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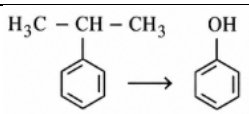
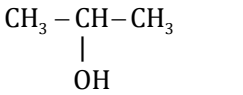
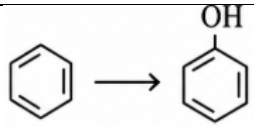
12

NEET 2026

Chemistry_Solution

46. Match List I with List II:

	List-I		List-II
A.		**I.**	(i) oleum; (ii) NaOH, Δ; (iii) H^+
B.	CH_3COOH – CH_3CH_2OH	**II.**	(i) O_2; (ii) H_2O/H^+
C.	$CH_3CH_2CH_2OH \rightarrow$ 	**III.**	(i) CH_3OH, H^+; (ii) H_2, catalyst
D.		**IV.**	(i) conc. H_2SO_4, Δ; (ii) H^+/H_2O

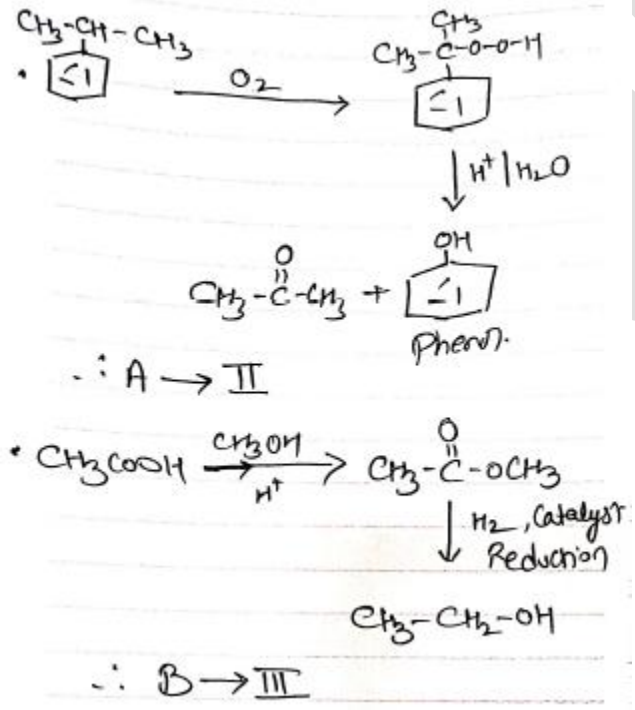
(1) A-I; B-III; C-IV; D-II

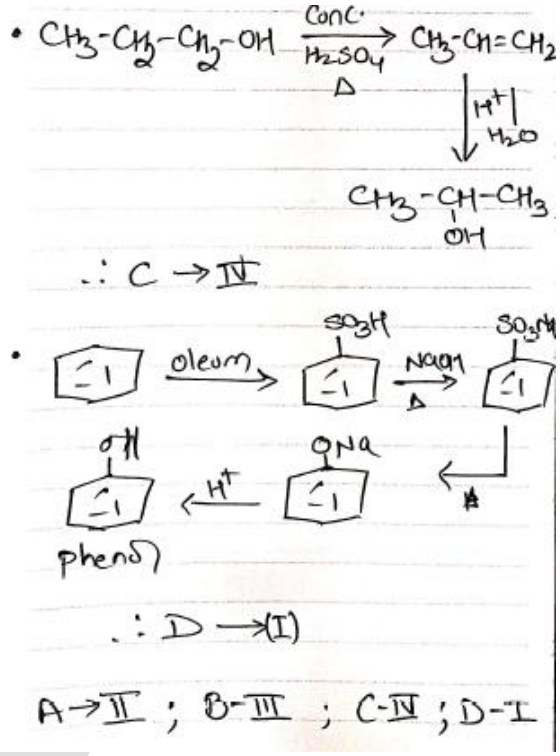
(2) A-II; B-IV; C-III; D-I

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

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

Solution:





47. The major product Z formed in the following sequence of reactions is:

$$C_2H_6 \xrightarrow[UV\,light]{Cl_2} \underset{\text{monochloriniated product}}{X} \xrightarrow{NH_3} Y \xrightarrow[(ii)\,H_2O]{(i)\,NaNO_2,\ HCl} Z$$

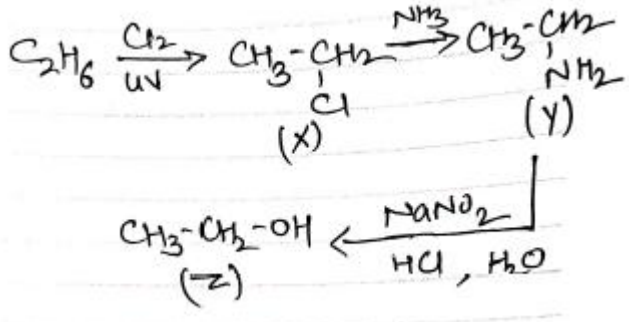
(1) $C_2H_5 - N = N - OH$

(2) C_2H_5OH

(3) $C_2H_5NO_2$

(4) $C_2H_5NH_2$

Solution:



48. In a qualitative analysis, Bi^{3+} is detected by appearance of precipitate of BiO(OH)(s). Calculate pH when the following equilibrium exists at 298 K :

$BiO(OH)(s) \rightleftharpoons BiO + (aq) + OH^{-}(aq)$,

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

(Given : log 2 = 0.3010)

(1) 4.699 (2) 8.714

(3) 9.301 (4) 5.286

Solution:

$BiO(OH)_{(s)} \rightleftharpoons BiO^{+}_{(aq)} + \bar{O}H_{(aq)}$

$K_{sp} = S^2 \qquad S = [\bar{O}H]$.

$S = \sqrt{K_{sp}}$

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

$S = 2 \times 10^{-5}$

now $pOH = -\log[\bar{O}H]$

$\therefore pOH = -\log(2 \times 10^{-5})$

$= 5 - \log 2$

$= 5 - 0.3 = 4.7$

$\boxed{pOH = 4.7}$

now

$pH + pOH = 14$

$\therefore pH = 14 - pOH$

$= 14 - 4.7$

$\boxed{pH = 9.3}$

49. When 1 dm^3 of CO_2 gas is passed over hot coke, the volume of gaseous mixture after complete reaction at STP becomes 1.4 dm^3. The composition of the gaseous mixture at STP is :

(1) 0.6 dm^3 of CO, 0.8 dm^3, of CO_2

(2) 0.8 dm^3 of CO, 0.8 dm^3 of CO_2

(3) 0.8 dm^3 of CO, 0.6 dm^3 of CO_2

(4) 0.6 dm^3 of CO, 0.4 dm^3 of CO_2

Solution:

$CO_{2(g)} + C_{(s)} \longrightarrow 2CO_{(g)}$

1 —

$1-x$ $2x$

$V_T = 1.4$

also $V_T = V_{CO_2} + V_{CO}$.

$1.4 = 1 - x + 2x$

$1.4 = 1 + x$

$\boxed{x = 0.4\ dm^3}$

$V_{CO_2} = 1 - x$

$= 1 - 0.4$

$\boxed{V_{CO_2} = 0.6 dm^3}$

$V_{CO} = 2x = 2 \times 0.4$

$\therefore \boxed{V_{CO} = 0.8 dm^3}$

50. Match List I with List II :

	List-I (Quantum Numbers)			List-II (Orbital)
	'n'	'l'		
A.	2	1	**I.**	3d
B.	4	0	**II.**	2p
C.	5	3	**III.**	4s
D.	3	2	**IV.**	5f

Choose the correct answer from the option given below :

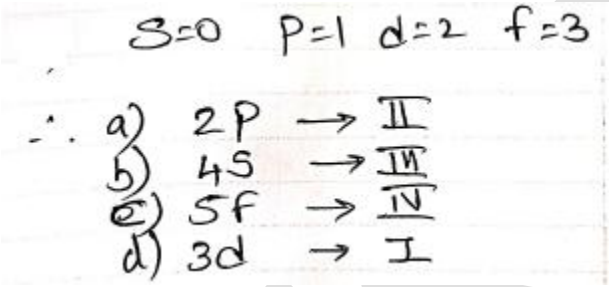
(1) A-II, B-III, C-IV, D-I

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

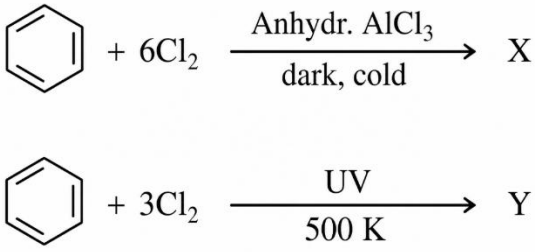
(3) A-IV, B-II, C-III, D-I

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

Solution:



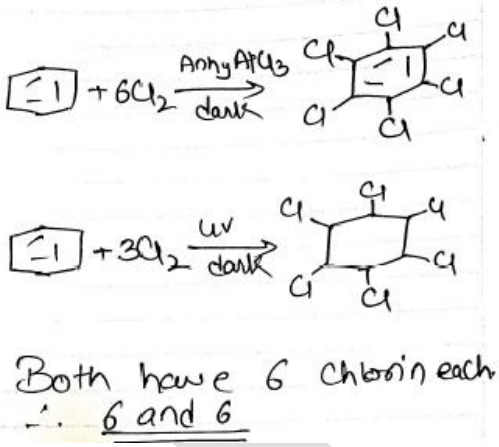
51. The number of chlorine atoms present in the organic products X and Y of the following reactions, respectively, are



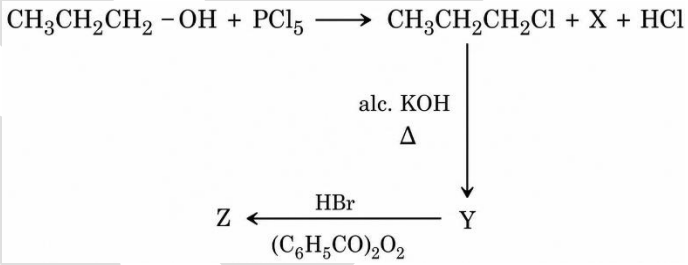
(1) 3 and 6 (2) 6 and 6

(3) 6 and 3 (4) 3 and 3

Solution:



52. In the following reaction sequence, X and Z respectively are :



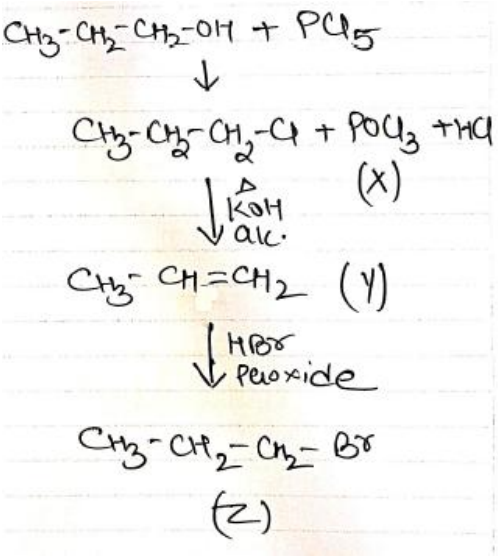
(1) X = $POCl_3$; Z = $CH_3-\underset{\underset{Br}{|}}{CH}-CH_3$

(2) X = H_3PO_3; Z = $CH_3CH_2CH_2-Br$

(3) X = H_3PO_3; Z = $CH_3-\underset{\underset{Br}{|}}{CH}-CH_3$

(4) X = $POCl_3$; Z = $CH_3CH_2CH_2-Br$

Solution:



53. Match List I with List II

	List-I (Transition metal/compound/ complex)		**List-II** (Catalytic Role)
A.	V_2O_5	**I.**	Preparation of ammonia from N_2/H_2 mixture
B.	Fe	**II.**	Polymerisation of alkynes
C.	$PdCl_2$	**III.**	Preparation of H_2SO_4 from SO_2
D.	Ni complex	**IV.**	Oxidation of ethyne to ethanal

Choose the correct answer from the options given below :

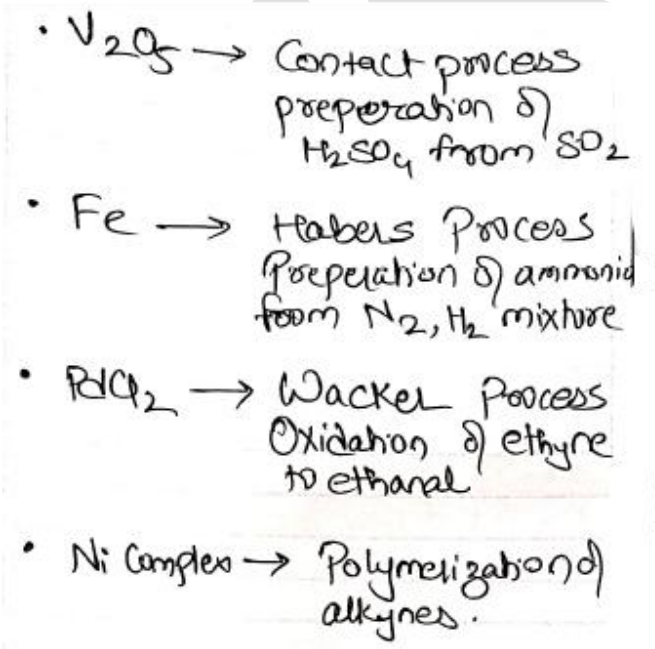
(1) A-III, B-IV, C-I, D-II

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

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

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

Solution:



54. Identify the correct statement about ClF_3 from the following options :

(1) It has a trigonal pyramidal geometry with two lone pairs on Cl atom.

(2) It has T-shaped geometry with two lone pairs on Cl atom.

(3) It has a planar trigonal geometry with two lone pairs on Cl atom

(4) It has T-shaped geometry with three lone pairs on Cl atom.

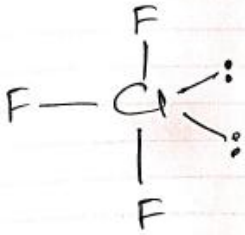
Solution:

$ClF_3 = \frac{1}{2}[V+m-C+A]$

$= \frac{1}{2}[7+3-0+0]$

$= \frac{1}{2}(10)5$

$= sp^3d$



T-shaped geometry with two lone pairs on Cl atom.

55. Calculate emf of the half cell given below :

Pt (s) | H_2 (g, 2 atm) | HCl (aq, 0.02 M)

$E^o_{H_2/H^+} = 0V$

(Given : $\frac{2.303RT}{F} = 0.059$**, log 2 = 0.3010)**

(1) 0.109 V (2) 0.035V

(3) – 0.035 V (4) 0.109V

Solution:

$Pt_{(s)} | H_{2(g, 2atm)} | HCl_{(aq, 0.02M)}$

Anode half cell Reaction

$H_2 \longrightarrow 2H^+ + 2e^-$

Nernst Equation

$$E = E^0_{cell} - \frac{0.0592}{n} \log \left[\frac{[H^+]^2}{P_{H_2}}\right]$$

$$= 0 - \frac{0.0592}{2} \log \left(\frac{(2\times10^{-2})^2}{2}\right)$$

$$= 0 - \frac{0.06}{2} \log \left(\frac{2}{4\times10^{-4}}\right)$$

$$= 0 - \frac{0.06}{2} \left[\log 2 + \log 10^{-4}\right]$$

$$= 0 - 0.03 (0.3 - 4)$$

$$= +0.03 (3.7)$$

$$\boxed{E = 0.111\ V}$$

ie $\boxed{E = 0.109\ V}$

56. Match List I with List II :

	List-I (Order of reaction)		List-II
A.	Zero order	**I.**	$mol^{-1}\ Ls^{-1}$
B.	First order	**II.**	$mol^{-2}\ L^2s^{-1}$
C.	Second order	**III.**	s^{-1}
D.	Third order	**IV.**	$mol\ L^{-1}\ s^{-1}$

Choose the correct answer from the options given below :

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

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

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

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

Solution:

Unit of $K = mol^{1-n}\ L^{n-1}\ s^{-1}$

- 1^{st} order $\Rightarrow mol^{1-1}\ L^{1-1}\ s^{-1}$ $(n=1)$

  $\therefore s^{-1}$ **B-III**
- 0^{th} order $= mol^1\ L^{-1}\ s^{-1}$ $(n=0)$ **A-IV**
- 2^{nd} order $= mol^{-1}\ L^1\ s^{-1}$ **C → I**
- 3^{rd} order $= mol^{-2}\ L^2\ s^{-1}$ **D → II**

57. The calculated 'spin-only' magnetic moment of $Ti^{2+}(3d^2)$ is :

(1) 2.84 BM (2) 5.92 BM

(3) 4.90 BM (4) 3.87 BM

Solution:

$Ti = 22 = [Ar]\ 4s^2\ 3d^2$

$Ti^{+2} = [Ar]\ 4s^0\ 3d^2$

↑	↑				

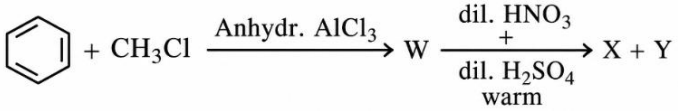
now $\mu = \sqrt{n(n+2)}$

$= \sqrt{2(2+2)}$

$= \sqrt{2(4)}$

$= \sqrt{8} = 2.84 BM$

58. Two products X and Y are formed in the following reaction sequence.



The suitable method that can be used for the separation of products X and Y is :

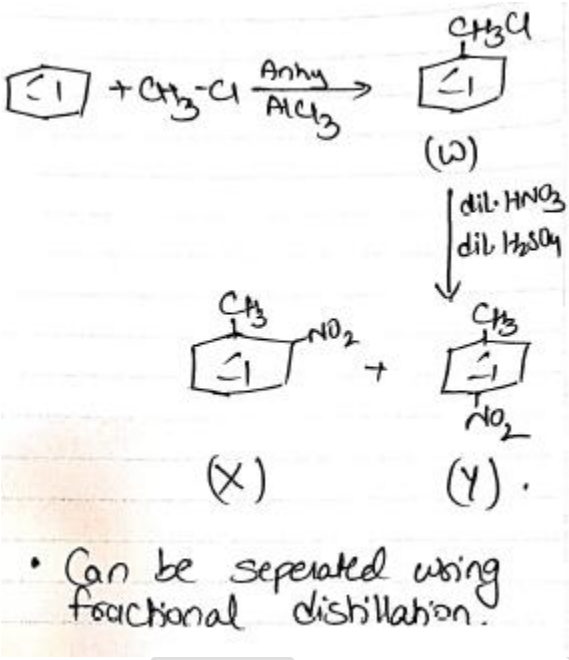
(1) Continuous extraction

(2) Differential extraction

(3) Fractional distillation

(4) Sublimation

Solution:



59. A bulb is rated at 150 watt, converting 8% energy into light. If energy of one photon is 4.42×10^{-19} J, how many photons are emitted by the bulb per second ?

(1) 1.35×10^{19} (2) 4.06×10^{19}

(3) 2.71×10^{19} (4) 27.2×10^{19}

Solution:

60. In a test tube containing a salt, a few drops of dilute H_2SO_4 was added, which gave colourless vapours having the smell of vinegar. The vapours turned the blue litmus paper red.

Identify the correct anion from the following :

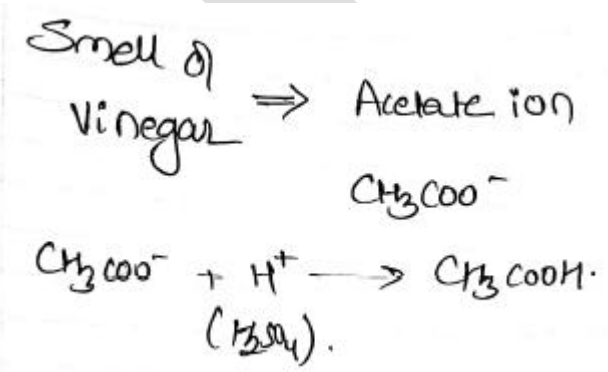
(1) Acetate, CH_3COO^-

(2) Carbonate, CO_3^{2-}

(3) Sulphate, SO_4^{2-}

(4) Sulphide, S^{2-}

Solution:



61. Select the reagents that reduce nitriles to primary amines :

A. (i) $LiAlH_4$; (ii) H_2O

B. Sn + HCl

C. H_2/Ni

D. Na(Hg)/C_2H_5OH

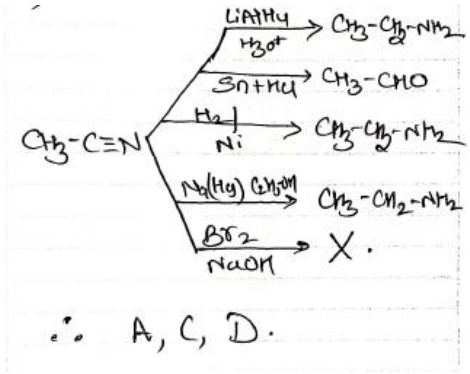
E. Br_2/aq. NaOH

Choose the correct answer from the options given below :

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

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

Solution:



62. Identify the incorrect statement from the following :

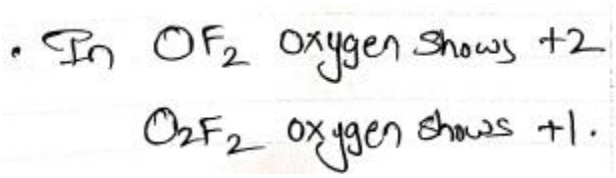
(1) Carbon has the ability to form $p\pi$-$p\pi$ multiple bond with itself.

(2) ECl_3 (E = B and Al) is a monomer when E = B and a dimer when E = Al.

(3) Oxygen exhibits only – 2 oxidation state.

(4) The order of catenation property of Group 14 elements is C >> Si > Ge ≈ Sn.

Solution:



63. Although +3 oxidation state is most common in lanthanoids, cerium still shows +4 oxidation state because :

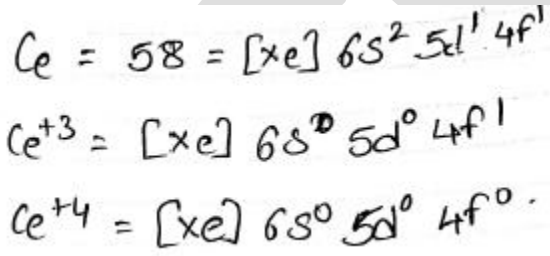
(1) Its nearest inert gas is Radon.

(2) After losing one more electron, it acquires $4f^{14}$ electronic configuration.

(3) Its atomic number is 61

(4) After losing one more electron, it acquires $4f^0$ electronic configuration.

Solution:



64. During Lassaigne's test, the elements present in an organic compound are converted from :

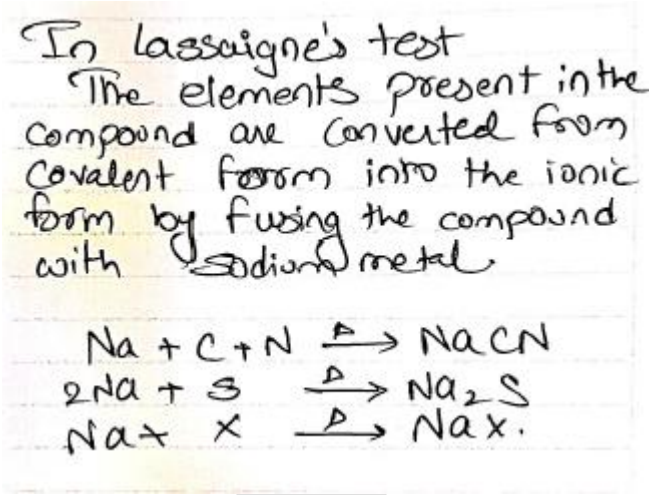
(1) covalent form to covalent form

(2) ionic form to ionic form

(3) covalent form to ionic form

(4) ionic form to covalent form

Solution:



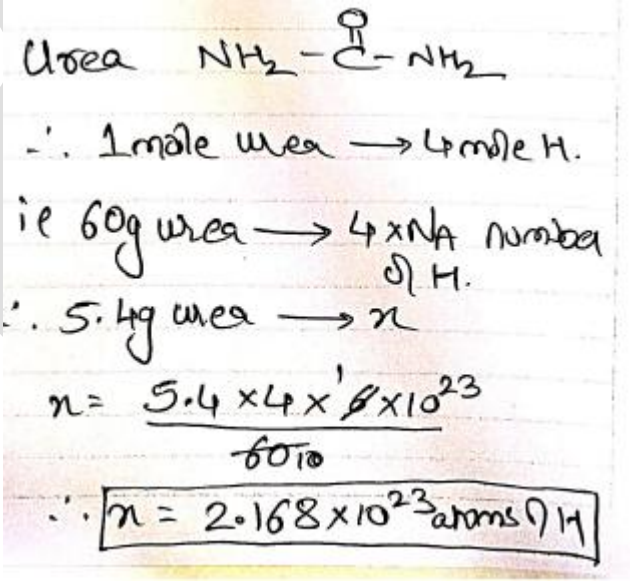
65. The number of hydrogen atoms present in 5.4 g of urea is :

(Given : Molar mass of urea : : 60 g mol^{-1}, N_A : 6.022×10^{23} particles mol^{-1})

(1) 2.168×10^{23} (2) 2.168×10^{22}

(3) 1.084×10^{22} (4) 1.084×10^{23}

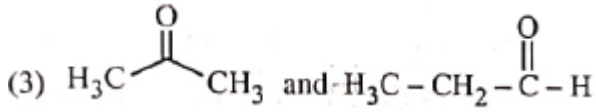
Solution:



66. The pair of molecules that are metamers among the following is :

(1) $CH_3CH_2CH_2OH$ and $CH_3 - CH(OH) - CH_3$

(2) $CH_3OCH_2CH_2CH_3$ and $CH_3CH_2OCH_2CH_3$

(3)  and

(4) $CH_3CH_2CH_2CH_2CH_3$ and $(CH_3)_2CHCH_2CH_3$

Solution:

Metamers :- functional group K aju baju alag alag group.

(a) Positional isomer

(b) Metamers

(c) functional isomer

(d) Chain isomer.

67. Identify the incorrect statement from the following :

(1) $P(C_2H_5)_3$ and $As(C_6H_5)_3$ form $d\pi$-$d\pi$ bond with transition metals.

(2) Nitrogen can form $d\pi$-$p\pi$ bond with oxygen.

(3) Nitrogen can form $p\pi$-$p\pi$ multiple bonds with itself.

(4) Phosphorus, arsenic and antimony show catenation property.

Solution:

• Nitrogen do not have 'd' orbital

& Hence it cannot form $d\pi$-$p\pi$ bond.

68. Phenolphthalein is used as an indicator for the titration of sodium hydroxide solution against a standard solution of oxalic acid. The colour change that is observed at an alkaline pH close to the equivalence point during this titration is :

(1) pinkish red to yellow

(2) yellow to pinkish red

(3) colourless to pink

(4) pink to colourless

Solution:

• Base in Burette

Phenolphthalein + NaOH → Salt

(Colourless) (Pink)

69. Match List I with List II :

	List-I		List-II
A.	C_2H_4	**I.**	3 σ bonds, 2 π bonds
B.	C_2H_2	**II.**	3 σ bonds, one lone pair
C.	CH_4	**III.**	4 σ bonds
D.	NH_3	**IV.**	5 σ bonds, 1 π bond

Choose the correct answer from the options given below :

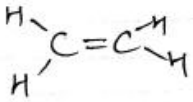
(1) A-IV, B-I, C-III, D-II

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

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

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

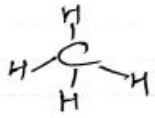
Solution:

a) C_2H_4 

1 π & 5 σ bonds.

b) C_2H_2 $H-C\equiv C-H$

2 π & 3 σ bond

c) CH_4  4 σ bonds

d) NH_3  3 σ bonds & 1 lone pair

70. **At a certain temperature, T (K), during a process, 500 J is absorbed by the system and work of 200 J is done by the system. Then change in internal energy of the system is :**

(1) 700 J (2) 300 J

(3) 400 J (4) 500 J

Solution:

Given: Heat (q) = +500 J.
Work (w) = −200 J.

To find: Change in Internal energy ΔU = ?.

Solution:

$\Delta U = q + w$.

$= 500 + (-200)$

$\therefore \boxed{\Delta U = 300\ J}$

71. **Methane reacts with steam at 1273 K in the presence of nickel catalyst to form**

(1) CO and H_2 (2) CO and H_2O

(3) CO_2 and H_2O (4) CO_2 and H_2

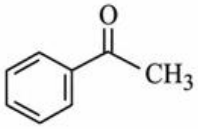
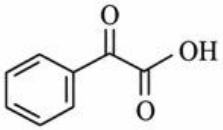
Solution:

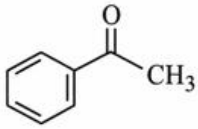
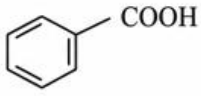
$$CH_4(g) + H_2O(g) \xrightarrow[1273K]{Ni} CO(g) + 3H_2(g)$$

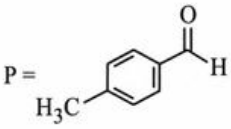
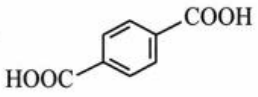
In this process, the mixture of $CO_{(g)}$ and $H_{2(g)}$ is commonly called as "SYN GAS"

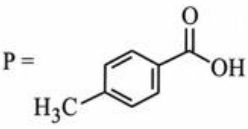
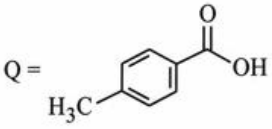
$\therefore$ Answer: CO and H_2.

72. **Compound P (C_6H_8O) gives a red orange precipitate with 2,4-DNP reagent and it does not reduce Fehling's reagent. On drastic oxidation with chromic acid, P gives an aromatic product Q that produces effervescence on treating with aq. $NaHCO_3$. Compounds P and Q, respectively, are :**

(1) P =  Q = 

(2) P =  Q = 

(3) P =  Q = 

(4) P =  Q = 

(2)

Solution:

73. **A solution of copper sulphate is electrolysed for 10 minutes with a current of 1.5 amperes. The mass of copper deposited at cathode is : (Given : Molar mass of Cu = 63 g mol^{-1}; 1 F = 96487 C mol^{-1})**

(1) 2.4036 g (2) 1.7018 g

(3) 0.5876 g (4) 0.2938 g

Solution:

Given: $I = 1.5\ A$.

$t = 10\ mins \rightarrow 10 \times 60\ s$

M.W of Cu = $63\ g\ mol^{-1}$.

$F = 96487\ C\ mol^{-1}$.

$n = 2$.

To find → Wt of Copper.

$W = ?$.

Solution :

$$W = \frac{I \times t}{96487} \times \text{Mole Ratio} \times \text{Molar mass}$$

$$= \frac{1.5 \times 10 \times 60}{96487} \times \frac{1}{2} \times 63$$

$$= \frac{900 \times 63}{96487 \times 2}$$

$$\therefore \boxed{W = 0.2938\ g}$$

74. The functional group that can be identified through phthalein dye test is

(1) Phenolic (2) Alcohol

(3) Aldehyde (4) Carboxylic acid

Solution:

"Functional group identified by "Phthalein Dye" test is PHENOLIC Group.

phenol + phthalic Anhydride $\xrightarrow{Conc\ H_2SO_4}$ phthalein Dye.

Phthalein Dye + dil NaOH → pink/red [phenol test +ve]

∴ Answer: Phenolic.

75. The correct statement with regard to the secondary structure of DNA/RNA is :

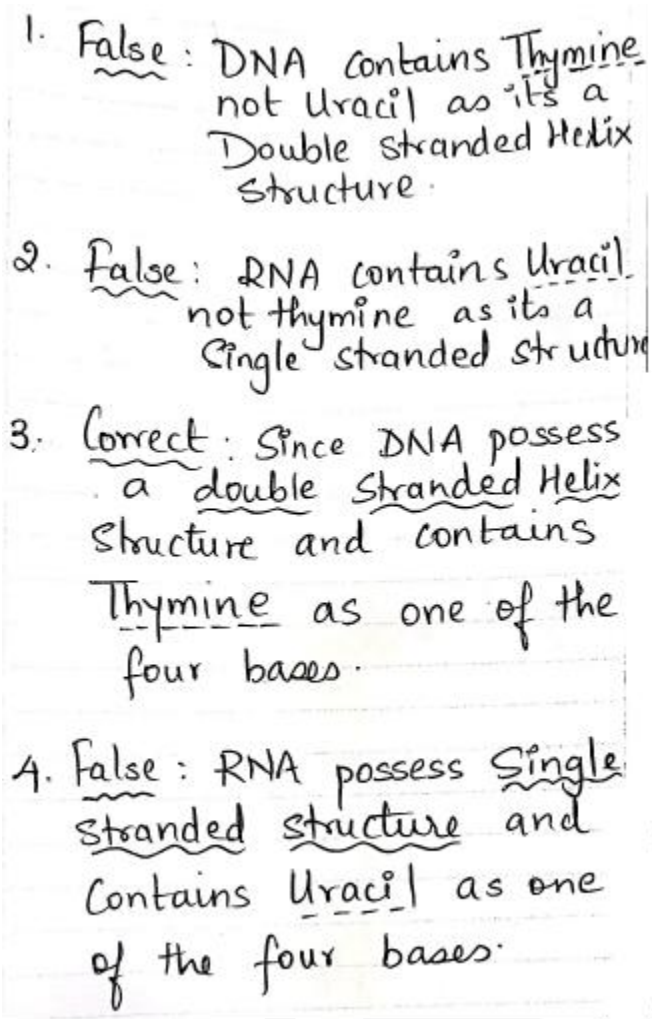
(1) DNA possesses a single strand helix structure and contains uracil as one of the four bases.

(2) RNA possesses a single strand helix structure and contains thymine as one of the four bases.

(3) DNA possesses a double strand helix structure and contains thymine as one of the four bases.

(4) RNA possesses a double strand helix structure and contains uracil as one of the four bases.

Solution:



76. Identify the correct statements :

A. The molality of 2.5 g of ethanoic acid (Molar mass : 60 g mol^{-1}) in 75 g of benzene solution is 0.556 m.

B. The molarity of a solution containing 5 g of NaOH (molar mass : 40 g mol^{-1}) in 450 mL of solution is 0.278 M at 298 K.

C. Aquatic species are more comfortable in cold water.

D. The solubility of gas increases with decrease in pressure.

E. For a binary mixture of A and B, the number of moles of A and B are nA and nB respectively. The mole fraction of B will be

$$x_B = \frac{n_A}{n_A + n_B}$$

Choose the correct answer from the options given below :

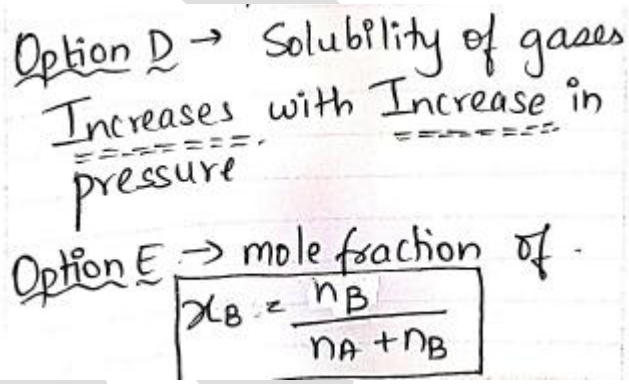
(1) A and C only

(2) A, B and C only

(3) A, D and E only

(4) A and B only

Solution:



77. Mixture of chloroform and acetone forms a solution with negative deviation from Raoult's law due to :

(1) formation of hydrogen bonding between acetone and chloroform.

(2) increase in escaping tendency of molecules of each component.

(3) stronger intermolecular forces between chloroform molecules than those between chloroform and acetone molecules.

(4) repulsive forces.

Solution:

Explaination :

Chloroform ($CHCl_3$) and Acetone ($CH_3-\overset{O}{\overset{\|}{C}}-CH_3$) molecule form Intermolecular H-Bonding with each other.

These interactions are Stronger than A-A and B-B interaction leads to Decrease in Vapour pressure [Negative - Deviation]

78. At 298 K, a certain buffer solution contains equal concentrations of X^- and HX, K_b for X^- is 10^{-10}.

What is the pH of this buffer solution ?

(1) 2 (2) 10

(3) 4 (4) 6

Solution:

$[HX] = [X^-]$.

$K_b = 10^{-10}$

$K_w = K_a \times K_b$

$\therefore K_a = \frac{K_w}{K_b} = \frac{10^{-14}}{10^{-10}} = 10^{-4}$

$\boxed{K_a = 10^{-4}}$

$\therefore pK_a = -\log K_a$

$= -\log 10^{-4} = 4$

Now,

$pH = pK_a + \log\left[\frac{\text{Salt}}{\text{Acid}}\right]$.

$pH = 4 + \log\left[\frac{1}{1}\right]$

$\therefore \boxed{pH = 4}$

79. Identify the incorrect statement from the following :

(1) The IUPAC name of the element with atomic number 107 is Unnilseptium.

(2) The largest and the smallest species among Mg, Mg^{2+}, Al and Al^{3+} are Al and Mg^{2+}, respectively.

(3) The similarity in behaviour of Li with Mg is referred to as 'diagonal relationship'.

(4) The oxidation state and covalency of Al in $[AlCl(H_2O)_5]^{2+}$ are 3 and 6 respectively.

Solution:

Incorrect Statement is opt-2

- Neutral atoms Mg & Al are in period-3.
- Left → Right, nuclear charge increases, pulling electron Closer.

$\therefore$ Mg > Al.

- Mg^{+2} & Al^{+3} are isoelectronic species ($\because$ they have 10 e^-s)

Al^{+3} has high nuclear charge than Mg^{+2}, means it pulls the electron more strongly

$\therefore Mg^{+2} > Al^{+3}$.

Incorrect Statement is opt-2

- Neutral atoms Mg & Al are in period-3.
- Left → Right, nuclear charge increases, pulling electrons closer.

∴ Mg > Al.

- Mg^{+2} & Al^{+3} are isoelectronic species (∵ they have 10 e^-)

Al^{+3} has high nuclear charge than Mg^{+2}, means it pulls the electron more strongly

∴ $Mg^{+2} > Al^{+3}$.

- Cations are always Smaller than parent atoms.

$Mg > Mg^{+2}$, $Al > Al^{+3}$.

Largest species → Mg
Smallest species → Al^{+3}

Overall order: $Mg > Al > Mg^{+2} > Al^{+3}$

80. The correct order of increasing metallic character of Na, Be, P, Mg and Si is :

(1) P < Si < Be < Mg < Na
(2) Be < S < P < Mg < Na
(3) P < S < Na < Mg < Be
(4) P < Mg < Be < Si < Na

Solution:

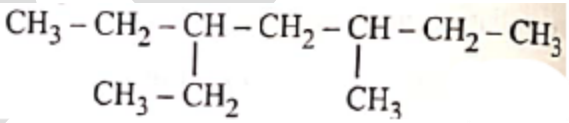
Metallic Character :

- Increases as we move down the group
- Decreases as we move from Left to right

∴ Non metals (P < Si) < period 2-metal (Be) < period 3 metals (Mg < Na)

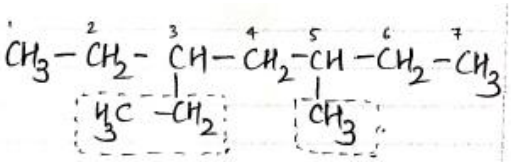
∴ P < Si < Be < Mg < Na.

81. The correct IUPAC name of the following compound is :



(1) 2,4-diethylhexane
(2) 3,5-diethylhexane
(3) 3-ethyl-5-methylheptane
(4) 3-methyl-5-ethylheptane

Solution:



Longest Carbon chain → 7 [Heptane]

Carbon no-3 has Ethyl group as Substituent.

Carbon no-5 has Methyl group as Substituent.

∴ IUPAC name → 3-ethyl-5-methyl heptane.

82. Match List I with List II :

	List-I (Complex/ion)		List-II (Shape/geometry)
A.	$Pt(Cl_2)(NH_3)_2]$	**I.**	Octahedral
B.	$[Co(NH_3)_6]Cl_3$	**II.**	Trigonal bipyramidal
C.	$[NiCl_4]^{2-}$	**III.**	Square planar
D.	$[Fe(CO)_5]$	**IV.**	Tetrahedral

Choose the correct answer from the options given below :

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

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

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

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

Solution:

A] $[Pt(Cl_2)(NH_3)_2]$ → Square planar.

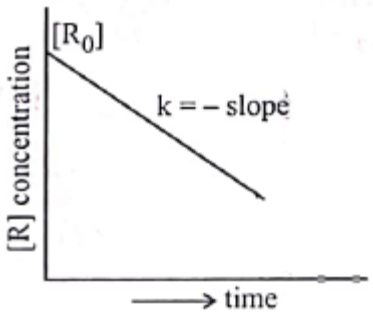
B] $[Co(NH_3)_6]Cl_3$ → Octahedral

C] $[NiCl_4]^{-2}$ → Tetrahedral

4] $Fe(CO)_5$ → Trigonal Bipyramidal

∴ Answer : A-III, B-I, C-IV, D-II.

83. For a certain reaction R → Product, the plot of concentration [R] vs time has a negative slope as shown. The order of reaction is :



(1) 0 (2) 1

(3) 2 (4) 2.5

According to graph;

$k = \frac{A_0 - A_t}{t}$

$\therefore kt = A_0 - A_t$.

$\therefore A_t = A_0 - kt$

$y = c - mx$

∴ The Order of Reaction is Zero

84. Which one of the following is an ambidentate ligand ?

(1) Ethylenediaminetetraacetate ion

(2) Oxalate

(3) Ethane-1,2-diamine

(4) Thiocyanate

Solution:

- Ethylene diammine tetra acetate ion → Hexadentate (6)
- Oxalate → didentate (2)
- Ethane-1, 2 diamine → didentate (2)
- Thiocyanate (SCN^-) → Ambidentate.

Since it can bind either by Sulfur (S) or Nitrogen (N) atoms.

85. Consider the following reaction :

$2A(g) + B(g) \rightarrow 2D(g)$

$\Delta U^\circ = -10$ kJ mol^{-1} and $\Delta S^\circ = -44$ J K^{-1} at 298 K.

Identify the correct option with ΔG° for the reaction and spontaneity of the reaction at 298 K. (Given : R = 8.31 J mol^{-1} K^{-1})

(1) -1.635 kJ mol^{-1}, spontaneous

(2) $+0.63568$ kJ mol^{-1}, non-spontaneous

(3) -0.63568 kJ mol^{-1}, spontaneous

(4) $+1.635$ kJ mol^{-1}, non- spontaneous

Solution:

Given: $\Delta U^\circ = -10\ KJ\ mol^{-1}$

$\Delta S^\circ = -44\ JK^{-1}$

$R = 8.31\ J\ mol^{-1}\ K^{-1}$

To find: $\Delta G^\circ = ?$

Spontaneity = ?

Solution:

$\Delta H^\circ = \Delta U^\circ + \Delta ng\ RT$

$\Delta ng = 2 - (2+1) = -1$

$\therefore \Delta H^\circ = -10,000\ (J\ mol^{-1}) + (-1 \times 8.314 \times 298)$

$\therefore \Delta H^\circ = -12,477.57\ J\ mol^{-1}$

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

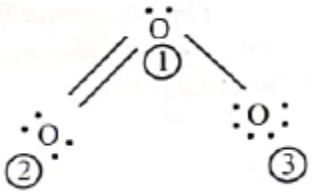
$\Delta G^\circ = -12,477.57 - (298 \times -44)$

$\therefore \Delta G^\circ = +634.42\ J\ mol^{-1}$

or $\Delta G^\circ = +0.635\ KJ\ mol^{-1}$

Since ΔG° is positive $[\Delta G^\circ > 0]$

$\therefore$ Reaction is Non-Spontaneous

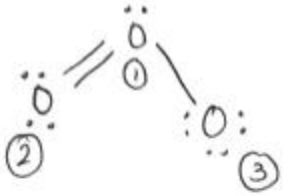


86. **The correct formal charges on oxygen atoms numbered 2, 1 and 3 respectively are :**

(1) $-1, 0, +1$ (2) $0, +1, -1$

(3) $0, 0, 0$ (4) $+1, 0, -1$

Solution:



① → Bonding → 4 [double bond]

nonbonding → 4 [2 L·P]

$\therefore$ F·C = $6 - 4 - \frac{1}{2}(4) = 0$

$\therefore$ **F·C = 0**

② Bonding → 6 [1 double + 1 Single bond

Non-bonding → 2 [1 L·P]

$\therefore$ F·C = $6 - 2 - \frac{1}{2}(6)$

$\therefore$ **F·C = +1**

③ Bonding → 2 [2 single bond]

Non-bonding → 6 [3 L·P]

F·C = $6 - 6 - \frac{1}{2}(2)$

$\therefore$ **F·C = −1**

87. **Given below are certain reactions. Identify the reaction for which $K_p \neq K_c$.**

(1) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

(2) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$

(3) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

(4) $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$

Solution:

$K_p = K_c \cdot (RT)^{\Delta ng}$

1. $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

$\Delta ng = 2 - (1+1) = 0$

$\therefore$ **$K_p = K_c$**

2. $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$

$\Delta ng = 2 - (1+1) = 0$

$\therefore$ **$K_p = K_c$**

3. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

$\Delta ng = 2 - (1+3) = -2$

$\therefore$ **$K_p \neq K_c$**

4. $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$

$\Delta ng = (1+1) - (1+1) = 0$

$\therefore$ **$K_p = K_c$**

Note : $\Delta ng = (\text{no. of moles in product}) - (\text{no. of moles in Reactant})$

88. **Given below is an expression for the rate constant of a first order reaction occurring at a certain temperature, T (K).**

$$\ln k = 14.34 - \frac{1.25\times10^4}{T}$$

The energy of activation in kcal mol^{-1} for the reaction is :

(Given : k in s^{-1}, R = 1.987 cal mol^{-1} K^{-1})

(1) 12.42 (2) 14.34

(3) 18.63 (4) 24.84

Solution:

Given: $R = 1.987$ cal mol^{-1} K^{-1}.

$\ln k = 14.34 - \frac{1.25\times10^4}{T}$.

To find :- E_a = ?

Solution :

Arrhenius Equation is

$\ln k = \ln A - \frac{E_a}{RT}$.

Comparing with.

$\ln k = 14.34 - \frac{1.25\times10^4}{T}$

$\therefore \frac{E_a}{R} = 1.25\times10^4$

$\therefore E_a = 1.25\times10^4 \times R$.

$= 1.25\times10^4 \times 1.987$.

$\therefore E_a \approx 24837.5$ cal mol^{-1}.

$\therefore$ $E_a = 24.84$ kcal mol^{-1}

89. **The following two reactions give the same foul smelling product Z.**

$$C_2H_5Cl \xrightarrow{X} Z$$

$$C_2H_5\overset{\overset{O}{\|}}{C}NH_2 \xrightarrow{Br_2,NaOH} Y \xrightarrow[\Delta]{CHCl_3/\text{ethanolic KOH}} Z$$

X and Z, respectively, are

(1) X = AgCN; Z = C_2H_5CN

(2) X = KCN; Z = C_2H_5CN

(3) X = KCN; Z = C_2H_5NC

(4) X = AgCN; Z = C_2H_5NC

Solution:

• $C_2H_5Cl \xrightarrow{AgCN} C_2H_5NC$

(Ethyl chloride) (Ethyl Isocyanide)

• $C_2H_5-\overset{\overset{O}{\|}}{C}-NH_2 \xrightarrow[NaOH]{Br_2,} C_2H_5-NH_2$

(Propanamide) (Ethanamine)

∵ [Hoffmann Bromamide Degradation].

• $C_2H_5NH_2 \xrightarrow[\Delta]{CHCl_3/\text{ethanolic KOH}} C_2H_5NC$

This reaction is called as Carbylamine Reaction & the product will have a foul smell as a characteristic feature.

∴ X → AgCN

Z → C_2H_5NC

90. Match List I with List II :

	List-I (Complex)		List-II (Type of isomerism)
A.	$[Pt(NH_3)_2Cl_2]$	**I.**	Optical
B.	$[Co(en)_3]^{3+}$	**II.**	Solvate
C.	$[Co(NH_3)_5NO_2]Cl_2$	**III.**	Geometrical
D.	$[Cr(H_2O)_6]Cl_3$	**IV.**	Linkage

Choose the correct answer from the options given below :

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

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

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

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

Solution:

1. $[Pt(NH_3)_2Cl_2]$ → Geometrical Isomerism

2. $[Co(en)_3]^{+3}$ → Optical Isomerism

3. $[Co(NH_3)_5NO_2]Cl_2$ → Linkage Isomerism.

4. $[Cr(H_2O)_6]Cl_3$ → Solvate Isomerism

Answer : A-III, B-I, C-IV, D-II.

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ADWITA MISHRA
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GMC GADCHIROLI
DHANRAJ MISHRA
504/720
97.82%ile

KMC GADCHIROLI
AKSHITA TRIPATHI
504/720
97.82%ile

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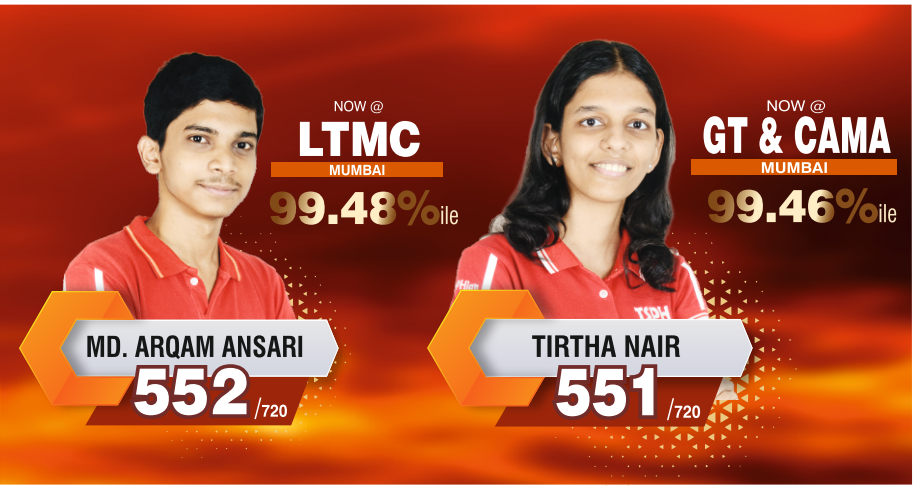

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Kadambari Belekar	GT & CAMA, Mumbai
Ananya Tandle	NYTMC, Karjat
Kalash Mishra	MIMS, Lucknow
Saachi Jadhav	GMC, Ratnagiri
Khushi Chaurasia	SGMC, Gorakhpur
AadityaYadav	SMBT, Igatpuri
Heva Raut	GMC, Alibaug
Tanishk Rai	HIMC, Varanasi
Vidya Chhetiar	ASMC, AP
Amaan Patanwala	JNMC, Belgaum
Zoya Ali Sayed	MGMC, Navi Mumbai
Harshika Dalvi	MGM, Panvel
Akshita Shetty	AJIMC, Mangalore
Preeti Chauhan	SKSMC, Mathura
Vaishnavi Singh	RMC, UP
Hiya Tibrewala	PIMC, Lucknow
Hiral Patel	Naraina, Kanpur
Vaishnavi Agarwal	MGMC, Navi Mumbai
Naina Sahu	PMC, Jharkhand
Archie Sharma	DY Patil, Navi Mumbai
Shreeram Dubey	SRNMC, Allahabad
Palavi Kadam	BVMC, Pune
Anuj Singh	SCMC, Bihar
Krishna Dubey	CMC, Lucknow
Sneha Dubey	TSMMC, Lucknow
Farhan Shaikh	CMC, Lucknow

सपने नही हकीकत बुनते है,
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8652 373 373