INDIAN ASSOCIATION OF PHYSICS TEACHERS

NATIONAL STANDARD EXAMINATION IN CHEMISTRY (NSEC) 2025

(QUESTION PAPER CODE 33)

Date : 23/11/2025 **Time : 120 Minute** **Maximum Marks: 216**

Write the question paper code (mentioned above) on YOUR OMR Answer Sheet (in the space provided), otherwise your Answer Sheet will NOT be evaluated, Note that the same Question paper code appears on each page of the question paper.

INSTRUCTIONS

1. Use of mobile phone, smart watches, and iPad during examination is STRICTLY **PROHIBITED.**
2. In addition to this question paper, you are given OMR Answer Sheet along with candidate's copy.
3. On the OMR sheet. make all the entries carefully in the space provided ONLY in BLOCK CAPITALS as well as by properly darkening the appropriate bubbles.
   Incomplete/ incorrect/ carelessly filled information may disqualify your candidature.
4. On the OMR Answer sheet, use only **BLUE or BLACK BALL POINT PEN** for making entries and filling bubbles.
5. Your **fourteen-digit roll number and date of birth** entered in the OMR Answer sheet shall remain your login credentials means login id and password respectively for accessing your performance result.
6. Question paper has two parts. In part A1 (**Q. No.1 to 48**) each question has four alternatives, out of which only one is correct. Choose the correct alternative (s) and fill the appropriate bubbles(s), as shown.

   Q.No.12 (a) ● (c) (d)

   In part A2 (**Q. No. 49 to 60**) each question has four alternative out of which any number of alternative (s) (1, 2, 3, or 4) may be correct. You have to choose all correct alternative(s) and fill the appropriate bubbles(s), as shown

   Q.No.52 (a) ● (c) ●
7. For **Part A1,** each correct answer carries 3 marks whereas 1 mark will be deducted for each wrong answer. In **Part A2,** you get 6 marks. If all the correct alternative are marked. No negative marks in this part.
8. Rough work should be done only in the space provided. There are **31** printed pages in this paper.
9. Use of **non-programmable scientific** calculator is allowed
10. No candidate should leave the examination hall before the completion of the examination.
11. After submitting answer paper, take away the question paper & candidate's copy of OMR for your reference
    Please DO NOT make any mark other than filling the appropriate bubbles properly in the space provided on the OMR answer sheet.
    OMR answer sheets are evaluated using machine, hence CHANGE OF ENTRY IS NOT ALLOWED, Scratching or overwriting may result in wrong score.
    DO NOT WRITE ON THE BACK SIDE OF THE OMR ANSWER SHEET.

Name of Student :..

Batch : ....

Enrolment No. | | | | | | | | | | | | | | | | |

INDIAN ASSOCIATION OF PHYSICS TEACHERS

NATIONAL STANDARD EXAMINATION IN CHEMISTRY (NSEC) 2025

PAPER CODE-33

Date of Examination – 23th November, 2025

SOLUTIONS

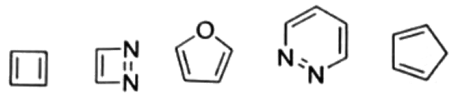
Attempt All Sixty Questions

(NSEA) PART : A–1

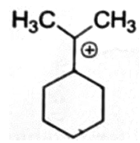
ONLY ONE OUT OF FOUR OPTIONS IS CORRECT, BUBLE THE CORRECT OPTION.

[Q.1] The correct numerical answers for the following is:

(i) The number of NOT-aromatic compounds from the following is



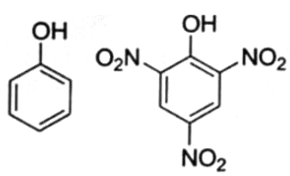
(ii) The number of α hydrogen atoms in the following structure is



(iii) The number of geometrical isomers possible in

$CH_3CH=CH-CH=CH_2$

(iv) The number of compounds more acidic that CH_3COOH from:



CF_3COOH CH_3SO_3H C_2H_5OH

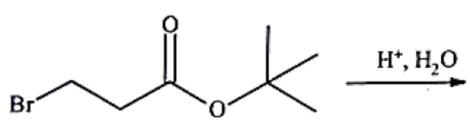
[A] (i) = 3; (ii) = 6; (iii) = 2; (iv) = 3 [B] (i) = 2; (ii) = 6; (iii) = 2; (iv) = 3

[C] (i) = 2; (ii) = 7; (iii) = 4; (iv) = 2 [D] (i) = 3; (ii) = 7; (iii) = 2; (iv) = 3

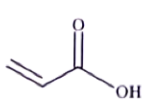
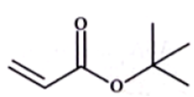
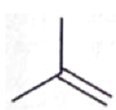
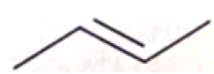
[ANS] **D**

[SOLN] Concept base

[Q.2] The following reaction is performed and multiple products are observed.

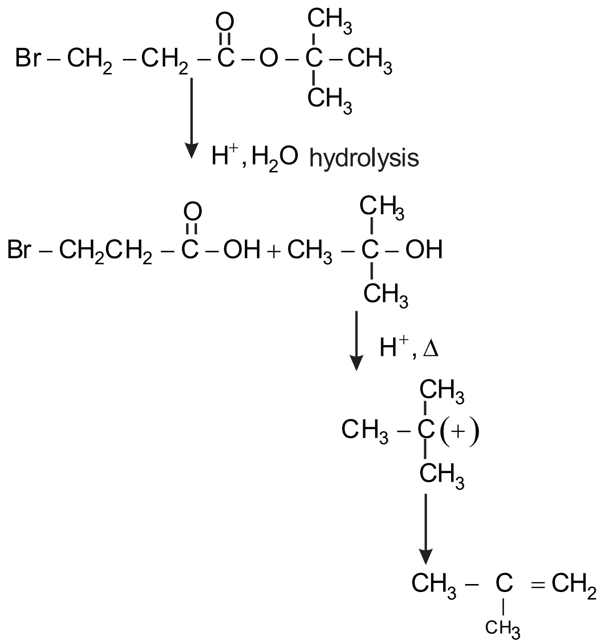


One of the products (X) can decolourize Br_2 water. The product (X) is

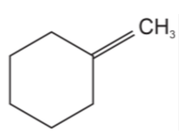
[A]  [B]  [C]  [D] 

[ANS] **C**

[SOLN] Ester on hydrolysis gives acid and 3° alcohol . 3° alcohol in the presence of H^+ and hat gives alkene. Which decolourise Br_2 water.



[Q.3] Compound A can be prepared from a suitable alkyl halide and appropriate reagent and conditions. The most appropriate combination of the requirements to give the highest yield is:

Compound A 

[A] 1–bromo–1–methylcyclohexane, CH_3O^-; CH_3OH

[B] 1–fluoro–1–methylcyclohexane, CH_3O^-; CH_3OH

[C] 1–bromo–1–methylcyclohexane, $(CH_3)_3CO^-$; $(CH_3)_3COH$

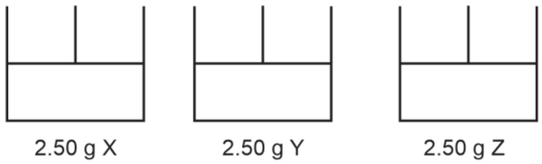
[D] 1–fluoro–1–methylcyclohexane, $(CH_3)_3CO^-$; $(CH_3)_3COH$

[ANS] **D**

[SOLN] **best**

[Q.4] Consider three cylinders of capacity 2.24 L each fitted with piston. Each containing 2.50 g of an ideal gas (X, Y and Z) as specified below at 273 K. The pressure is not specified.

Given: Molar mass (in g mol^{-1}) as X = 40, Y = 80 and Z = 20.



The correct set of statement(s) is/are

(i) The number of molecules in each cylinder is the same.

(ii) The average velocity of the molecules in each cylinder is the same.

(iii) The pressure of gas Z is the highest.

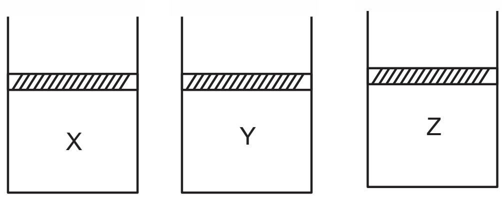
(iv) If the pressure in each cylinder is adjusted to one atmosphere at constant temperature, the volume of the gas Z will increase and those of the other two will decrease.

[A] (i) and (ii) are correct [B] (i) and (iii) are correct

[C] (ii) and (iv) are correct [D] (iii) and (iv) are correct

[ANS] **D**

[SOLN]



2.24 L 2.24 ℓ 2.24 ℓ

X = 40 Y = 80 Z = 20

(i) $n_x \neq n_y \neq n_z$ since molar mass is different

(ii) $u_{ang} = \sqrt{\dfrac{8RT}{\pi M}}$ M (different)

(iii) Z = Highest no. of moles of gas

$\therefore$ Pressure highest

(iv) vol. of Z initially = 2.24 L

Vol. of y initially = 2.24 L

Vol. of x initially = 2.24 ℓ

<u>Vol. of Find.</u>

$$X = \frac{2.5}{40} \times 22.4 = 1.4$$

$$Y = \frac{2.5}{80} \times 22.4 = 0.7$$

$$Z = \frac{2.5}{20} \times 22.4 = 2.8\ell$$

[Q.5] A sample(X) of MCl_2 was found to contain a small quantity of $M(OH)_2$ as an impurity, both of the compounds are soluble in water. In an experiment 30 g of the above sample (X) was dissolved in 60 mL of 0.4 M HCl to give solution(Y). 20 mL of 0.4 M NaOH was required to neutralize the excess HCl in solution(Y). The percentage of $M(OH)_2$ in sample(X) is:

Given: Molar mass of $M(OH)_2$ = 65 g mol^{-1}

[A] 1.7 [B] 3.5 [C] 0.17 [D] 0.35

[ANS] **A**

[SOLN]

$MCl_2 + M(OH)_2 = 30g$

$\downarrow$ +60ml. 0.4mHCl

Y (left MCl)

$\downarrow$ 0.4M, 20m / NaOH

Neutralized

$\therefore\ 60 \times 0.4 \times 1 = 20 \times 0.4 \times 1 + n \times 2$

No.of moles of $M(OH)_2$

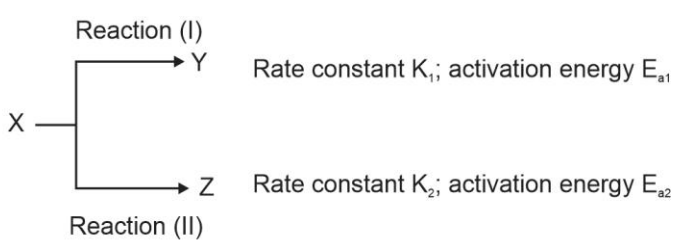
$\therefore$ n = 8 millimoles

W $m(OH)_2$ = $65 \times 8 = 520$ mg.

= 0.52 g.

$\therefore$ of $M(OH)_2 = \dfrac{0.52}{30} \times 100 = 1.73\%$

[Q.6] Consider the following reactions (i) and (ii) occurring at 298 K, such that $E_{a2} = 3E_{a1}$ and the Arrhenius constant A has the same value for both the reactions. The relation between k_1 and k_2 is



[A] $k_1 = 3k_2e^{E_{a2}/RT}$ [B] $k_1 = k_2e^{2E_{a1}/RT}$

[C] $k_2 = k_1e^{2E_{a1}/RT}$ [D] $k_2 = k_1e^{3E_{a1}/RT}$

[ANS] **B**

[SOLN] $X \xrightarrow[E_{a_1}]{K_1} Y$

$X \xrightarrow[E_{a_2}]{K_2} X$

$$\frac{E_{a_2} = 3E_{a_1}}{K_1 = Ae^{-E_{a_1}/RT}}$$

$$K_2 = Ae^{-3E_{a_1}/RT}$$

$$\therefore \frac{K_1}{K_2} = e^{2E_{a_1}/RT}$$

$$\therefore K_1 = K_2 e^{2E_{a_1}/RT}$$

[Q.7] In the spacecrafts of NASA, the oxygen required for the astronauts is obtained from the following chemical reaction.

$$KClO_3(s) + Fe(s) \longrightarrow O_2(g) + KCl(s) + FeO(s)$$

The requirement of O_2 per astronaut per day is 500 L as measured at 1 atm and 300 K. The minimum mass of $KClO_3$ (Molar mass of $KClO_3$ = 122.5g mol^{-1}) needed for two astronauts to be in the spacecraft for ten days in a space mission is:

[A] 49.8 kg [B] 426 g [C] 213 g [D] 498.0 kg

[ANS] **A**

[SOLN] 500 L, 1 atm, 300 K

n (moles) for 1 person.

$$n = \frac{1 \times 500}{0.0821 \times 300} = 20\,\text{mol}$$

$\therefore$ 2 person for 10 days = 400 mol

$$\therefore \eta_{KClO_3} = 400\,\text{mol}$$

$$w_{KClO_3} = 49000\,\text{g} = 49\ \text{kg}$$

[Q.8] When 15.0 g of steam at 373 K is passed in 250.0 g of $H_2O(l)$ in closed container at 298 K at constant pressure of 1 bar, then the correct statement, if this is isolated system, will be:

(Assume that the final state is liquid water)

[A] Both the volume and entropy will increase.

[B] Both the volume and entropy will decrease.

[C] The volume will increase and the entropy will decrease.

[D] The volume will decrease and the entropy will increase.

[ANS] **A**

[SOLN] 15 g of steam is added

$\therefore S\uparrow$ and vol. $\uparrow$

[Q.9] Consider the given equilibrium reaction at 473 K

$$Li_3N(s)+2H_2(g) \rightleftharpoons LiNH_2(s)+2LiH(s) \qquad \Delta H_{rxn}^{0} = -200\ kj/mol$$

The number of moles of H_2(g) present at equilibrium can be maximized by

	Temperature	**Pressure**
[A]	increasing	increasing
[B]	increasing	decreasing
[C]	decreasing	increasing
[D]	decreasing	decreasing

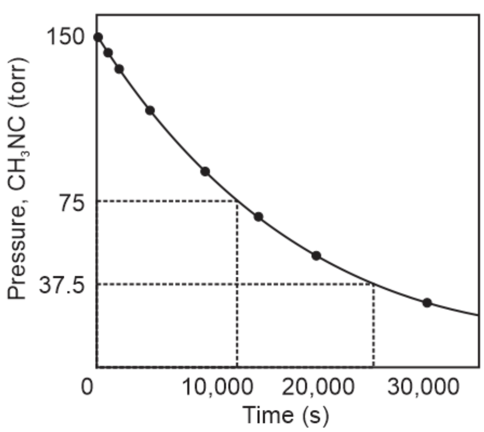
[ANS] **B**

[SOLN] Backward endothermic

$\therefore T\uparrow$ and $P\downarrow$

[Q.10] The following concentration vs time plot represents the conversion of $CH_3NC(g)$ to $CH_3CN(g)$.

Which of the following statements (I to IV) is/are true?



I. The reaction is of zero order

II. Unit of rate constant of this reaction is s^{-1}

III. Unit of rate constant of the reaction is torr s^{-1}

IV. Unit of rate of the reaction is torr s^{-1}

[A] I only [B] I, II [C] III only [D] II, IV

[ANS] **D**

[SOLN] Reaction is first order from the given graph.

[Q.11] Consider the chemical reaction $A \rightarrow C + D$

The observations for kinetic study of the above unimolecular elementary reaction at 298 K are given in the table below:

Time (minute)	[A] (M)
0	0.35
10	0.035
t	0.00035

The value of t (minute) is

[A] 20 [B] 30 [C] 40 [D] 35

[ANS] **B**

[SOLN] $A \rightarrow C + O$

t A

0 0.35

10 0.035

t 0.0035

$$\therefore \ln\frac{0.35}{0.035} = k \times 10$$

$$\therefore k = \frac{\ln 10}{10}$$

$$\ln\frac{0.35}{0.00035} = \frac{\ln 10}{10} \times t$$

$$\therefore t = 30\,\text{min}$$

[Q.12] Propanoic acid (PA) is an organic acid. At 298 K, the pH of a 50.0 mL sample of 0.20 M of it is 3.0. The pH of solution formed by mixing 25.0 mL 0.2 M sodium propanoate solution with 25.0 mL 0.1 M propanoic acid will be

[A] 3.3 [B] 5.3 [C] 5.6 [D] 6.3

[ANS] **C**

[SOLN] 50ml , 0.20M (PA) : PH = 3

$$\left[H^{+}\right] = 10^{-3}$$

$$\sqrt{CK_a} = 10^{-3}$$

$$0.2\ Ka = 10^{-6}$$

$$K_a = 5 \times 10^{-6}$$

$\left.\begin{array}{l}25\text{ ml, } 0.2\text{ M NaPA : mm mole NaPA} = 5\text{ m mole}\\ 25\text{ml}, 0.1\text{M PA} : \text{m mole PA} = 2.5\text{m mole}\end{array}\right\}$ Bnf fu soln.

$PH = PKa + \log\frac{[RaPA]}{[PA]}$

$= 6 - \log 5 + \log\frac{5}{2.5}$

$= 6 - \log 5 + \log 2$

= 6-0.7+0.3

= 5.6

[Q.13] M is an alkaline earth metal. 1.0 M solution of MCl_2 is added dropwise to a solution that is 0.01 M each in fluoride, sulfite, and phosphate ions. The order of precipitation of corresponding salts is

Solid	Ksp
MSO_3	7×10^{-7}
MF_2	5×10^{-9}
$M_3(PO_4)_2$	1×10^{-25}

[A] $M_3(PO_4)_2, MF_2, MSO_3$ [B] $M_3(PO_4)_2, MSO_3, MF_2$

[C] $MSO_3, MF_2, M_3(PO_4)_2$ [D] $MF_2, MSO_3, M_3(PO_4)_2$

[ANS] **A**

[SOLN] for ppt : $Q; > KsP$

For $MSO_3 : Q_i = [M^{2+}]\times 0.01 > 7\times10^{-7}$

$[M^{2+}] > 7\times10^{-5}M$

For $Mf_2 : Q_i = [M^{2+}](0.01)^2 > 5\times10^{-9}$

$[M^{2+}] > 5\times10^{-5}M$

For $M_3(PON)_2 : Q_i = [M^{2+}]^3(0.01)^2 > 1\times10^{-25}$

$[M^{2+}]^3 > 10^{-21}$

$[M^{2+}] > 10^{-7}M$

$[M^{2+}]$ required for ppt order : $MSO_3 > MF_2 > M_3(PO_4)_2$

So, order of ppt : $M_3(PO_4)_2, Mf_2, MSO_3$

[Q.14] $CrCl_3.xNH_3$ can exist as an octahedral complex (P). 0.1 molal aqueous solution of this complex (P) shows a depression in freezing point of 0.558 ºC. The molecular formula of the complex (P) is: (Given K_f = 1.86 K Kg mol^{-1})

(Assuming 100 % ionization of the complex)

[A] $[Cr(NH_3)_6]Cl_3$ [B] $[Cr(NH_3)_5Cl]Cl_2$ [C] $[Cr(NH_3)_4Cl_2]Cl$ [D] $[Cr(NH_3)_3Cl_3]$

[ANS] **B**

[SOLN] $\Delta T_f = i k_f m$

$0.558 = i \times 1.86 \times 0.1$

$$\frac{0.558}{1.86 \times 0.1} = i = 3$$

$[Cr(NH_3)_5 Cl]Cl_2$

[Q.15] Aspirin $(C_9H_8O_4)$ is produced by the reaction between salicylic acid $(C_7H_6O_3)$ and acetic anhydride $(C_7H_6O_3)$ as per the reaction $C_4H_6O_3 + C_4H_6O_3 \rightarrow C_9H_8O_4 + C_2H_4O_2$

In the reaction of 155 g salicylic acid and 105 g acetic anhydride, assuming 80% conversion of the limiting reactant, the mass of aspirin formed is:

Given molar mass in g mol^{-1} salicylic acid = 138, acetic anhydride = 102 and aspirin = 180

[A] 148 g [B] 162 g [C] 202 g [D] 184 g

[ANS] **A**

[SOLN] $C_7H_6O_3 + C_4H_6O_3 \rightarrow C_9H_8O_4 + C_2H_4O_2$

no. of moles of Aspirin = no. or moles or Acetic hydride

$$= \frac{1.029 \times 8\cancel{0}}{10\cancel{0}} X$$

$$\text{Weight} = \frac{1.029 \times 80}{100} \times 180$$

or Aspirin = 148.17 gm

[Q.16] A voltaic cell is constructed as shown below

$Ni(s)\,|\,Ni^{2+}(aq)\,||\,Ag^{+}(aq)\,|\,Ag(s)$

$E^{o}_{Ni^{2+}(aq)/Ni(s)} = -0.236\,V, E^{o}_{Ag^{+}(aq)/Ag(s)} = 0.799V$. The initial concentration of $Ag^{+}(aq)$ in the $Ag^{+}(aq)/Ag(s)$ half-cell is 0.005 M and the corresponding cell voltage is +0.95 V at 298 K. Identify the correct option from the following

[A] Initial $\left[Ni^{2+}\right](aq) = 0.019M;$ it will increase with time

[B] Initial $\left[Ni^{2+}\right](aq) = 0.120M;$ it will increase with time

[C] Initial $\left[Ni^{2+}\right](aq) = 0.019M;$ It will decrease with time

[D] Initial $\left[Ni^{2+}\right](aq) = 0.120M;$ it will decrease with time

[ANS] **A**

[SOLN] $Ni(S)\,|\,Ni^{+2}(aq.)\,||\,Ag^{+}(aq.)\,|\,Ag(s)$

$E^{\circ}_{Ag^{+}/Ag} = 0.799V$

$E^{\circ}_{Ni/Ni^{+2}} = 0.236V$

$\therefore E^{\circ}_{cell} = 1.035$

$\left[Ag^{+}\right]_{i} = 0.005M \qquad E_{cell} = +0.95V$ at 298K

Cell reaction.

$Ni(s) + 2Ag^{+}(aq) \rightarrow Ni^{+2}(aq.) + 2Ag(s)$

$$Q = \frac{\left[Ni^{+2}\right]}{\left[Ag^{+}\right]^{2}} = \frac{x}{25\times10^{-6}}$$

$$0.95 = 1.035 - \frac{0.059}{2}\log\frac{x}{25\times10^{-6}}$$

$\therefore x = 2\times10^{-2}M$

[Q.17] A certain quantity of a hydrocarbon fuel sample (C_xH_Y) is burnt in excess O_2 (g) to ensure complete combustion. The combustion produced 11.93 g CO_2(g), 2.19 H_2O(g), and 311 kJ of heat. Mass of the fuel burnt in this combustion is

[A] 3.493 g [B] 14.02 g [C] 11.93 g [D] 3.250 g

[ANS] **A**

[SOLN] $C_xH_y + \underset{\text{excers}}{O_2} \longrightarrow \underset{11.93g}{CO_2} + \underset{2.19g}{H_2O}$: $\Delta H = -311$ KJ

M_C in $C_xH_y = m_c$ in 11.93 g CO_2

$$= \frac{11.93}{44} \times 12 = 3.25g$$

m_H in C_xH_y = m_H in 2.19 g H_2O

$$= \frac{2.19}{18} \times 2 = 0.24g$$

$m_{cx}H_y$ total = 3.25 + 0.24 = 3.49 g

[Q.18] The photon with the longest wavelength required for the electronic transition in an atom of hydrogen is:

[A] $n = 1 \rightarrow n = 3$ [B] $n = 2 \rightarrow n = 6$ [C] $n = 3 \rightarrow n = 1$ [D] $n = 1 \rightarrow n = 6$

[ANS] **B**

[SOLN] **Amongest** $\rightarrow$ Least energy (required)

[Q.19] Choose the correct statement

[A] XeO_4 and XeO_2F_2 have tetrahedral geometry with no lone pairs

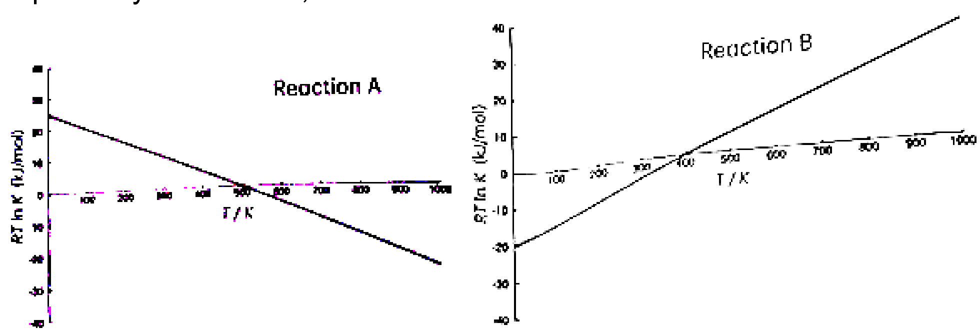
[B] XeO_2F_2 is trigonal planar with two oxygen atoms in the trigonal plane

[C] XeO_4 has square planar geometry with no lone pairs of electrons

[D] XeO_2F_2 is distorted tetrahedral and XeO_4 is square planar

[ANS] Bonus

[Q.20] Consider two reactions A and B for which the variation of RT In K with temperature is given in the plots below. If the enthalpy change for the reactions are – 25 kJ/mol and 20 kJ/mol, respectively for A and B, the correct statement is:



[A] The equilibrium constant for Reaction B decrease as temperature increases.

[B] The entropy change for Reaction A is 50 kJ/mol.

[C] Reaction A remains spontaneous only at temperatures less than 500 K

[D] At 400 K, reaction B changes from exothermic to endothermic reaction.

[ANS] **C**

[SOLN] $\Delta G^\circ = -RT\ln K_{eq}$

$\Delta G^\circ = \Delta G^\circ + RT\ln k_{eq}$

$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$

$\therefore\ -RT\ln K_{eq} = \Delta H^\circ - T\Delta S^\circ$

$\therefore$ Reaction A Reaction B

(a) X as endothermic $T\uparrow \quad K_{eq}\uparrow$

(b) $\Delta S^\circ = \dfrac{\Delta H^\circ}{T} = \dfrac{25000}{500} = 50\ J/mol$

(c) At 500 K; the sign of ΔG° changes from -ve to +ve

[Q.21] Among Ca, V, Cr and Mn, the second Ionization Energy is the highest for

[A] V [B] Ca [C] cr [D] Mn

[ANS] **C**

[SOLN]

$$\left.\begin{array}{l} Cr - 3d^5 4s^1 \\ Mn - 3d^5 4s^2 \\ V - 3d^3 4s^2 \end{array}\right\} \rightarrow d-\text{block elements}$$

$$Ca - [Ar]4s^2\} \rightarrow s-\text{block elments}$$

$Cr > Mn > V > Ca$ (order of IE_2)

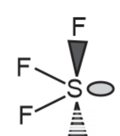
Highest $IE_2 \Rightarrow$ Cr

[Q.22] Among the given compounds, the permanent dipole moment is exhibited by

[A] BF_3 [B] XeF_4 [C] SiF_4 [D] SF_4

[ANS] D

[SOLN]



$\mu \neq 0$

$SF_4\ (4+1)$

$$\left.\begin{array}{l} SiF_4\ (4+0) \\ XeF_4\ (4+2) \\ BF_3\ (3+0) \end{array}\right\} \rightarrow \text{All are symmetrical } (\mu = 0)$$

Permanent dipole $\Rightarrow SF_4$

[Q.23] $HClO_4$ is used in etching of liquid crystal displays whereas $H_2C_2O_4$ is present in vegetables like spinach which causes itching to throat. Consider the following statements for these compounds

(i) $HClO_4$, is a stronger acid than $H_2C_2O_4$

(ii) $HClO_4$ is a weaker acid than $H_2C_2O_4$

(iii) $H_2C_2O_4$ is reducing agent and $HClO_4$ is oxidizing agent

(iv) The conjugate base of $HClO_4$ is stronger than the conjugate base of $H_2C_2O_4$

The correct statements are

[A] (i) and (iii) [B] (ii) and (iii) [C] (ii) and (iv) [D] (i) and (iv)

[ANS] A

[SOLN] (i) & (iii) are correct

$HClO_4 > H_2C_2O_4$ – Acidic

$$\underset{\text{R.A}}{H_2\overset{+3}{C}_2O_4} \longrightarrow \overset{+4}{C}O_2,\ \underset{\text{O.A}}{HClO_4} \longrightarrow Cl^-$$

$$\underset{\text{S.A}}{HClO_4} \longrightarrow \underset{\text{C.B weaker}}{ClO_4^-}$$

$$\underset{\text{weak acid}}{H_2C_2O_4} \longrightarrow \underset{\text{relatively strong CB}}{HC_2O_4^-}$$

[Q.24] Compounds A, B, C and D are solid trihalides, all containing the same central atom. Compounds A, B, Care pale lilac (pale purple) in colour but compound D is dark green. Compound A is insoluble in water and alcohol but rest of the three are soluble in both the solvents.

The correct statement indicating the central atom and halides present in each of the compounds is

[A] Central atom is As, halides are F^-, Cl^-, Br^-, I^- respectively

[B] Central atom is Co, halides are F^-, Cl^-, Br^-, I^- respectively

[C] Central atom is Cr, halides are F^-, Cl^-, Br^-, I^- respectively

[D] Central atom is Nd, halides are F^-, Cl^-, Br^-, I^- respectively

[ANS] D

[SOLN] Factual

NdF_3 – insoluble in water and alcohol

$NdCl_3, NdBr_3, NdI_3$

All soluble in water and alcohol

$NdF_3, NdCl_3, NdBr_3$

All pale litac (palepurple) is colour

NdI_3 – dark green

[Q.25] You are given a set of oxides: SrO, MoO_3 and ZrO_2. All the three show different reactions with water. Two of these oxides react with water whereas the third one is insoluble in water at room temperature (25-30°C). The statement that is correct about these oxides is

[A] MoO_3 is insoluble in water, SrO gives a basic solution and ZrO_2 gives an acidic solution in water.

[B] MoO_3 is insoluble in water. SrO gives an acidic solution and ZrO_2 gives a basic solution in water.

[C] ZrO_2 is insoluble in water, SrO gives a basic solution and MoO_3 gives an acidic solution in water.

[D] ZrO_2 is insoluble in water, MoO_3 gives a basic solution and SrO gives an acidic solution in water.

[ANS] C

[SOLN] SrO-Basic oxide aq. Solution basic

MuO_3 – Acidic oxide – aq solution acidic

ZrO_2 – insoluble in water at RT chemistry inert.

[Q.26] The shows maximum number of isomers is (where gly = glycine, Pet_3 = triethylphosphine)

[A] [$Pt(ox)(NH_3)_2$]

[B] $[Pd(Pet_3)_2BrCl]$

[C] [Pd(gly)(ox)]

[D] $\left[Pt(NH_3)(NO_2)(PEt_3)_2\right]^+$

[ANS] D

[SOLN] (a) $\left[Pt(ox)(NH_3)_2\right] - \left[M(AA)a_2\right] - X$

(b) $\left[Pd(PEt_3)_2BrI\right] - \left[Ma_2bc\right] - (2)$

(c) $\left[Pd(gly)(OX)\right] - \left[M(AB)(AA)\right] - x$

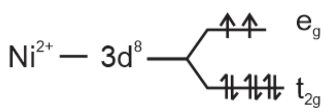
(d) $\left[Pt(NH_3)(NO_2)(PEt_3)_2\right] - \left[Mabc_2\right] - (4)$

[Q.27] The spin-only magnetic moment for $\left[Ni(H_2O)_6\right](ClO_4)_2$ should be

[A] 3.87 [B] 2.83 [C] 1.72 [D] 5.92

[ANS] B

[SOLN] $\left[Ni(H_2O)_6\right](ClO_4)_2$



$n = 2 \;\; \mu_s = \sqrt{8} = 2.83$ B.M

[Q.28] . The correct Δ_0 for the following given transition metal complexes is

[A] $Rh(CN)_6^{3-} > Rh(NH_3)_6^{3+} > RhCl_6^{3-}$ [B] $Rh(NH_3)_6^{3+} > RhCl_6^{3-} > Rh(CN)_6^{3-}$

[C] $RhCl_6^{3-} > Rh(CN)_6^{3-} > Rh(NH_3)_6^{3+}$ [D] $Rh(CN)_6^{3-} > RhCl_6^{3-} > Rh(NH_3)_6^{3+}$

[ANS] **A**

[SOLN] $\Delta_0 : \propto$ strength of ligands: $-CN^- > NH_3 > Cl^-$

$\left[Rh(CN)_6\right]^{3-} > \left[Rh(NH_3)_6\right]^{3+} > \left[RhCl_6\right]^{3-}$

[Q.29] The correct rank of bond order for O_2^+, O_2^-, CO and O_2^{2-} is

[A] 3, 1.5, 3, 1 [B] 2, 5, 1, 1 [C] 1.5, 2.5, 3, 2 [D] 2.5, 1.5,3,1

[ANS] **D**

[SOLN] $O_2^+, O_2^-, CO, O_2^{2-}$

e = 15,17,14,18

B.O.= 2.5,1.5,3.0, 1.0

[Q.30] The correct basicity order in water for the following is

[A] $NMe_3 > NH_3 > NH_2NH_2 > NF_3$ [B] $NH_2OH > NH_3 > NMe_3$

[C] $NH_3 < NF_3 < NMe_3 < NH_2NH_2$ [D] $NMe_3 < NH_2NH_2 < NH_3 < NF_3$

[ANS] **A**

[SOLN] $\ddot{N}Me_3 > \ddot{N}H_3 > \ddot{N}H_2 - \ddot{N}H_2 > \ddot{N}F_3$ – Basicity

(+I max) (-I max)

[Q.31] A 1.25 g Shelcal 500 tablet contains 1250 mg of $CaCO_3$. A student dissolved one tablet in water to make 1.0 L solution (X). 10.0 mL of solution (X) was titrated with 0.0198 M EDTA-Mg EDTA mixture in the burette and found the $CaCO_3$ content matched the label claim. (Molar mass of $CaCO_3$ = 100.0 g/mol). The correct option is

[A] The burette reading is 6.31 mL and molarity of Shelcal solution is 0.125 M

[B] The burette reading is 10.00 mL and molarity of Shelcal solution is 0.0125 M

[C] The burette reading is 6.31 mL and molarity of Shelcal solution is 0.0125 M

[D] The burette reading is 10.00 mL and molarity of Shelcal solution is 0.125 M

[ANS] **C**

[SOLN] 1250 mg $CaCO_3$ in leit

$\Rightarrow$ 10ml has 12.50 mg $CaCO_3$

$CaCO_3 + \text{MGEDTA} - \text{MEDTA} \longrightarrow \text{CaEDTA}$

12.50 mg 0.0198 M

$$\text{mmole}\, CaCO_3 = \frac{12.50}{100} = 0.125$$

$$\text{m mole}_{CaCO_3} = \text{m mole}_{\text{MEDTA-MgEDTA}} \text{ mixt}$$

$$0.125 = v \times 0.0198$$

$$v\,(\text{ml}) = \frac{0.125}{0.0198} = 6.31\,\text{ml}$$

$$\text{Molarity}_{\text{ shelcal}} = \frac{0.125}{10} = 0.0125\text{M}$$

[Q.32] When 10 mL of 0.01 M HCl was added to a mixture of 0.5 M NH_3 and 0.5 M NH_4Cl, the pH of the resultant solution will be $(pK_b \text{ of } NH_3 \text{ is } 4.75)$

[A] 9.07 [B] 9.75 [C] 9.25 [D] 8.75

[ANS] **A**

[SOLN] **pOH =** $pK_b - \log\frac{0.5}{0.5}$

$$pOH = pK_b = 4.75$$

$$pH = 9.25$$

When HCl is added pH $\downarrow$

$\therefore$ pH = 9.0

[Q.33] The correct order of CO triple bond character in the given metal carbonyl complexes is

[A] $\left[Fe(CO)_4\right]^{-2} > \left[Co(CO)_4\right]^{-1} > \left[Mn(CO)_6\right]^{+} > Ni(CO)_4$

[B] $Ni(CO)_4 > \left[Mn(CO)_6\right]^{+} > \left[Co(CO)_4\right]^{-1} > \left[Fe(CO)_4\right]^{-2}$

[C] $\left[Mn(CO)_6\right]^{+} > \left[Fe(CO)_4\right]^{-2} > \left[Co(CO)_4\right]^{-1} > Ni(CO)_4$

[D] $\left[Mn(CO)_6\right]^{+} > Ni(CO)_4 > \left[Co(CO)_4\right]^{-1} > \left[Fe(CO)_4\right]^{-2}$

[ANS] **D**

[SOLN] $\left(\frac{e}{p}\right)\uparrow$ extent of B.B $\uparrow$ M – C B.O $\uparrow$ C – O B.O $\downarrow$

$(M-O)_{B.O}\ \left[Fe(CO)_4\right]^{2-} > \left[CO(CO)_4\right]^{-} > \left[Ni(CO)_4\right]$

$(C-O)_{B.O}\ \left[Fe(CO)_4\right]^{2-} < \left[CO(CO)_4\right]^{-} < \left[Ni(CO)_4\right] < \left[Mn(CO)_6^{+}\right]$

d_{10} d_6

Extent high Extent low

[Q.34] Consider the following statements for the square planar complex $\left[Pt(en)(NCS)_2\right]$. Identify the correct statements

I. It is thermodynamically more stable than $\left[Pt(NH_3)_2(NCS)_2\right]$

II. It can exhibit stereoisomerism.

III. It can exhibit structural isomerism.

IV. It is not easily soluble in polar solvents.

The correct option is

[A] I, II, IV [B] II, III, IV [C] I, III, IV [D] I, II, III

[ANS] **C**

[SOLN] $\left[Pt(en)(NCS)_2\right]$

$\left[Pt(en)(SCN)_2\right]$

$\left[Pt(en)(SCN)(NCS)\right]$

Show structural

$\left[Pt(NH_3)_2(NCS)_2\right] < \left[Pt(en)(NCS)_2\right]$ – stability

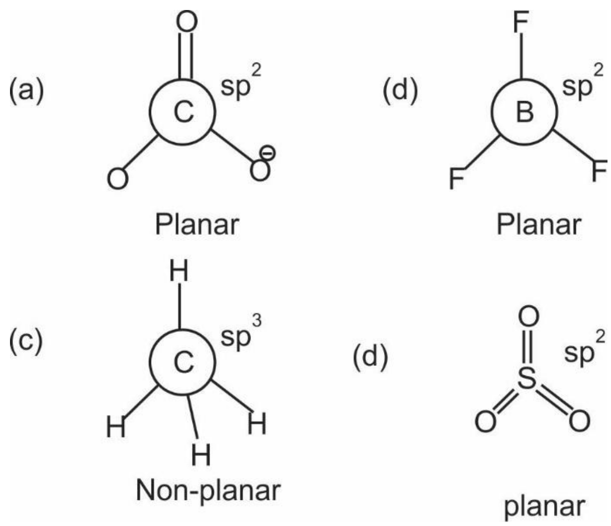
Relatively lower dipole moment not easily soluble in polar solvent.

[Q.35] Which of the following molecules is odd one out in its bonding properties?

[A] CO_3^{2-} [B] SO_3 [C] CH_4 [D] BF_3

[ANS] **C**

[SOLN]



[Q.36] Which one of the following reactions will give a product that has zero net dipole moment ?

[A] Hex-3-yne with $H_2 - Pd/C$

[B] Hex-3-yne with Na in liquid ammonia

[C] Hex-2-yne with $H_2 - Pd/C$

[D] Hex-2-yne with Na in liquid ammonia

[ANS] **B**

[SOLN] symmetrical trans alkens has net – dipole moment zero

[Q.37] Which of the following statements is not correct regarding the aromatic electrophilic substitution reactions of aniline or its derivatives under standard laboratory conditions?

[A] Aniline, when subjected to bromination with Br_2 / H_2O, undergoes rapid tribromination to form 2,4,6-tribromoaniline as the major product.

[B] During direct nitration of aniline with a nitrating mixture, meta-substitution is observed predominantly due to protonation of the amino group under acidic conditions.

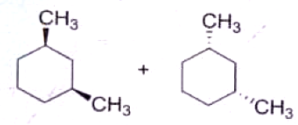
[C] The acetamido group ($-NHCOCH_3$), being less basic than $-NH_2$, shows stronger +M (mesomeric) effect and thus activates the ring more than the free amino group.

[D] Acetylation of aniline reduces its reactivity towards electrophilic substitution and facilitates controlled monosubstitution at ortho and para positions.

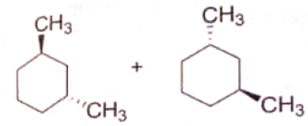
[ANS] (C)

[SOLN] concept based

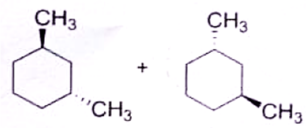
[Q.38] The optically active mixtures from the following is :

[A] 

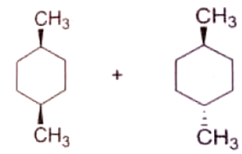
(75%) (25%)

[B] 

(50%) (50%)

[C] 

(75%) (25%)

[D] 

(75%) (25%)

[ANS] **C**

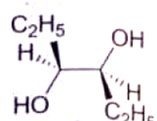
[SOLN] Both are pair of enantiomers since there amount are different in the mixture, so mixture are overall optical active

[Q.39] Alkenes can be converted to cis-diols using OsO_4 + $NaHCO_3$ and trans-diols via the epoxide followed by acid hydrolysis.

Compound **C** given below is formed from:

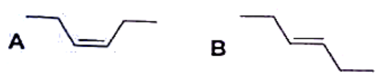
(i) alkene **A** by treatment with OsO_4 + $NaHCO_3$

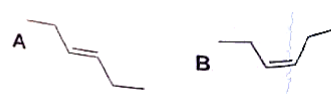
(ii) the epoxide of alkene **B** followed by acid hydrolysis.

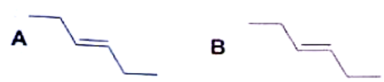


C

The structures of **A** and **B** are :

[A] 

[B] 

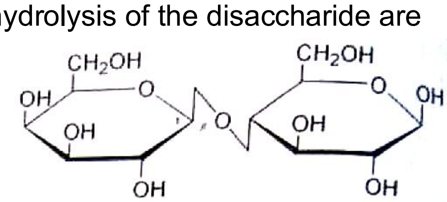
[C] 

[D] 

[ANS] **B**

[SOLN] concept based

[Q.40] The disaccharide shown below undergoes enzymatic hydrolysis. The monosaccharide units formed upon complete hydrolysis of the disaccharide are



[A] Glucose and Glucose

[B] Glucose and Galactose

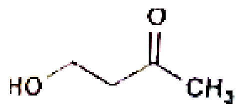
[C] Galactose and Fructose

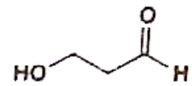
[D] Galactose and Galactose

[ANS] **D**

[SOLN] concept based

[Q.41] Which of the following most readily forms a cyclic hemiacetal in the presence of an acid catalyst?

[A] 

[B] 

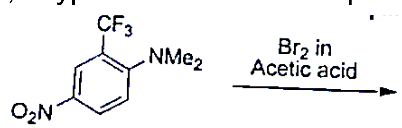
[C] 

[D] 

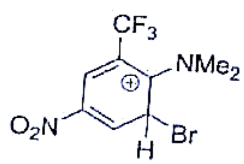
[ANS] D

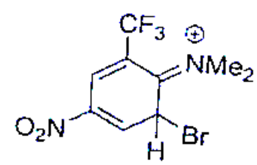
[SOLN] Aldehyde is more reactive than ketone, six member ring is more stable then four member ring.

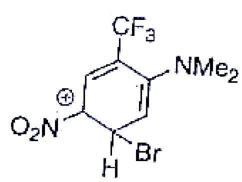
[Q.42] A medicinal chemist is exploring halogenated aromatic compounds as potential precursors for drug molecules. In one experiment, she attempts bromination of a substituted aromatic ring in the presence of acetic acid, a typical aromatic electrophilic substitution (AES) condition.

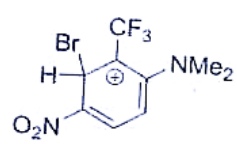


The chemist proposed an intermediate for the above reaction with the following resonance structures. Which of the following structures contributes the most to the stability of the intermediate?

[A] 

[B] 

[C] 

[D] 

[ANS] **B**

[SOLN] Octate configuration is more stable then non-octate configuration.

[Q.43] Which sequence of reagents, when used in the correct order, will convert benzene to m-nitro-n-propylbenzene?

(a) (i) $CH_3COCl/AlCl_3$, (ii) HNO_3/H_2SO_4, (iii) Zn/Hg,HCl

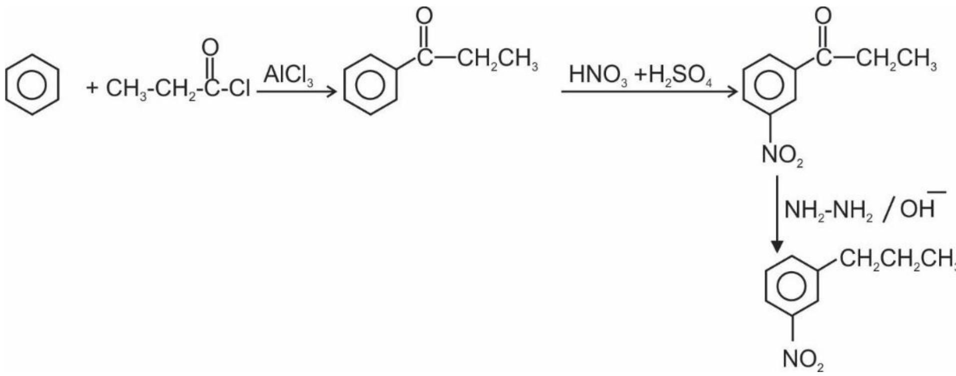
(b) (i) HNO_3/H_2SO_4, (ii) $CH_3CH_2CH_2Cl/AlCl_3$

(c) (i) HNO_3/H_2SO_4, (ii) $CH_3CH_2COCl/AlCl_3$, (iii) $H_2NNH_2/NaOH$

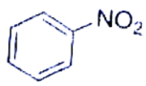
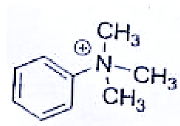
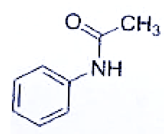
(d) (i) $CH_3CH_2COCl/AlCl_3$, (ii) HNO_3/H_2SO_4, (iii) $H_2NNH_2/NaOH$

[ANS] **D**

[SOLN] concept based



[Q.44] Which of the following compounds predominantly gives the para-nitro product as the major isomer upon nitration using a nitrating mixture ($HNO_3 + H_2SO_4$)?

[A]  [B]  [C]  [D] 

[ANS] **C**

[SOLN] $-NH-\overset{O}{\overset{||}{C}}-CH_3$ act – as ortho & para directing activating qr.

[Q.45] The correct order of the isoelectric points (pI) of Alanine (Ala). Arginine (Alla), and Glutamic acid (Glu) is :

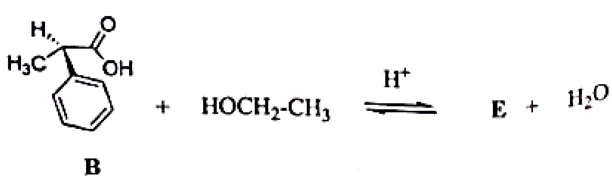
[A] Ala > Arg > Glu [B] Arg > Ala > Glu [C] Glu > Arg > Ala [D] Glu > Ala > Arg

[ANS] **B**

[SOLN] $PI = \dfrac{PK_{a_2} + pk_{a_2}}{2}$

pK_a increases, isoelectric point increases

[Q.46] Product E formed in the following chemical reaction will



[A] have the same configuration as B

[B] have inverted configuration as compared to B

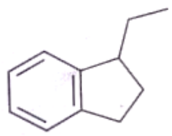
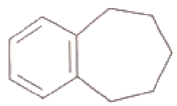
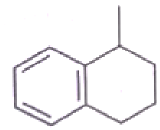
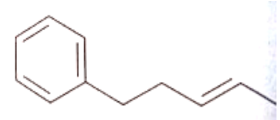
[C] be a racemic mixture

[D] be optically inactive

[ANS] **A**

[SOLN] concept base, bond breaking takes place at non chiral centre.

[Q.47] The most predominant product of the following reaction will be :

[A]  [B]  [C]  [D] 

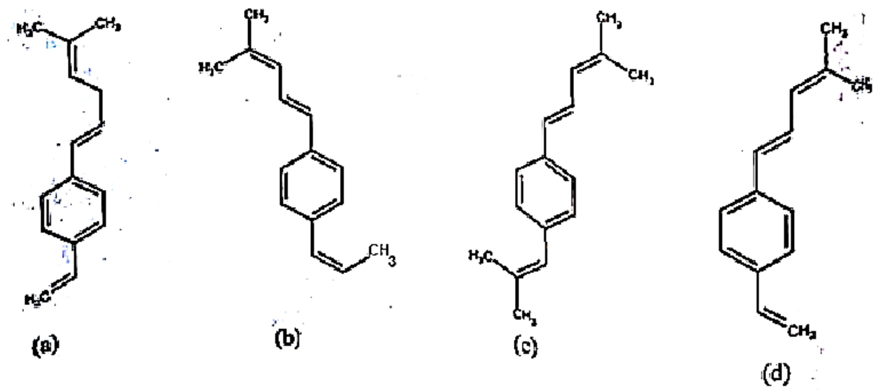
[ANS] **C**

[SOLN] Friedel -craft reaction

concept base

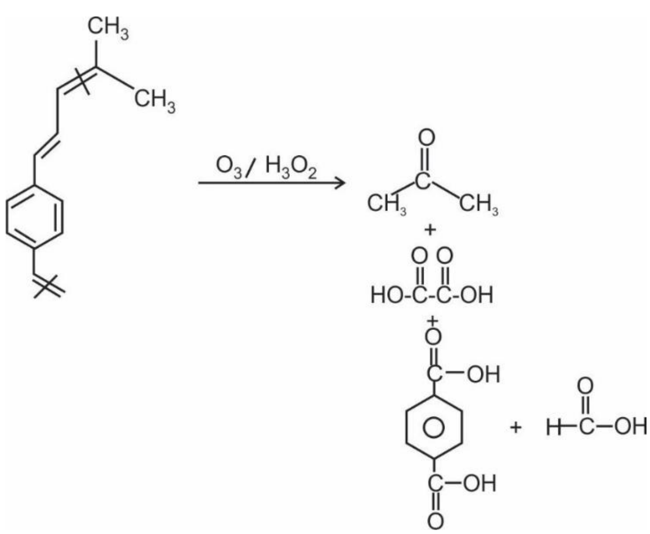
$$R-COOH+R-OH\xrightarrow{H^+}R-COOR'$$

[Q.48] Which of the following molecules will react with ozone and hydrogen peroxide to form 1,4-because dicarboxylic acid, formic acid, oxalic acid and acetone?



[ANS] **D**

[SOLN]

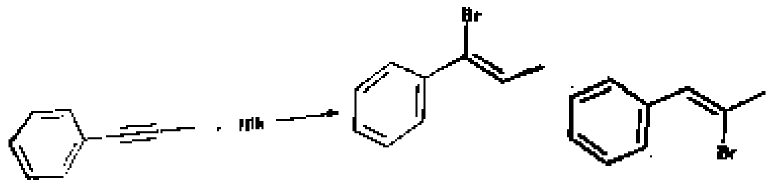


(NSEA) PART : A–2

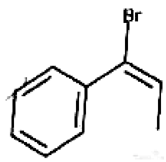
ANY NUMBER OF OPTIONS 4, 3, 2 OR 1 MAY BE CORRECT

MARKS WILL BE AWARDED ONLY IF ALL THE CORRECT OPTIONS ARE BUBBLED.

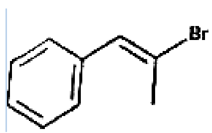
[Q.49] The following reaction was performed.



However, on investigation it was discovered that there were additional product(s) in the reaction mixture. The additional product(s) is/are

[A] 

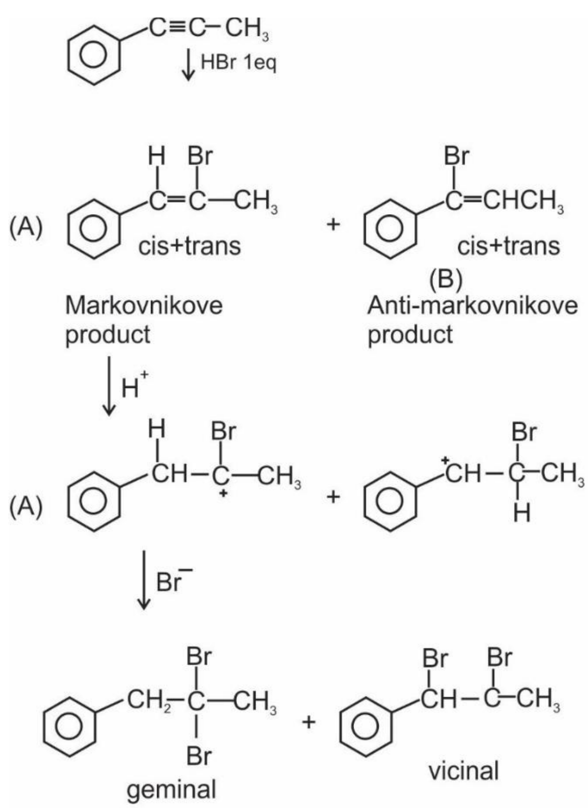
[B] a vicinal dibromide

[C] 

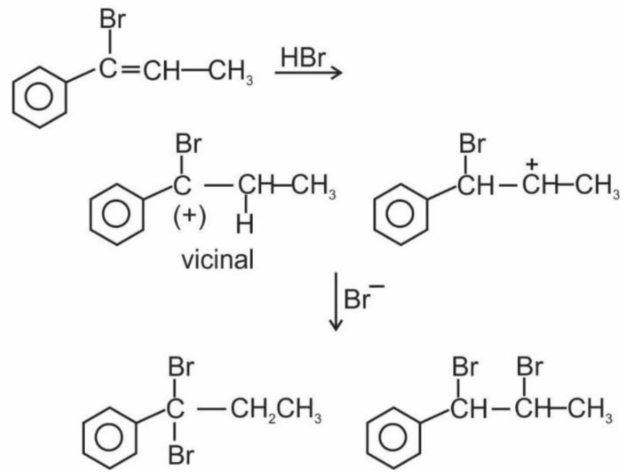
[D] a geminal dibromide

[ANS] **ABCD**

[SOLN]



(B)



[Q.50] Two open beakers A and B are kept inside a sealed box. Initially, beaker A contains 30 mL of 0.050 M glucose solution and beaker B contains 30 mL of 0.035 M fructose solution. Enough time was given to ensure that the water vapour in the system is in equilibrium. Under the equilibrium conditions.

Assume density of solution to be 1 gm/cm^3

[A] Volume of solution in A decreased to 25 Ml

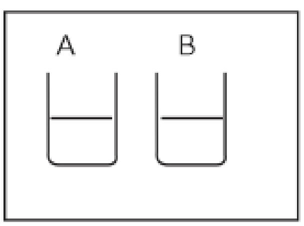
[B] Volume of solution in B decreased to 25 mL

[C] Volume of solution in A increased to 35 mL

[D] Volume of solution in B increased to 35 mL

[ANS] **B, C**

[SOLN]



A $\rightarrow$ 30 ml $\rightarrow$ 30 + x

0.05 M

Glucose

B $\rightarrow$ 30 ml $\rightarrow$ 30 – x

0.035 M

Fructose

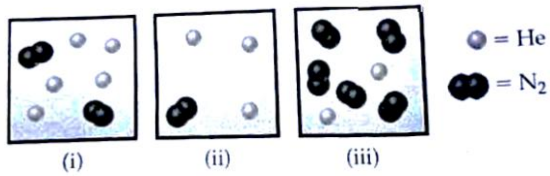
$\therefore$ At final concentration of A = B

$$\therefore \frac{30 \times 0.05}{30 + x} = \frac{30 \times 0.07}{30 - x}$$

$x = 5.3$ ml

$\therefore$ Option (B) and (C)

[Q.51] Three different gaseous mixtures (i), (ii) and (iii) of helium and nitrogen are placed in boxes of equal volume as shown below:



The true statement(s) from the following is/are

[A] Box (ii) has the lowest pressure

[B] Box (ii) has the lowest partial pressure of helium

[C] Box (ii) has the lowest density

[D] Pressure of box (iii) is less than pressure of box (i)

[ANS] **A, C**

[SOLN] (a) As mole is minimum in (ii) so, pressure is minimum

(b) As no. of moles of He is not minimum

(c) least total mass

(d) Both has same partial pressure.

[Q.52] Identify the isotonic solution(s) from the following mixtures of aqueous solution at 298 K. (Assume complete dissociation of the electrolytes in water)

[A] 100 mL 0.5 M glucose solution and 110 mL 0.2 M $CuSO_4$ solution

[B] 200 mL 0.5 M acetamide solution and 300 mL 0.1 M NaCl solution

[C] 400 mL 0.1 M $BaCl_2$ solution and 100 mL 0.2 M KCl solution

[D] 200 mL 0.13 M $CaCl_2$ solution and 200 mL 0.125 M HCl solution

[ANS] **BCD**

[SOLN] (a) $i_1c_1 = 1\times\frac{100\times0.5}{210} = \frac{50}{210}$

$$L_2C_2 = 2\times\frac{110\times0.2}{210} = \frac{2\times22}{210} = \frac{44}{210}$$

(b) 200 × 0.5 = 100

$2\times300\times0.1 = 60 \qquad = \frac{160}{500} = 0.32$

(c) $3\times400\times0.1 = 120$

$2\times100\times0.2 = 40 \qquad = \frac{160}{500} = 0.32$

(d) $3\times200\times0.13 = 78$

$2\times200\times0.125 = 50 \qquad = \frac{128}{400} = 0.32$

$= \frac{94}{210} = 0.447$

[Q.53] Alkyl lithium compounds are of interest in organic synthesis as efficient alkylating agents. Consider the following two reactions

(i) $C_4H_9Li + C_6H_6 \rightarrow C_6H_5Li + C_4H_{10}$

(ii) $C_5H_5Li + C_6H_6 \rightarrow C_6H_5Li + C_5H_6$

The CORRECT statement(s) for the above two reactions is/are:

[A] Reaction (i) will proceed because the more acidic hydrocarbon will react with the Li-derivative of less acidic hydrocarbon to liberate less acidic hydrocarbon.

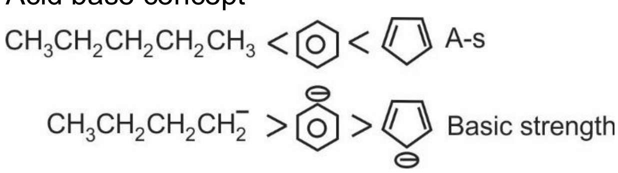
[B] Reaction (ii) will proceed because the less acidic hydrocarbon will react with the Li-derivative of more acidic hydrocarbon to liberate more acidic hydrocarbon.

[C] Both the reactions will proceed because the more acidic hydrocarbon will react with the Li-derivative of more acidic hydrocarbon to liberate less acidic hydrocarbon.

[D] Both the reactions proceed because the less acidic hydrocarbon will react with the Li-derivative of more acidic hydrocarbon to liberate less acidic hydrocarbon.

[ANS] **A**

[SOLN] Acid base concept



Base can accept 'H' form stronger acid.

[Q.54] A mixture gave light yellow precipitate with silver nitrate which did not dissolve completely with ammonia solution. It gave positive chromyl chloride test. When organic layer test was performed with addition of excess of concentrated nitric acid, a violet coloured organic layer first formed which them changed to orange colour. Brown ring test was positive but brown coloured gas was not intensified on heating the mixture with copper turnings and concentrated sulphuric acid. Which of the anions were present?

[A] Chloride, bromide, iodide

[B] Fluoride, nitrate, bromide

[C] Chloride, nitrate, iodide

[D] Chloride, iodide, nitrite

[ANS] **A, D**

[SOLN] List yellow ppt with $AgNO_3$ -insoluble in dil. NH_3 but soluble in line NH_3 anion may be Br^-.

+ve chromyl chloride test - Cl^-

	$AgNO_3$	Dil. NH_3	Conc.NH_3
Cl^-	$AgCl\downarrow$ (white)	positive	positive
Br^-	$AgBr\downarrow$ (Pale yellow)	×	Positive
I^-	$AgI\downarrow$ (dark yellow	×	×

Brown ring test:

$$NO_2^- / NO_3^- + \text{conc. } H_2SO_4 + FeSO_4\text{.dil} \rightarrow \underbrace{\left[Fe(H_2O)_5NO\right]SO_4}_{\text{Brown ring}}$$

But brown colour NO_2 was not intensified upon testing NO_3^- with cuturnig and conc. H_2SO_4

Layer Test-$I^- + \text{conc.}HNO_3 \longrightarrow \underset{\text{Reddish Brown}}{I_2} \longrightarrow \underset{\text{Orange soln}}{KI_3}$

Br^-, Cl^-, I^-, NO_2^-

[Q.55] Consider the following half-cell reactions:

$$H^+_{(aq)} + e^- \rightleftharpoons 1/2H_{2(g)} \quad E^0 = 0.00\ V$$
$$V^{3+}_{(aq)} + e^- \rightleftharpoons V^{2+}_{(aq)} \quad E^0 = -0.255\ V$$
$$VO^{2+} + e^- + 2H^+ \rightleftharpoons V^{3+}_{(aq)} + H_2O_{(l)} \quad E^0 = +0.337\ V$$
$$1/2O_{2(g)} + 2e^- + 2H^+ \rightleftharpoons H_2O_{(l)} \quad E^0 = +1.23\ V$$

Using above equations, the correct statement(s) is/are:

[A] Oxidation of $V^{2+}_{(aq)}$ to $V^{3+}_{(aq)}$ by H^+ is spontaneous reaction.

[B] Oxidation $V^{3+}_{(aq)}$ to $V^{4+}_{(aq)}$ by H^+ is a nonspontaneous reaction.

[C] H^+ is better oxidizing agent than O_2.

[D] O_2 will be able to oxidize $V^{2+}_{(aq)}$ to $V^{3+}_{(aq)}$.

[ANS] **ABD**

[SOLN] (a) $\varepsilon^o = \varepsilon^o_{V^{3+},V^{2p}} = 0-(-0.255) = 0.255 = +ve$ Spontaneous

(b) $\varepsilon^o = \varepsilon^o_{H+,H_2} - \varepsilon^o_{V^{4+},V^{3+}} = 0-(+0.337) = -0.337 = -ue$ Non spontaneous

(c) $\varepsilon^o_{H^+,H_2} < \varepsilon^o_{O_2,H_2O}$

$\Rightarrow$ Oxidising power : $H+ < O_2$

(d) $\varepsilon^o = \varepsilon^o_{O_2,H_2O} - \varepsilon^o_{V^{3+},V^{2+}} = 1.23-(-0.255) = 1.485 = +\ ve$

spontaneous.

[Q.56] The suitable combinations of physico-chemical methods that can be used to assign the correct formula to the compound $CoCl_3 4NH_3$ are

[A] Addition of Ag^+ ions

[B] Electrical conductance of aqueous solution

[C] Depression in freezing point

[D] Thermal decomposition of the complex under controlled conditions

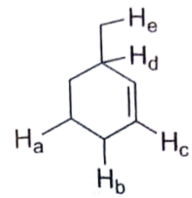
[ANS] **ABC**

[SOLN] $CoCl_3.4NH_3$

(a)Right (b) right (c) right

All are appropriate to count ions.

[Q.57] Given below is the structure of a compound X, Identify the correct statement(s) from below.



X

[A] Compound X has two vinylic protons, and two allylic protons.

[B] Compound X (9.6 gram) will react with excess of bromine to give a dibromide (25.6 gram).

[C] The carbon radical that generated by cleavage of C-H_d bond will be more stable than that generated by cleavage of C-H_b bond.

[D] Compound X on ozonolysis followed by treatment with Zn/H_2O will give a dial.

[ANS] **BCD**

[Q.58] Which of the following statement(s) is/are incorrect for sugars?

[A] If a disaccharide is dextrorotatory, it means both its monosaccharides will also be essentially dextrorotatory.

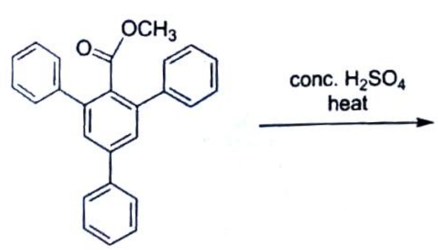
[B] The designaitons(+) and (–) can also be referred to as D-and L- respectively

[C] The predominant hemiacetal form of glucose is formed by bond formation between C_1 and C_6

[D] All nucleic acids contain 2-deoxy-D-ribose as the aldopentose

[ANS] **ABCD**

[Q.59] When the following reaction was performed, the product obtained gave a bright orange red precipitate with 2,4-dinitrophenylhydrazine and does not react with saturated solution of $NaHCO_3$.



This implies:

[A] Hydrolysis has taken place

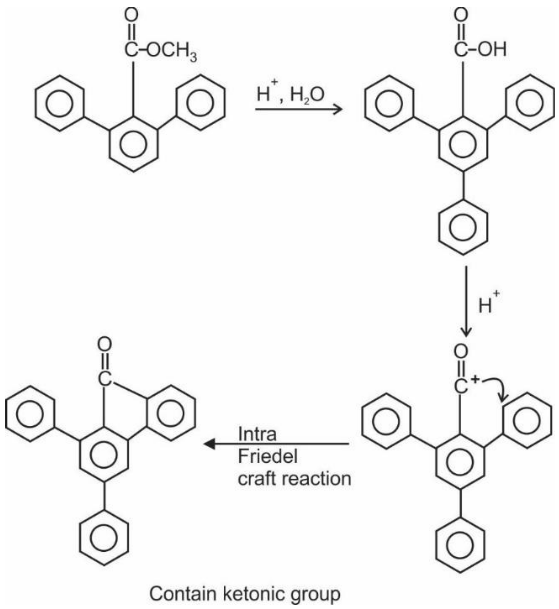
[B] Intramolecular Friedal Crafts reaction has been favoured

[C] Intermolecular Friedal Crafts reaction has taken place

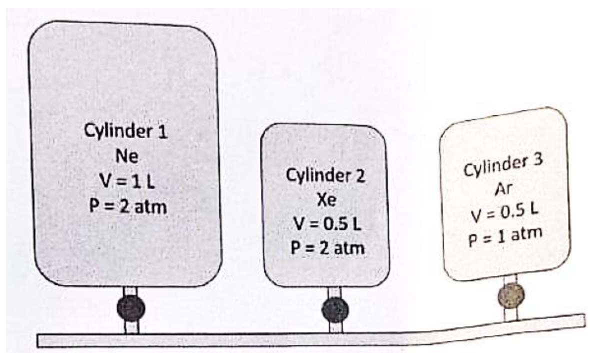
[D] The product has a carbonyl functional group

[ANS] **ABD**

[SOLN]



[Q.60] Three cylinders connected with valves are shown in the diagram. All the cylinders are at same temperature. Which of the following statement(s) is/are true once the valves are opened and the system is allowed to reach equilibrium?



NOTE : Volume of connecting tubes may be neglected.

[A] Total pressure of the system will be 1.75 atm

[B] The partial pressure of Ne in cylinder 1 will be higher than that in cylinder 2 and 3

[C] The correct order of partial pressures will be $p(Ne) > p(Xe) > p(Ar)$

[D] Number of moles of gas in cylinder 2 will be lower than its initial value.

[ANS] **A,C,D**

[SOLN] (A) $\dfrac{1\times2+0.5\times2+0.5\times1}{2}=1.75$ atm

(B) Partial press will be uniform everywhere.

(C) $Me > Xe > Ar$

(D) since P decreases $\therefore$ n lowers.