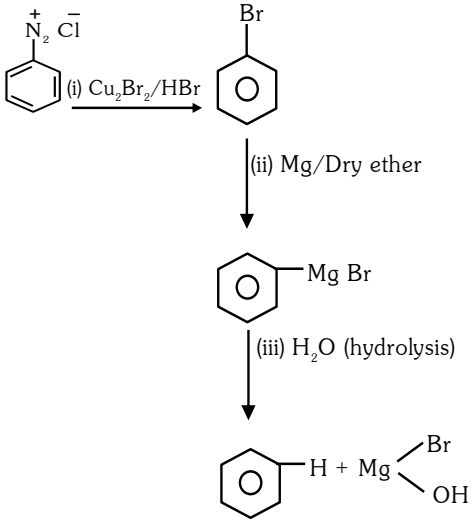
(2) 

(3) 

(4) 

Ans. (1)

Sol.



68. 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 elements 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) C,D and E only

(2) A and E only

(3) B,C and E only

(4) A,B and C only

Ans. (3)

Sol. It is statement based question.

Statements B, C & E are correct.

(B) Mass of the electron is 9.10939×10^{-31} kg

(C) All the isotopes of given elements show same chemical properties.

(E) Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

69. A compound is formed by two elements A and B. The elements B forms cubic close packed structure and atoms of A occupy 1/3 of tetrahedral voids. If the formula of the compound is A_xB_y, then the value of x + y is in option

(1) 4 (2) 3

(3) 2 (4) 5

Ans. (4)

Sol.

A	**B**
$\frac{1}{3}$ THV	CCP
$\Rightarrow Z_A = \frac{1}{3}\times 8 = \frac{8}{3}$	$Z_B = 4$
$\Rightarrow = \frac{8}{3} : 4$	
$\Rightarrow \frac{2}{3} : 1$	
2 : 3	

simplest formula $A_2 \downarrow x \quad B_3 \downarrow y$

$x + y = 5$

70. Given below are two statements:

Statement I : A unit formed by the attachment of a base to l' 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) Both Statement **I** and Statement **II** are false

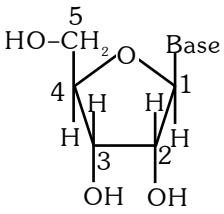
(2) Statement **I** is true but Statement **II** is false

(3) Statement **I** is false but Statement **II** is true

(4) Both Statement **I** and Statement **II** are true

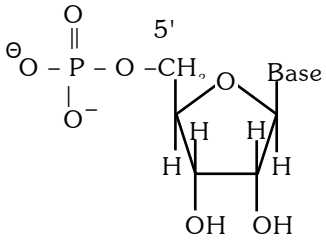
Ans. (2)

Sol.



Nucleoside

Base link with 1' position of sugar in nucleoside so statement I is correct



Nucleotide

→ When nucleoside is linked to **phosphoric acid** at 5' position of sugar moiety we get a Nucleotide

⇓

Statement II is Incorrect because not link with **phosphorous acid**.

71. Which amongst the following molecules on polymerization produces neoprene?

(1) $H_2C = \underset{\displaystyle Cl}{\underset{|}{C}} - CH = CH_2$

(2) $H_2C = CH - C \equiv CH$

(3) $H_2C = \underset{\displaystyle CH_3}{\underset{|}{C}} - CH = CH_2$

(4) $H_2C = CH - CH = CH_2$

Ans. **(1)**

Sol. $CH_2=\underset{\text{Chloroprene}}{\overset{\overset{Cl}{|}}{C}-CH=CH_2} \xrightarrow{\text{Temp \& Pressure}}$

$$\left\{CH_2-\overset{\overset{Cl}{|}}{C}=CH-CH_2\right\}_n$$

Neoprene

72. Taking stability as the factor, which one of the following represents **correct** relationship?

(1) $InI_3 > InI$ (2) $AlCl > AlCl_3$

(3) $TlI > TlI_3$ (4) $TlCl_3 > TlCl$

Ans. **(3)**

Sol. $T\ell^+ \text{ \& } I^- > T\ell^{+3} \text{ \& } 3I^-$

due to inert pair effect $T\ell^+$ is more stable than $T\ell^{+3}$.

73. Some tranquilizers are listed below. Which one from the following belongs to barbiturates?

(1) Meprobamate (2) Valium

(3) Veronal (4) Chlordiazepoxide

Ans. **(3)**

Sol. Veronal is an example of barbiturates.

74. 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) B,D only (2) D,E only

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

Ans. **(2)**

Sol. (D, E) explanation

(D) H–H bond strength/ bond dissociation energy/bond energy of H_2 can not be lowest because bond formed between hydrogen atoms is due to overlapping of 1s-1s.

(E) Hydrogen can not reduces oxides of highly reactive metal.

75. 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,D are correct (2) A,B,C,E are correct

(3) A,C,D,E are correct (4) B,C,D,E are correct

Ans. **(2)**

Sol. Intermolecular forces means force of attraction between two or more molecules

dipole-dipole (attraction between two or more polar molecules).

Dipole induced dipole (attraction between polar and non polar molecules)

Hydrogen bonding (it is a special type of dipole-dipole and ion-dipole attraction)

Dispersion forces (mainly acts between non polar molecules).

Covalent bonding (acts between atom not between molecules)

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

(1) H_2O (2) BF_3

(3) OH^- (4) NH_3

Ans. **(2)**

Sol. $\left.\begin{matrix}H_2O\\OH^-\\NH_3\end{matrix}\right\}$ can not act as lewis acid because they does not contain vacant orbital

$BF_3 \rightarrow$ Contains vacant orbital on central atom (Boron).

77. The **right** option for the mass of CO_2 produced by heating 20 g of 20% pure limestone is

(Atomic mass of Ca = 40)

$[CaCO_3 \xrightarrow{1200\,K} CaO + CO_2]$

(1) 1.76 g (2) 2.64 g (3) 1.32 g (4) 1.12 g

Ans. **(1)**

Sol. Weight of impure limestone = 20 g

Weight of pure limestone ($CaCO_3$) = 20% of 20 g

$= \frac{20}{100} \times 20$

$= 4g$

$n_{CaCO_3} = \frac{4}{100} = 0.04$

$CaCO_3 \rightarrow CaO + CO_2$

n=0.04 n=0.04

$n_{CO_2} = 0.04$

$W_{CO_2} = 0.04 \times 44$

$= 1.76$ g

78. The relation between n_m, (n_m = the number of permissible values of magnetic quantum number (m)) for a given value of azimuthal quantum number (l), is

(1) $l = 2n_m + 1$ (2) $n_m = 2l^2 + 1$

(3) $n_m = l + 2$ (4) $l = \frac{n_m - 1}{2}$

Ans. (4)

Sol. Number of permissible values of magnetic quantum number for a given value of azimuthal quantum (ℓ)

$\Rightarrow n_m = 2\ell + 1$

$\Rightarrow \ell = \frac{n_m - 1}{2}$

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

(1) enthalpy of atomization.

(2) hydration energy.

(3) second ionisation enthalpy.

(4) first ionisation enthalpy.

Ans. (2)

Sol. $Cu(s) \rightarrow Cu(g) \rightarrow Cu^{+}_{(g)} \rightarrow Cu^{+2}_{(g)} \rightarrow Cu^{+2}_{(aq)}$

$\Delta H_{atomisation}$ IE_1 IE_2 Hydration energy

Cu^{+2} is more stable than Cu^{+1} because released hydration energy is more in case of Cu^{+2} than Cu^{+1}.

80. Which one of the following statements is **correct**?

(1) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor.

(2) The bone in human body is an inert and unchanging substance.

(3) Mg plays roles in neuromuscular function and interneuronal transmission.

(4) The daily requirement of Mg and Ca in the human body is estimated to be 0.2 - 0.3 g.

Ans. (4)

Sol. The daily requirement in the human body has been estimated to be 200-300 mg (NCERT : s-block) Biological importance of magnesium and calcium.

81. Which of the following reactions will NOT give primary amine as the product?

(1) $CH_3CN \xrightarrow[(ii)H_3O^{\oplus}]{(i)LiAlH_4}$ Product

(2) $CH_3NC \xrightarrow[(ii)H_3O^{\oplus}]{(i)LiAlH_4}$ Product

(3) $CH_3CONH_2 \xrightarrow[(ii)H_3O^{\oplus}]{(i)LiAlH_4}$ Product

(4) $CH_3CONH_2 \xrightarrow{Br_2/KOH}$ Product

Ans. (2)

Sol.

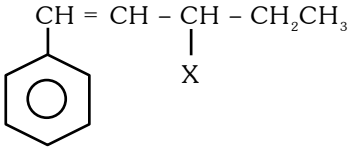
(1) $CH_3–CN \xrightarrow[(ii)H_3O^{\oplus}]{(i)LiAlH_4} CH_3–CH_2–NH_2$ 1° Amine

(2) $CH_3NC \xrightarrow[(ii)H_3O^{\oplus}]{(i)LiAlH_4} CH_3–NH–CH_3$ 2° Amine

(3) $CH_3–\overset{O}{\overset{\|}{C}}–NH_2 \xrightarrow[(ii)H_3O^{\oplus}]{(i)LiAlH_4} CH_3–CH_2–NH_2$ 1° Amine

(4) $CH_3–\overset{O}{\overset{\|}{C}}–NH_2 \xrightarrow{Br_2+OH^-} CH_3–NH_2$ 1° Amine

82. The given compound



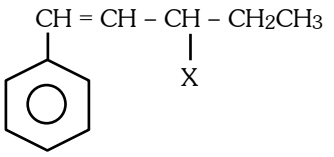
is an example of _____.

(1) aryl halide (2) allylic halide

(3) vinylic halide (4) benzylic halide

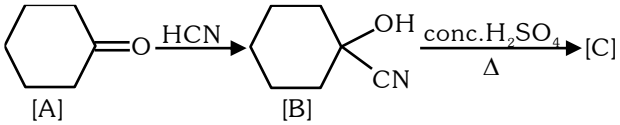
Ans. (2)

Sol.



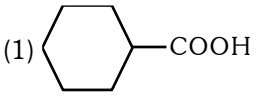
Allylic halide

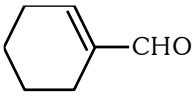
83. Complete the following reaction :

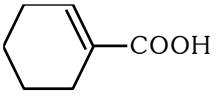


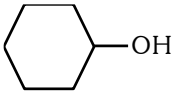
[A] [B]

[C] is _____.

(1) 

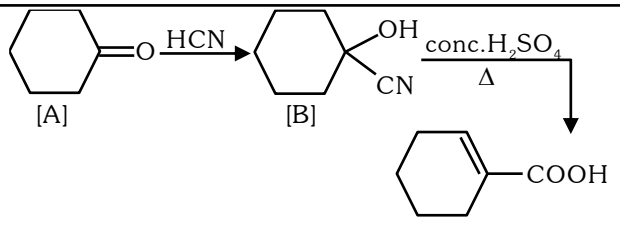
(2) 

(3) 

(4) 

Ans. (3)

Sol.



[A] [B] [C]

(Hydrolysis of Cyanide)
& (dehydration of alcohol)

84. Homoleptic complex from the following complexes is :

(1) Diamminechloridonitrito-N-platinum (II)

(2) Pentaamminecarbonatocobalt (III) chloride

(3) Triamminetriaquachromium (III) chloride

(4) Potassium trioxalatoaluminate (III)

Ans. (4)

Sol. (1) $[Pt(NH_3)_2Cl(NO_2)]$

(2) $[Co(NH_3)_5(CO_3)]Cl$

(3) $[Cr(NH_3)_3(H_2O)_3]Cl_3$

(4) $K_3[Al(C_2O_4)_3]$

Option 4 contain all ligands are of same type i.e. why complex will be homoleptic.

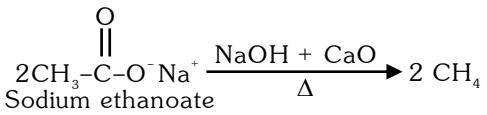
85. Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :

(1) 32 (2) 30

(3) 18 (4) 16

Ans. (1)

Sol.

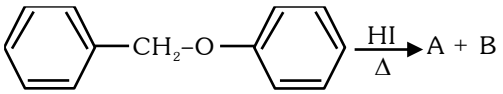


Sodium ethanoate

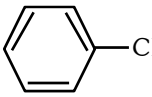
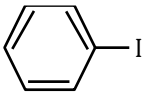
Weight = 2 × 16 = 32 g

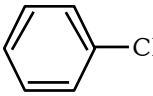
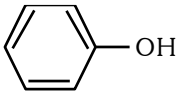
Chemistry : Section-B (Q. No. 086 to 100)

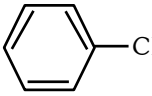
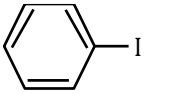
86. Consider the following reaction

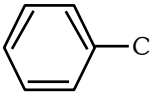
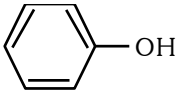


Identify products A and B :-

(1) A=  and B = 

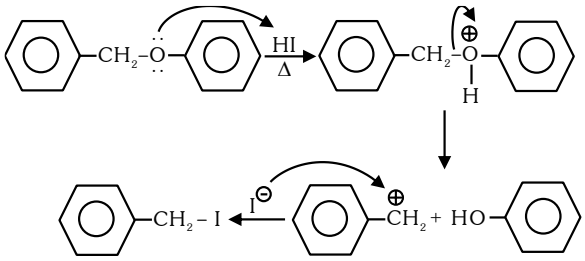
(2) A=  and B = 

(3) A=  and B = 

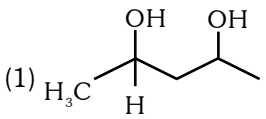
(4) A=  and B = 

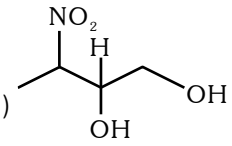
Ans. (2)

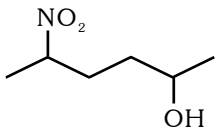
Sol.

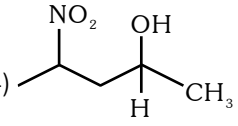


87. Which amongst the following will be most readily dehydrated under acidic conditions ?

(1) 

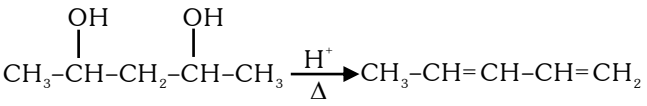
(2) 

(3) 

(4) 

Ans. (1)

Sol. Due to presence of conjugation in product.



88. 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^0 for the reaction is

(R = 2 cal/mol K)

(1) –137.26 cal (2) –1381.80 cal

(3) –13.73 cal (4) 1372.60 cal

Ans. (2)

Sol. $A + B \rightleftharpoons C + D$

$[A] = 2 \text{ mol } L^{-1}$

$[B] = 3 \text{ mol } L^{-1}$

$[C] = 10 \text{ mol } L^{-1}$

$[D] = 6 \text{ mol } L^{-1}$

$\Delta G^0 = -2.303 \text{ RT log } K_{eq}$

$= -2.303RT \log \frac{[C][D]}{[A][B]}$

$= -2.303 \times 2 \times 300 \times \log \frac{10 \times 6}{2 \times 3}$

$= -2.303 \times 2 \times 300 \times \log 10$

$= -1381.8$ cal

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) Both **Statement I** and **Statement II** are false

(2) **Statement I** is correct but **Statement II** is false.

(3) **Statement I** is incorrect but **Statement II** is true.

(4) Both **Statement I** and **Statement II** are true.

Ans. **(3)**

Sol. Nutrient enriched water bodies lead to eutrophication.

90. Which amongst the following options is the **correct** relation between change in enthalpy and change in internal energy?

(1) $\Delta H = \Delta U + \Delta n_g RT$ (2) $\Delta H - \Delta U = -\Delta nRT$

(3) $\Delta H + \Delta U = \Delta nR$ (4) $\Delta H = \Delta U - \Delta n_g RT$

Ans. **(1)**

Sol. $\Delta H = \Delta U + \Delta n_g RT$

91. Match **List-I** with **List-II** :

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

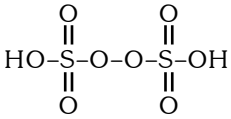
Choose the **correct** answer from the options given below:

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

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

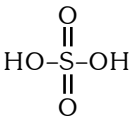
Ans. **(1)**

Sol. A → Peroxodisulphuric acid

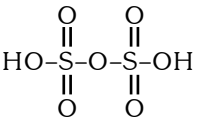


B → Sulphuric acid

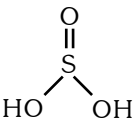
H_2SO_4



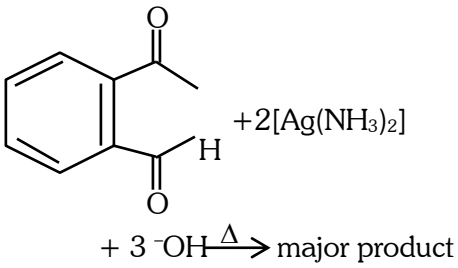
C → Pyrosulphuric acid $H_2S_2O_7$



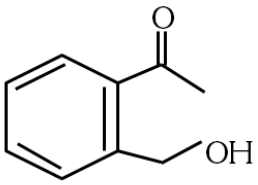
D → Sulphurous acid H_2SO_3



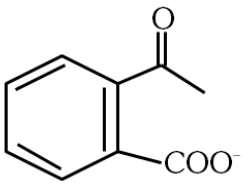
92. Identify the major product obtained in the following reaction:



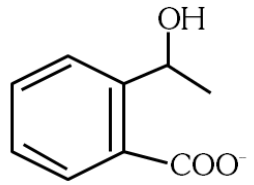
(1)



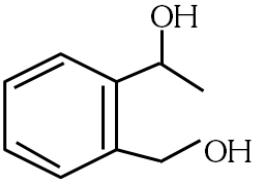
(2)



(3)

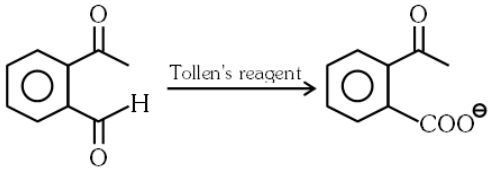


(4)



Ans. **(2)**

Sol.



93. Pumice stone is an example of -

(1) gel (2) solid sol

(3) foam (4) sol

Ans. **(2)**

Sol. Pumice stone is an example of solid state

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

(1) $FeO + CO \rightarrow Fe + CO_2$

(2) $C + CO_2 \rightarrow 2CO$

(3) $CaO + SiO_2 \rightarrow CaSiO_3$

(4) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

Ans. **(4)**

Sol. Reaction

$Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

This reaction takes place at temperature (500 K – 800 K) not at (900 K to 1500 K)

95. Which of the following statements are **INCORRECT** ?

A. All the transition metals except scandium form MO oxides which are ionic.

B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7.

C. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5.

D. V_2O_4 dissolves in acids to give VO_4^{3-} salts.

E. CrO is basic but Cr_2O_3 is amphoteric.

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

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

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

Ans. **(2)**

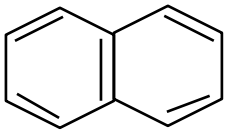
Sol. $C \rightarrow \overset{+3}{V_2}O_3 \rightarrow \overset{+4}{V_2}O_4 \rightarrow \overset{+5}{V_2}O_5$

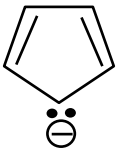
Acidic *Nature* ↑

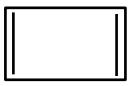
$D \rightarrow V_2O_5$ dissolve in acid to give VO_4^{-3} salts

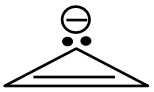
This doesn't shown by V_2O_4

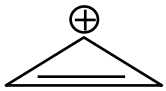
96. Consider the following compounds/species:

(i) 

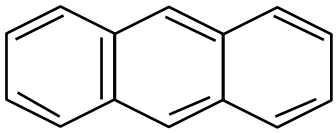
(ii) 

(ii) 

(iv) 

(v) 

(vi) 

(vii) 

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

(1) 6 (2) 2 (3) 5 (4) 4

Ans. **(4)**

Sol. Huckle's rule = $(4n + 2)\pi$ electrons

Comp (i), (ii), (v), (vii) obey Huckle's rule

97. What fraction of one edge centred octahedral void lies in one unit cell of fcc?

(1) $\frac{1}{3}$ (2) $\frac{1}{4}$ (3) $\frac{1}{12}$ (4) $\frac{1}{2}$

Ans. **(2)**

Sol. → Edge centered octahedral void is shared between four unit cells

→ Per unit cell contribution is 1/4

98. Which complex compound is most stable?

(1) $\left[Co(NH_3)_3(NO_3)_3\right]$

(2) $\left[CoCl_2(en)_2\right]NO_3$

(3) $\left[Co(NH_3)_6\right]_2(SO_4)_3$

(4) $\left[Co(NH_3)_4(H_2O)Br\right](NO_3)_2$

Ans. **(2)**

Sol. due to Chelation effect of (en).

99. On balancing the given redox reaction,

$$aCr_2O_7^{2-} + bSO_3^{2-}(aq) + cH^+(aq) \rightarrow$$

$$2aCr^{3+}(aq) + bSO_4^{2-}(aq) + \frac{c}{2}H_2O(\ell)$$

the coefficients a, b and c are found to be, respectively -

(1) 3, 8, 1 (2) 1, 8, 3

(3) 8, 1, 3 (4) 1, 3, 8

Ans. **(4)**

Sol. Reaction has to be balanced in acidic medium

'O' atoms are balanced by adding H_2O and then H-atom is balanced by adding H^+ ions and charge is balanced by $e^{\ominus}$.

Oxidation: $SO_3^{2-} + H_2O \rightarrow SO_4^{2-} + 2H^+ + 2e^{\ominus}] \times 3$

Reduction: $Cr_2O_7^{2-} + 14H^+ + 6e^{\ominus} \rightarrow 2Cr^{3+} + 7H_2O$

$$Cr_2O_7^{2-} + 3SO_3^{2-} + 8H^{\oplus} \rightarrow 2Cr^{3+} + 3SO_4^{2-} + 4H_2O$$

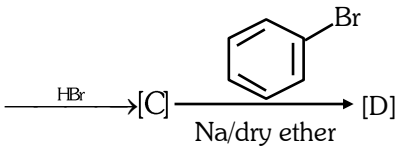
a = 1

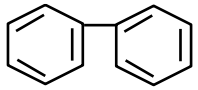
b = 3

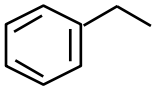
c = 8

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

$$CH_3CHO \xrightarrow[ii)\ H_3O^+]{i)\ LiAlH_4} [A] \xrightarrow[\Delta]{H_2SO_4} [B]$$



(1)  (2) C_4H_{10}

(3) $HC \equiv C^{\ominus}\ Na^+$ (4) 

Ans. **(4)**

Sol. $CH_3-CH=O \xrightarrow[H_3O^+]{LiAlH_4} CH_3-CH_2-OH \xrightarrow[\Delta]{H^+} CH_2=CH_2$