JEE–MAIN EXAMINATION – JANUARY 2026

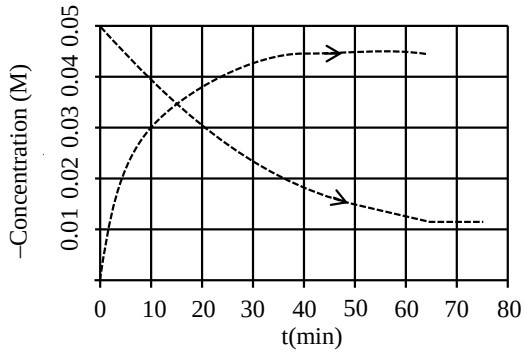
(HELD ON FRIDAY 23rd JANUARY 2026) **TIME : 3:00 PM TO 6:00 PM**

CHEMISTRY

TEST PAPER WITH SOLUTION

SECTION-A

51.



Given above is the concentration vs time plot for a dissociation reaction : A → nB.

Based on the data of the initial phase of the reaction (initial 10 min), the value of n is _____.

(1) 4 (2) 3

(3) 2 (4) 5

Ans. (2)

Sol. A → nB

0.05 0

0.04 0.01×n

$0.01 \times n = 0.03$

$n = 3$

52. It is noticed that Pb^{2+} is more stable than Pb^{2+} but Sn^{2+} is less stable than Sn^{4+}. Observe the following reactions

$PbO_2 + Pb \rightarrow 2PbO$; $\Delta_rG°$ (1)

$SnO_2 + Sn \rightarrow 2SnO$; $\Delta_rG°$ (2)

Identify the correct set from the following.

(1) $\Delta_rG°(1) > 0$; $\Delta_rG°(2) < 0$

(2) $\Delta_rG°(1) < 0$; $\Delta_rG°(2) < 0$

(3) $\Delta_rG°(1) < 0$; $\Delta_rG°(2) > 0$

(4) $\Delta_rG°(1) > 0$; $\Delta_rG°(2) > 0$

Ans. (3)

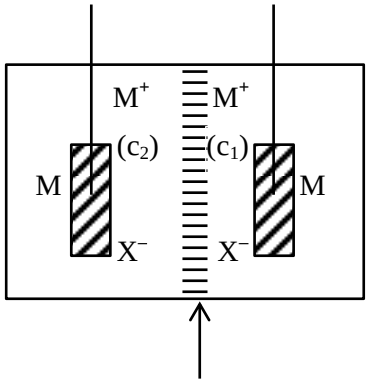
Sol. $PbO_2 + Pb \rightarrow 2PbO$

Pb^{2+} is more stable hence reaction will be spontaneous. So $\Delta G°_r(1)$ is negative.

$SnO_2 + Sn \rightarrow 2SnO$

Sn^{+2} is less stable, so reaction will be non-spontaneous hance $\Delta G°_r(2)$ is positive.

53.



Semi permeable membrane

Consider the above electrochemical cell where a metal electrode (M) is undergoing redox reaction by forming M^+ ($M \rightarrow M^+ + e$). The cation M^+ is present in two different concentrations c_1 and c_2 as shown above. Which of the following statement is correct for generating a positive cell potential?

(1) If c_1 is present at anode, then $c_1 = c_2$

(2) If c_1 is present at cathode, then $c_1 < c_2$

(3) If c_1 is present at cathode, then $c_1 > c_2$

(4) If c_1 is present at anode, then $c_1 > c_2$

Ans. (3)

Sol. (1) If C_1 is at anode $\Rightarrow$ cell reaction

$M^+(C_2) \rightarrow M^+(C_1)$

$$E_{cell} = -0.059 \log \frac{C_1}{C_2}$$

$\therefore E_{cell} > 0 \Rightarrow C_1 < C_2$

(2) If C_1 is at cathode

$M^+(C_1) \rightarrow M^+(C_2)$

$$E_{cell} = -0.059 \log \frac{C_2}{C_1} > 0$$

$C_2 < C_1$

54. Both human DNA and RNA are chiral molecules. The chirality in DNA and RNA arises due to the presence of

(1) Base unit (2) Chiral phosphate unit

(3) D-sugar component (4) L-sugar component

Ans. (3)

Sol. DNA & RNA are chiral molecules due to presence of chiral 2-deoxy-Ribose & Ribose sugar unit respectively.

55. Identify the **CORRECT** set of details from the following :

A. $[Co(NH_3)_6]^{3+}$: Inner orbital complex ; d^2sp^3 hybridized

B. $[MnCl_6]^{3-}$ Outer orbital complex; sp^3d^2 hybridized

C. $[CoF_6]^{3-}$: Outer orbital complex ; d^2sp^3 hybridized

D. $[FeF_6]^{3-}$: Outer orbital complex: sp^3d^2 hybridized

E. $[Ni(CN)_4]^{2-}$: Inner orbital complex ; sp^3 hybridized

Choose the correct answer from the options given below:

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

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

Ans. (2)

Sol. (A) Co^{3+}:- $3d^6$

$NH_3 \Rightarrow$ S.F.L

Hybridisation $\Rightarrow$ d^2sp^3, Inner orbital complex

(B) Mn^{3+}:- $3d^4$

$Cl^- \Rightarrow$ W.F.L

Hybridisation $\Rightarrow$ sp^3d^2, Outer orbital complex

(C) Co^{3+}:- $3d^6$

$F^- \Rightarrow$ W.F.L

Hybridisation $\Rightarrow$ sp^3d^2, Outer orbital complex

(D) Fe^{3+}:- $3d^5$

$F^- \Rightarrow$ W.F.L

Hybridisation $\Rightarrow$ sp^3d^2, Outer orbital complex

(E) Ni^{2+}:- $3d^8$

$CN^- \Rightarrow$ S.F.L

Hybridisation $\Rightarrow$ dsp^2, Inner orbital complex

56. Elements X and Y belong to Group 15. The difference between the electronegativity values of 'X' and phosphorus is higher than that of the difference between phosphorus and 'Y'. 'X' & 'Y' are respectively

(1) N & As (2) As & Bi

(3) Bi & N (4) As & Sb

Ans. (1)

Sol.

Element	EN
N	3.0
P	2.1
As	2.0
Sb	1.9
Bi	1.9

X = Nitrogen (N)

Y = Arsenic (As)

57. Given below are two statements:

Statement I: $(CH_3)_3\overset{\oplus}{C}$ is more stable than $\overset{\oplus}{C}H_3$ as nine hyperconjugation interactions are possible in $(CH_3)_3\overset{\oplus}{C}$.

Statement II: $\overset{\oplus}{C}H_3$ is less stable than $(CH_3)_3\overset{\oplus}{C}$ as only three hyperconjugation interactions are possible in $\overset{\oplus}{C}H_3$.

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

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

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

Ans. (1)

Sol. S-1 : $(CH_3)_3C^+ > \overset{+}{C}H_3$; due to hyperconjugation interaction $CH_3-\overset{\oplus}{\underset{\displaystyle CH_3}{\underset{|}{C}}}-CH_3$.

S-2 : False

58. Iodoform test can differentiate between

A. Methanol and Ethanol

B. CH_3COOH and CH_3CH_2COOH

C. Cyclohexene and cyclohexanone

D. Diethyl ether and Pentan-3-one

E. Anisole and acetone

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

(1) A & E only (2) A & D only

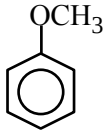
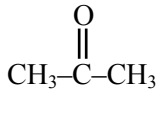
(3) A, B & E only (4) B, C & E only

Ans. (1)

Sol. $R-\overset{\overset{O}{\|}}{C}-CH_3$ or $R-\underset{\underset{OH}{|}}{CH}-CH_3$

$$\xrightarrow[+I_2]{NaOH} R-CO\overset{\ominus}{O}\overset{\oplus}{Na}+\underset{\text{Yellow ppt}}{CHI_3}\downarrow$$

(A) CH_3–OH & $CH_3-\underset{\underset{OH}{|}}{CH_2}$

59. Given below are two statements :

Statement I : The second ionisation enthalpy of Na is larger than the corresponding ionisation enthalpy of Mg.

Statement II : The ionic radius of O^{2-} is larger than that of F^-.

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

(1) Both statement I and statement II are true

(2) Both statement I and statement II are false

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

(4) Statement I is true but statement II is false

Ans. (1)

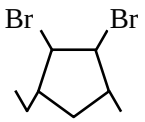
Sol. **Na^+ :-** $1s^2 2s^2 2p^6$ (fully filled electronic configuration)

Mg^+ **:-** $1s^2 2s^2 2p^6 3s^1$

IE_2 of Na > IE_2 of Mg

Size of $O^{2-} > F^-$

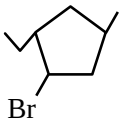
60.

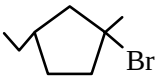


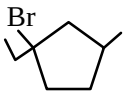
$\xrightarrow[(ii)\,HBr]{(i)\,Zn,\Delta}$ (P)

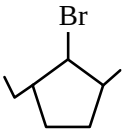
Major Product

Identify (P)

(1) 

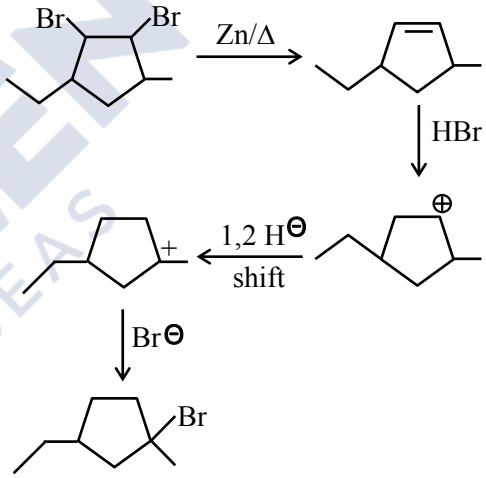
(2) 

(3) 

(4) 

Ans. (2)

Sol.



61. Observe the following reactions at T(K)

I. A → products.

II. $5Br^-(aq) + BrO_3^-(aq) + 6H^+(aq) \rightarrow 3Br_2(aq) + 3H_2O(l)$

Both the reactions are started at 10.00 am. The rates of these reactions at 10.10 am are same. The value of $-\frac{\Delta[Br^-]}{\Delta t}$ at 10.10 am is 2×10^{-4} mol L^{-1} Min^{-1}. The concentration of A at 10.10 am is 10^{-2} mol L^{-1}. What is the first order rate constant (in min^{-1}) of reaction I?

(1) 2×10^{-3} (2) 10^{-3}

(3) 10^{-2} (4) 4×10^{-3}

Ans. (4)

Sol. At t = 10 minutes

$$\text{Rate of reaction} = -\frac{1}{5}\frac{\Delta[Br^-]}{\Delta t} = \frac{1}{5} \times (2 \times 10^{-4})$$

$= 4 \times 10^{-5}$

For reaction $A \rightarrow P$

at t = 10 minutes

Rate of reaction $= 4 \times 10^{-5} = k[A]$

$k = 4 \times 10^{-3}\ min^{-1}$.

62. Which of the following statements are **TRUE** about Haloform reaction?

A. Sodium hypochlorite reacts with KI to give KOI.

B. KOI is a reducing agent.

C. α, β-unsaturated methylketone

$(CH_3–CH=CH–\overset{\overset{O}{\|}}{C}–CH_3)$ will give iodoform reaction.

D. Isopropyl alcohol will not give iodoform test.

E. Methanoic acid will give positive iodoform test.

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

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

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

Ans. (3)

Sol. (A) $NaOCl + KI \rightarrow NaCl + KOI$

(B) Incorrect statement

(C) $CH_3 - CH = CH - \overset{\overset{O}{\|}}{C} - CH_3$ gives iodoform reaction.

(D) Incorrect statement

(E) Incorrect statement

63. Which statements are **NOT TRUE** about XeO_2F_2?

A. It has a see-saw shape.

B. Xe has 5 electron pairs in its valence shell in XeO_2F_2.

C. The O–Xe–O bond angle is close to 180°.

D. The F–Xe–F bond angle is close to 180°

E. Xe has 16 valence electrons in XeO_2F_2.

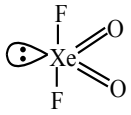
Choose the **correct** answer from the options given below.

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

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

Ans. (1)

Sol. **(A)**



See-saw

(B) Xe has 7 electron pair in its valence shell

(C) O–Xe–O Bond angle is close to 120°

(D) F–Xe–F Bond angle is close to 180°

(E) Xe has 14 valence electron in XeO_2F_2

64. Identify the **INCORRECT** statements from the following:

A. Notation $^{24}_{12}Mg$ represents 24 protons and 12 neutrons.

B. Wavelength of a radiation of frequency $4.5 \times 10^{15}\ s^{-1}$ is 6.7×10^{-8} m.

C. One radiation has wavelength = λ_1(900 nm) and energy = E_1. Other radiation has wavelength = λ_2(300 nm) and energy = E_2.$E_1 : E_2 = 3 : 1$.

D. Number of photons of light of wavelength 2000 pm that provides 1 J of energy is 1.006×10^{16}.

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

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

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

Ans. (2)

Sol. (A) $_{12}Mg^{24}$ represents 12 protons and 12 neutrons.

(B) $\lambda = \frac{C}{\nu} = \frac{3\times10^8}{4.5\times10^{15}} = 6.67 \times 10^{-8}$ m.

(C) $\frac{E_1}{E_2} = \frac{hC/\lambda_1}{hC/\lambda_2} = \frac{\lambda_2}{\lambda_1}$

$\frac{E_1}{E_2} = \frac{300}{900} = \frac{1}{3}$ (false)

(D) No. of photons $= \frac{\text{Energy}}{hC/\lambda} = 10^{16}$ (True)

65. In Carius method 0.2425 g of an organic compounds gave 0.5253 g silver chloride. The percentage of chlorine in the organic compound is

(1) 53.58% (2) 87.65%

(3) 37.57% (4) 34.79%

Ans. (1)

Sol. Organic compound : 0.2425 gm

AgCl obtained : 0.5253 gm

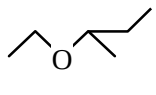
In carius method for estimation of halogen amount of AgCl obtained is 0.5253 gm from 0.2425 gm of organic compound.

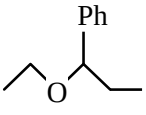
Hence percentage of Cl.

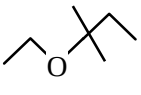
$$\text{Percentage of Cl} = \xrightarrow[143.5]{35.5} \times \frac{0.5253}{0.2425} \times 100$$

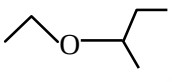
$= 53.58\%$

66. A mixed ether (P), when heated with excess of hot concentrated hydrogen iodide produces two different alkyl iodides which when treated with aq. NaOH give compounds (Q) and (R). Both (Q) and (R) give yellow precipitate with NaOI. Identify the mixed ether (P):

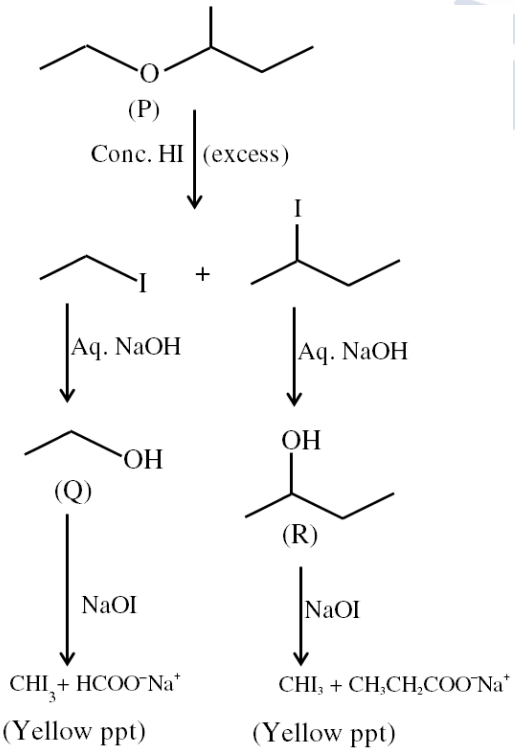
(1) 

(2) 

(3) 

(4) 

Ans. (1)



67. The oxidation state of chromium in the final product formed in the reaction between KI and acidified $K_2Cr_2O_7$ solution is:

(1) +4 (2) +3

(3) +2 (4) +6

Ans. (2)

Sol. $K_2Cr_2O_7 + KI \xrightarrow{H^+} I_2 + Cr^{3+}$

68. The work functions of two metals (M_A and M_B) are in the 1 : 2 ratio. When these metals are exposed to photons of energy 6 eV, the kinetic energy of liberated electrons of M_A : M_B is in the ratio of 2.642 : 1. The work functions (in eV) of M_A and M_B are respectively.

(1) 3.1, 6.2 (2) 2.3, 4.6

(3) 1.4, 2.8 (4) 1.5, 3.0

Ans. (2)

Sol. $KE_{max} = E - \phi$

$(KE_{max})_1 = 6 - \phi_1$ ..... (1)

$(KE_{max})_2 = 6 - \phi_2$ ..... (2)

By eq. (1) divide eq. (2)

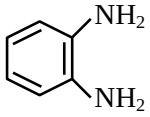
$$\frac{(KE_{max})_1}{(KE_{max})_2} = \frac{2.642}{1} = \frac{6-\phi_1}{6-\phi_2}$$

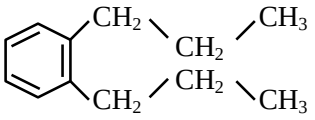
$$\frac{2.642}{1} = \frac{6-\phi_1}{6-2\phi_1}$$

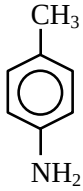
$\phi_1 = 2.3$ eV

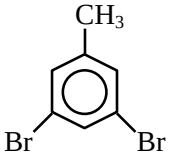
$\phi_2 = 4.6$ eV.

69. Given below are two statements:

Statement I:  can be synthesized from

 using simpler reagents in the order i) Acidic $KMnO_4$, ii) Ammonia, iii) Bromine and alkali

Statement II :  can be converted into

 using reagents in the order (i) Bromine-H_2O (ii) $NaNO_2$/HCl (0-5 °C) (iii) aq. H_3PO_2.

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

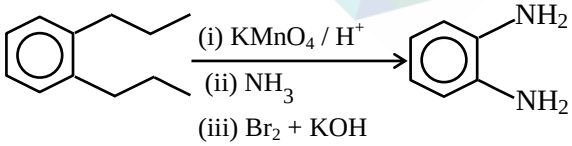
(2) **Statement I** is true but **Statement II** is false

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

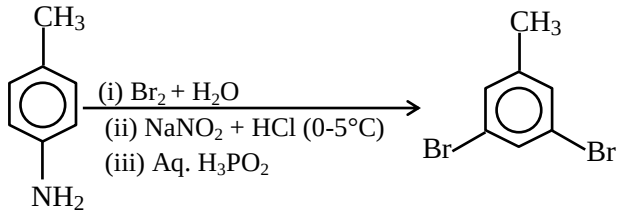
(4) **Statement I** is false but **Statement II** is true

Ans. (3)

Sol. Statement-**I**



Statement-**II**



Both statement (I) and (II) are true.

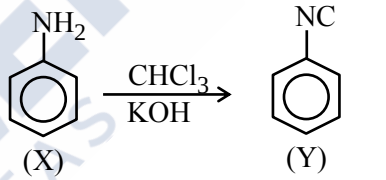
70. A student has been given a compound "x" of molecular formula – C_6H_7N. 'x' is sparingly soluble in water. However, on addition of dilute mineral acid , 'x' becomes soluble in water. 'x' when treated with $CHCl_3$ and KOH (alc.) 'y' is produced. 'y' has a specific unpleasant smell. On treatment with benzenesulphonyl chloride, 'x' gives a compound 'z' which is soluble in alkali. The number of different "H" atoms present in 'z' is:-

(1) 5 (2) 8

(3) 4 (4) 7

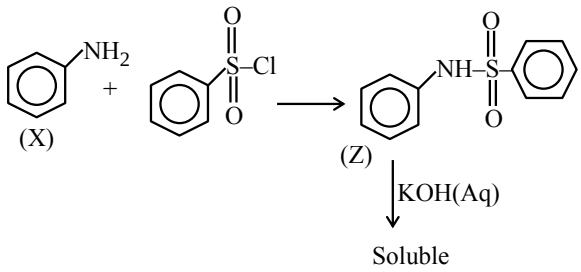
Ans. (4)

Sol.

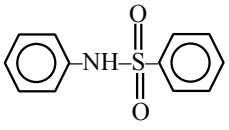


(X) (Y)

Unpleasant smell



Number of different H atom in



is 7.

SECTION-B

71. $X_2(g) + Y_2(g) \rightleftharpoons 2Z(g)$

$X_2(g)$ and $Y_2(g)$ are added to a 1 L flask and it is found that the system attains the above equilibrium at T(K) with the number of moles of $X_2(g)$, $Y_2(g)$ and Z(g) being 3, 3 and 9 mol respectively (equilibrium moles). Under this conditions of equilibrium, 10 mol of Z(g) is added to the flask and the temperature is maintained at T(K). Then the number of moles of Z(g) in the flask when the new equilibrium is established is _____. (Nearest integer).

Ans. (15)

Sol. $X_2(g) + Y_2(g) \rightleftharpoons 2Z\ (g)$

$$K_C = \frac{(9)^2}{3\times 3} = 9$$

Now 10 moles of Z are added then reaction will move in backward direction.

$X_2(g) + Y_2(g) \rightleftharpoons 2Z\ (g)$

$3 + X \quad 3 + X \qquad 19–2X$

$$K_C = \frac{(19-2X)^2}{(3+X)(3+X)} = 9$$

$$\frac{19-2X}{3+X} = 3$$

$19 – 2X = 9 + 3X$

$10 = 5X$

$X = 2$

At equilibrium $\Rightarrow$ moles of $Z = 19 – 2 \times 2$

$= 15$ moles

72. Two liquids A and B form an ideal solution. At 320 K, the vapour pressure of the solution, containing 3 mol of A and 1 mol of B is 500mm Hg. At the same temperature, if 1 mol of A is further added to this solution, vapour pressure of the solution increases by 20 mm Hg. Vapour pressure (in mm Hg) of B in the pure state is _____. (Nearest integer)

72. Ans. (200)

Sol. $X_A = \frac{3}{4},\ X_B = \frac{1}{4}$

$$P_S = P_A^o X_A + P_B^o X_B$$

$$500 = P_A^o \times \frac{3}{4} + P_B^o \times \frac{1}{4}$$

$$3P_A^o + P_B^o = 2000 \quad \ldots.. (1)$$

Now 1 moles of A is further added so $n_A = 4$ mole, $n_B = 1$ mole

$$X'_A = \frac{4}{5},\ X'_B = \frac{1}{5}$$

$$P_S = 520 = P_A^o \times \frac{4}{5} + P_B^o \times \frac{1}{5}$$

$$4P_A^o + P_B^o = 2600 \quad \ldots.. (2)$$

By equation (2) – equation (1)

$P_A^o = 600$ mm Hg

$P_B^o = 200$ mm Hg

73. 200 cc of $x \times 10^{-3}$M potassium dichromate is required to oxidise 750 cc of 0.6 M Mohr's salt solution in acidic medium.

Here x =

Ans. (375)

74. Total number of unpaired electrons present in the central metal atoms/ions of

$[Ni(CO)_4]$, $[NiCl_4]^{2-}$, $[PtCl_2(NH_3)_2]$, $[Ni(CN_4)]^{2-}$ and $[Pt(CN_4)]^{2-}$ is____.

Ans. **(2)**

Sol. In $[Ni(CO)_4]$, $Ni^0 : 3d^8 4s^2$

Hybridisation state : sp^3

Unpaired electron = 0

In $[NiCl_4]^{2-}$, $Ni^{2+} : 3d^8$

Hybridisation state : sp^3

Unpaired electron = 2

In $[PtCl_4]^{2-}$, $Pt^{2+} : 5d^8$

Hybridisation state : dsp^2

Unpaired electron = 0

In $[Ni(CN)_4]^{2-}$, $Ni^{2+} : 3d^8$

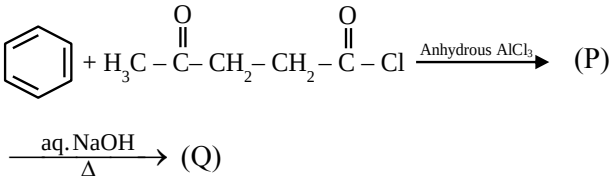
Hybridisation state : dsp^2

Unpaired electron = 0

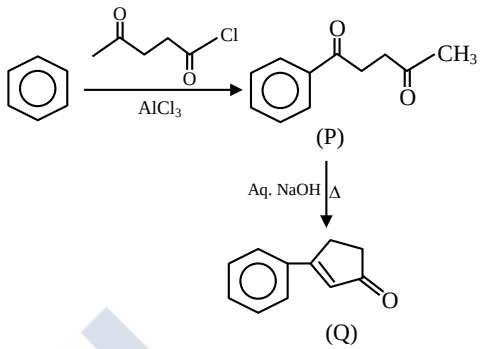
In $[Pt(NH_3)_2Cl_2]$, $Pt^{2+} : 5d^8$

Hybridisation state : dsp^2

Unpaired electron = 0

75. 

In compound (Q) , the percentage of oxygen is _____%. (Nearest integer)

Sol. 

Molecular mass of Q is = 157

% of oxygen in product 'Q' is = $\frac{16}{157}\times 100 = 10.19\%$