

JEE MAIN (Session 2) 2023 Paper Analysis

CHEMISTRY | 12th April 2023 _ Shift-1



MOTION®

PRE-ENGINEERING
JEE (Main+Advanced)

PRE-MEDICAL
NEET

PRE-FOUNDATION
Olympiads/Boards

MYBIZKID
Learn to Lead

CORPORATE OFFICE

"Motion Education" 394, Rajeev Gandhi Nagar, Kota 324005 (Raj.)

Toll Free : 18002121799 | www.motion.ac.in | Mail : info@motion.ac.in

**MOTION
LEARNING APP**



Scan Code
for Demo Class

Continuing to keep the pledge
of **imparting education** for the **last 16 Years**

49600+
SELECTIONS SINCE 2007

JEE (Advanced)

9395

JEE (Main)

26591

NEET/AIIMS

11383

(Under 50000 Rank)

NTSE/OLYMPIADS

2235

(6th to 10th class)

Most Promising RANKS
Produced by MOTION Faculties

Nation's Best SELECTION
Percentage (%) Ratio

NEET / AIIMS

AIR-1 to 10
25 Times

AIR-11 to 50
83 Times

AIR-51 to 100
81 Times

JEE MAIN+ADVANCED

AIR-1 to 10
8 Times

AIR-11 to 50
32 Times

AIR-51 to 100
36 Times

**Student Qualified
in NEET**

(2022)

4837/5356 = **90.31%**

(2021)

3276/3411 = **93.12%**

**Student Qualified
in JEE ADVANCED**

(2022)

1756/4818 = **36.45%**

(2021)

1256/2994 = **41.95%**

**Student Qualified
in JEE MAIN**

(2022)

4818/6653 = **72.41%**

(2021)

2994/4087 = **73.25%**



NITIN VIJAY (NV Sir)
Founder & CEO

SECTION - A

61. Match list I with list II

List I		List II	
A.	Nitrogen oxides in air	I.	Eutrophication
B.	Methane in air	II.	pH of rain water becomes 5.6
C.	Carbon dioxide	III.	Global warming
D.	phosphate fertilisers in water	IV.	Acid rain

Choose the correct answer from the options given below:

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

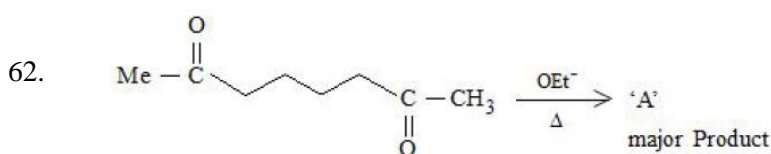
(2) A-I, B-II, C-III, D-IV

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

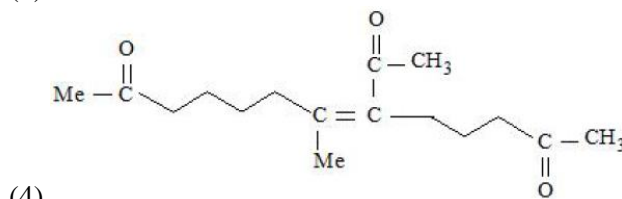
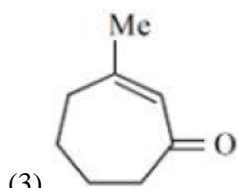
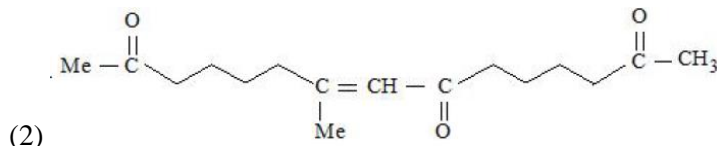
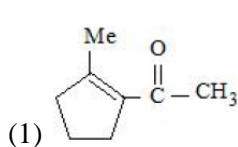
(4) A-IV, B-II, C-III, D-I

Sol. 1

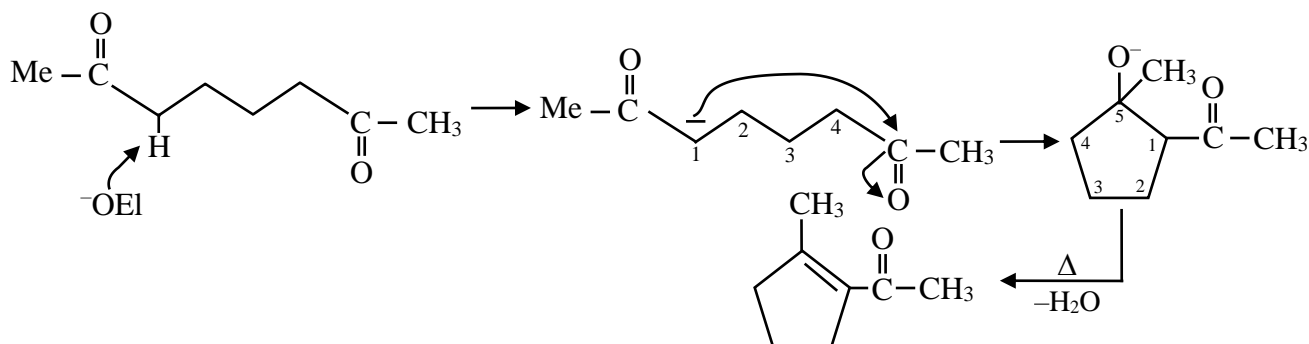
A-IV, B-III, C-II, D-I



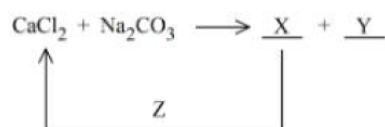
A in the above reaction is :



SOL. 1



63. In the given reaction cycle



X, Y and Z respectively are

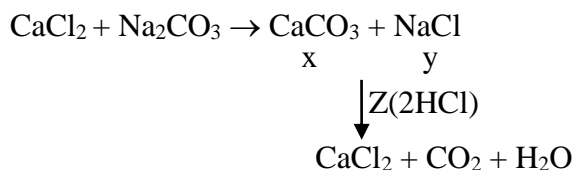
(1) X-CaO, Y-NaCl+CO₂, Z-NaCl

(2) X-CaCO₃, Y-NaCl, Z-HCl

(3) X-CaO₃, Y-NaCl, Z-KCl

(4) X-CaO, Y-NaCl+CO₂, Z-KCl

Sol. 2



64. Given below are two statements :

Statement I : SbCl_5 is more covalent than SbCl_3

Statement II : The higher oxides of halogens also tend to be more stable than lower ones.

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

- (1) Statement I is correct but statement II is incorrect
- (2) Both statement I and statement II are incorrect
- (3) Both statement I and statement II are correct
- (4) Statement I is incorrect but statement II is correct

Sol. 3

$\text{I} \rightarrow \text{SbCl}^{+5}$ is more covalent due to sb in higher 0.5 more covalent due to more charge.

II → Higher oxides of halogen tend to be more stable because higher oxidation states are less reactive and also the size of the atoms are more higher so they are less reactive.

65. A metal chloride contains 55.0% of chlorine by weight . 100 mL vapours of the metal chloride at STP weigh 0.57 g. The molecular formula of the metal chloride is (Given: Atomic mass of chlorine is 35.5u)

- (1) MCl (2) MCl_3 (3) MCl_2 (4) MCl_4

Sol. 3

Molecular. weight of metal chloride

$$= \frac{0.57}{100} \times 22700$$

$$= 129.39$$

$$\text{weight of Cl} = 129.39 \times 0.55$$

$$= 71.1645$$

$$\therefore \text{Mole of Cl} = \frac{71.1645}{35.5} \cong 2$$

Hence MCl_2

66. Four gases A, B, C and D have critical temperature 5.3, 33.2, 126.0 and 154.3K respectively. For their adsorption on a fixed amount of charcoal, the correct order is:

- (1) $D > C > B > A$ (2) $C > B > D > A$ (3) $D > C > A > B$ (4) $C > D > B > A$

Sol. **1**

Extent of adsorption \propto critical temp.

67. The bond order and magnetic property of acetylide ion are same as that of

- (1) N_2^+
(2) O_2^+
(3) NO^+
(4) O_2^-

Sol. 3



Both are diamagnetic because both have absence of unpaired electron.

68. For lead storage battery pick the correct statements
- During charging of battery, PbSO_4 on anode is converted into PbO_2
 - During charging of battery, PbSO_4 on cathode is converted into PbO_2
 - Lead storage battery consists of grid of lead packed with PbO_2 as anode
 - Lead storage battery has ~38% solution of sulphuric acid as an electrolyte

Choose the correct answer from the options given below:

- (1) B, D only (2) B, C only (3) B, C, D only (4) A,B,D only

Sol. 1

Lead storage battery consists of lead anode and a grid of lead packed with lead oxide (PbO_2) as cathode, a 38% solution of H_2SO_4 is used as an electrolyte.

On charging the battery the reaction is reversed and $\text{PbSO}_4(\text{s})$ on anode and cathode is converted into Pb and PbO_2 respectively.

69. Match List I with List II

LIST I Complex		LIST II CFSE (Δ_o)	
A.	$[\text{Cu}(\text{NH}_3)_6]^{2+}$	I.	- 0.6
B.	$[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$	II.	- 2.0
C.	$[\text{Fe}(\text{CN})_6]^{3-}$	III.	- 1.2
D.	$[\text{NiF}_6]^{4-}$	IV.	- 0.4

Choose the correct answer from the options given below:

- (1) A-III, B-IV, C-I, D-II (2) A-II, B-III, C-I, D-IV
(3) A-I, B-IV, C-II, D-III (4) A-I, B-II, C-IV, D-III

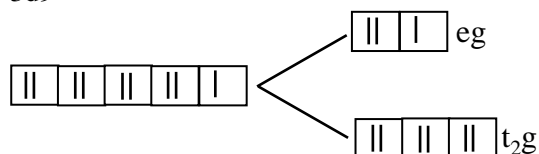
Sol. 3



↑

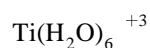


↑



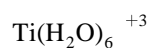
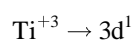
$$\text{CSf} : -0.4 \times 6 + 3 \times 0.6 + \text{xp} \\ - 2.4 + 1.8$$

$$= -0.6$$

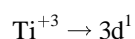


↓

, CFse = - 0.4



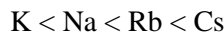
↓



70. The density of alkali metals is in the order

- (1) $\text{Na} < \text{K} < \text{Cs} < \text{Rb}$ (2) $\text{K} < \text{Na} < \text{Rb} < \text{Cs}$
(3) $\text{Na} < \text{Rb} < \text{K} < \text{Cs}$ (4) $\text{K} < \text{Cs} < \text{Na} < \text{Rb}$

Sol. 2



↓

$$D = \frac{\text{Mass}}{\text{volume}} \rightarrow \text{generally dominant}$$

Potassium have extra volume due to presence of vacant 3d.

71. Match List I with List II

LIST I Type of Hydride		LIST II Example	
A.	Electron deficient hydride	I.	MgH ₂
B.	Electron rich hydride	II	HF
C.	Electron precise hydride	III	B ₂ H ₆
D.	Saline hydride	IV	CH ₄

Choose the correct answer from the options given below:

(1) A–II, B–III, C–IV, D–I

(2) A–III, B–II, C–IV, D–I

(3) A–II, B–III, C–I, D–IV

(4) A–III, B–II, C–I, D–IV

Sol. 1

(B₂H₆) – Electron deficient hydride

(HF) – electron rich

CH₄ – electron precise hydride

MgH₂ – saline hydride

72. Match List I with List II

LIST I (Examples)		LIST II (Type)	
A	2-Chloro-1, 3-butadiene	I.	Biodegradable polymer
B.	Nylon 2-nylon 6	II	Synthetic Rubber
C.	Polyacrylonitrile	III	Polyester
D.	Dacron	IV	Addition Polymer

Choose the correct answer from the options given below:

(1) A–IV, B–I, C–III, D–II

(2) A–II, B–IV, C–I, D–III

(3) A–II, B–I, C–IV, D–III

(4) A–IV, B–III, C–I, D–II

Sol. 3

Fact

Topic: metallurgy

Level: M

73. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**
Assertion A : In the Ellingham diagram, a sharp change in slope of the line is observed for $Mg \rightarrow MgO$ at $\sim 1120^\circ C$

Reason R: There is a large change of entropy associated with the change of state

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

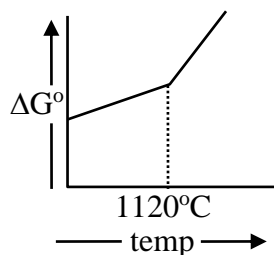
(1) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**

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

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

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

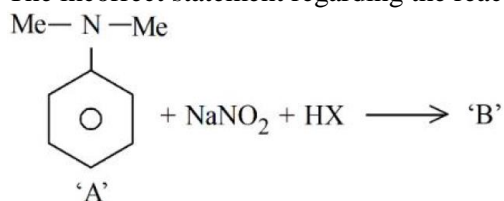
Sol. 4



(A) shape change slope of 1120°C

(R) During state change there is large change in entropy.

74. The incorrect statement regarding the reaction given below is



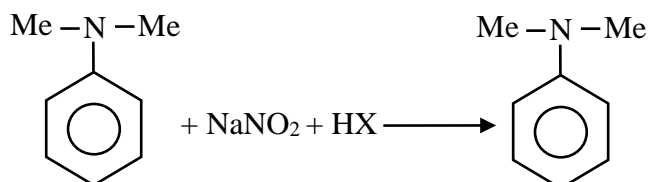
(1) The product 'B' formed in the above reaction is p-nitroso compound at low temperature

(2) 'B' is N-nitroso ammonium compound

(3) The electrophile involved in the reaction is NO^+

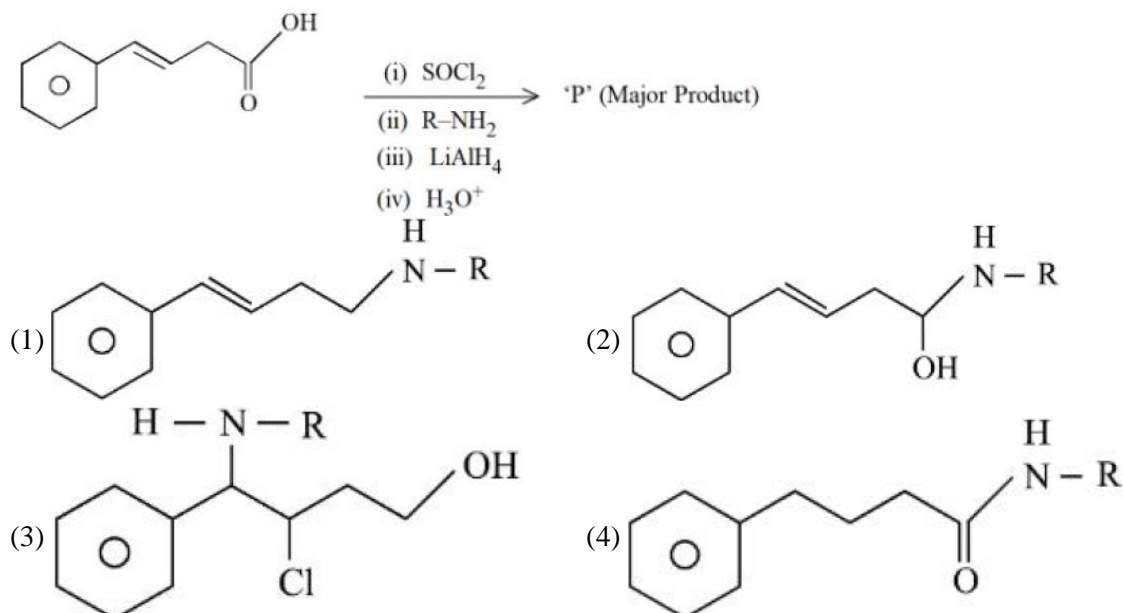
(4) The reaction occurs at low temperature

Sol. 2

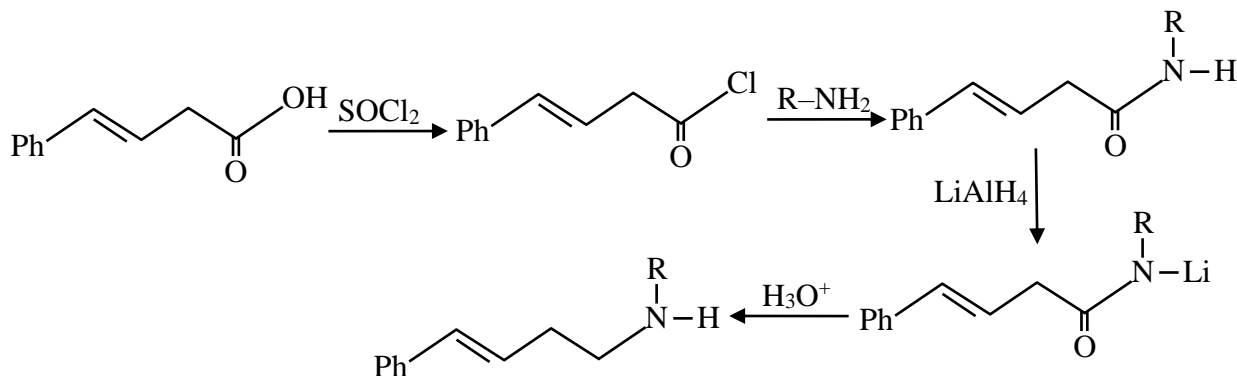


Here electrophile NO^+ attack on para position at low temperature

75. The major product 'P' formed in the following sequence of reactions is



Sol. 1



76. Given below are two statement: one is labelled as **Assertion A** and the other is labelled as **Reason R**
Assertion A: 5f electrons can participate in bonding to a far greater extent than 4f electrons

Reason R: 5f orbitals are not as buried as 4f orbitals

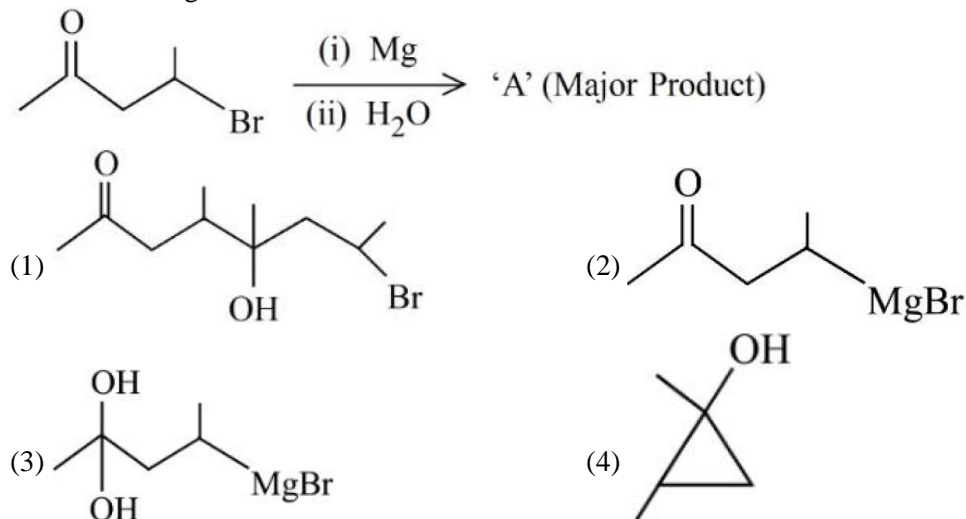
In the light of the above statements, choose the correct answer from the options given below

- (1) Both **A** and **R** are true and **R** is the correct explanation of **A**
- (2) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
- (3) **A** is true but **R** is false
- (4) **A** is false but **R** is true

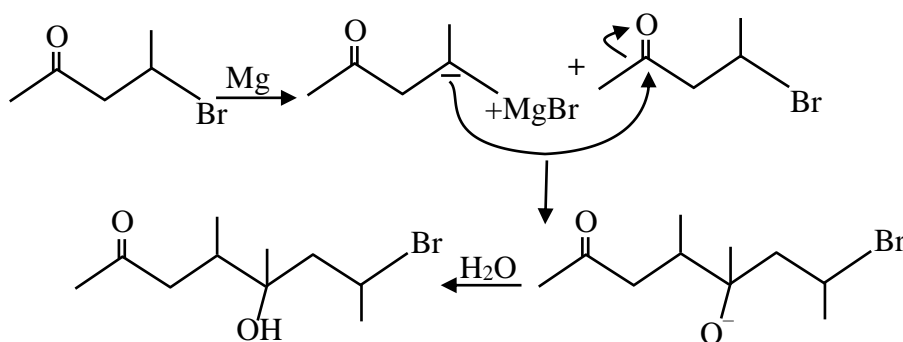
Sol. 1

Due to this reason actinoids participate in more bonding.

77. In the following reaction



Sol. 1



78. Given below are two statements:

Statement I : Boron is extremely hard indicating its high lattice energy

Statement II : Boron has highest melting and boiling point compared to its other group members.

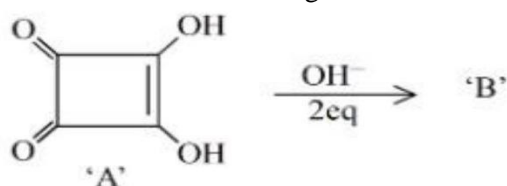
In the light of the above statements, choose the most appropriate answer from the options given below

- (1) Both Statement I and Statement II are incorrect
- (2) Statement I is incorrect but Statement II is correct
- (3) Statement I is correct but Statement II is incorrect
- (4) Both statement I and Statement II are correct

Sol. **4**

Boron has high melting point because small atomic size and very strong crystalline lattice and it forms strong covalent bond with neighboring atoms:

79. Correct statements for the given reaction are :

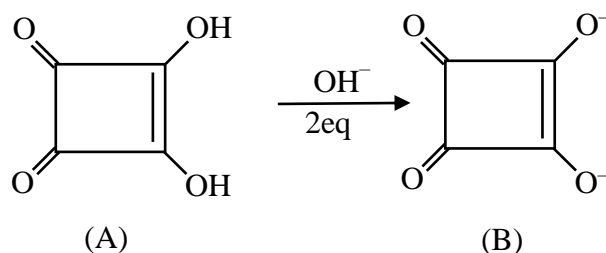


- A. Compound 'B' is aromatic
- B. The completion of above reaction is very slow
- C. 'A' shows tautomerism
- D. The bond lengths of C-C in compound B are found to be same

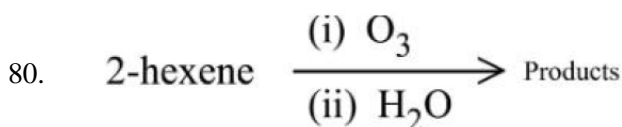
Choose the correct answer from the options given below:

- (1) A, B and C only
- (2) A, C and D only
- (3) B, C and D only
- (4) A, B and D only

Sol. **2**



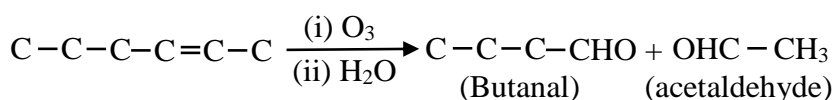
- (i) B is Aromatic
- (ii) Completion of reaction is very fast due to formation of aromatic compound
- (iii) A shows keto-enol tautomerism
- (iv) B is aromatic so C-C bond lengths are same.



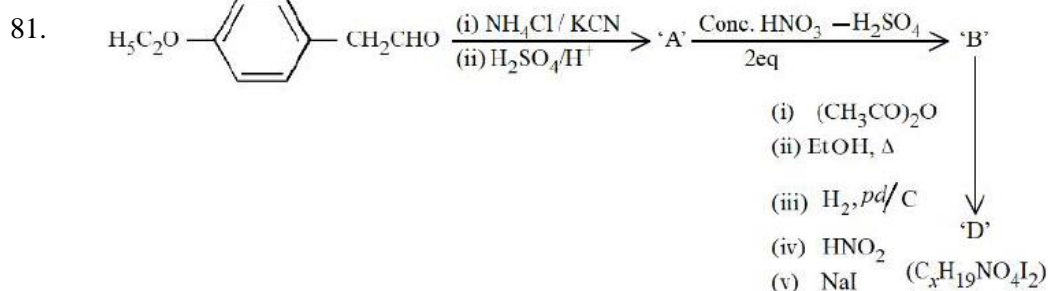
The two products formed in above reaction are -

- (1) Butanal and acetaldehyde
- (2) Butanal and acetic acid
- (3) Butanoic acid and acetaldehyde
- (4) Butanoic acid and acetic acid

Sol. **1**

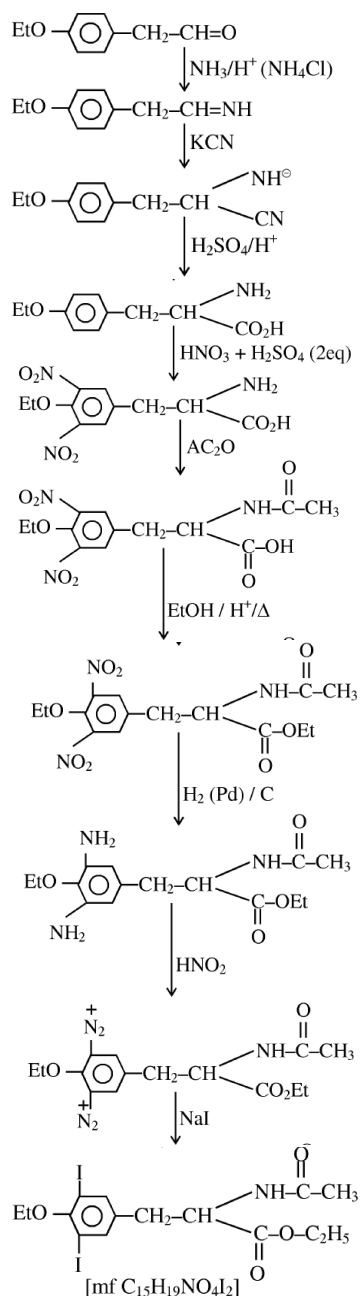


SECTION - B

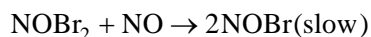
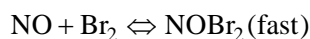


The value of x in compound 'D' is _____

Sol. **15**

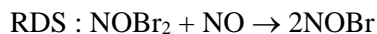


82. The reaction $2\text{NO} + \text{Br}_2 \rightarrow 2\text{NOBr}$ takes places through the mechanism given below:



The overall order of the reaction is _____.

Sol. **3**



$$r = K[\text{NOBr}_2][\text{NO}] \dots\dots(i)$$

$$K_{eq} = \frac{[\text{NOBr}_2]}{[\text{NO}][\text{Br}_2]} \dots\dots(ii)$$

From (i) & (ii)

$$R = K \cdot K_{eq} \cdot [\text{NO}][\text{Br}_2][\text{NO}]$$

$$R = K'[\text{NO}]^2[\text{Br}_2]$$

Overall order = 3

83. At 600 K, the root mean square (rms) speed of gas X (molar mass = 40) is equal to the most probable speed of gas Y at 90 K. The molar mass of the gas Y is _____ gmol^{-1} . (Nearest integer)

Sol. **4**

$$U_{\text{rms X,600}} = U_{\text{mp Y,90}}$$

$$\sqrt{\frac{3 \times R \times 600}{400}} = \sqrt{\frac{2 \times R \times 20}{M}}$$

$$M = 4$$

84. An analyst wants to convert 1L HCl of pH=1 to a solution of HCl of pH 2. The volume of water needed to do this dilution is _____ mL. (Nearest integer)

Sol. **9000**

$$(M_1 \times V_1) = (M_2 \times V_2)$$

$$-1 = -2$$

$$10 \times 1 = 10 \times V_2$$

$$V_2 = 10 \text{ L}$$

$$\text{Water added} = 10 - 1$$

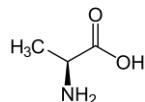
$$= 9 \text{ Litre}$$

$$= 9000 \text{ mL}$$

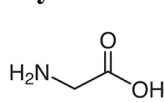
85. In an oligopeptide named Alanylglycylphenyl alanyl isoleucine, the number of sp^2 hybridised carbons is

Sol. **10**

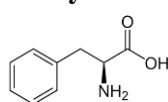
Alanine



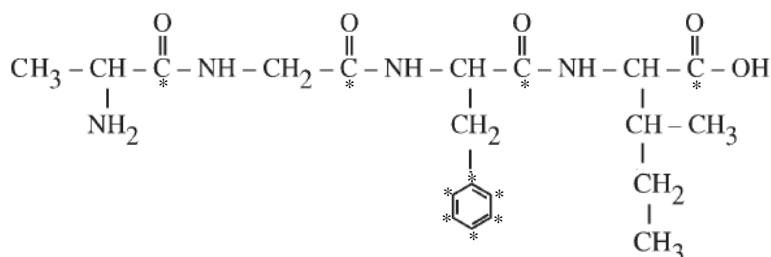
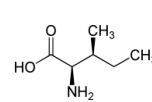
Glycine



Phenyl alanine



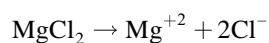
Isoleucine



86. 80 mole percent of MgCl_2 is dissociated in aqueous solution. The vapour pressure of 1.0 molal aqueous solution of MgCl_2 at 38°C is _____ mmHg. (Nearest integer)

Given : Vapour pressure of water at 38°C is 50 mm Hg.

Sol. **48**



$$1 - \alpha \quad \alpha \quad 2\alpha$$

$$i = 1 + 2\alpha (\alpha = 0.8)$$

$$i = 2.6$$

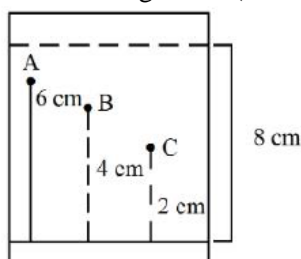
$$\frac{\Delta p}{p^0} = \frac{i \times n_2}{n_1}$$

$$\Delta p = 2.34$$

$$p_s = 47.66$$

$$p_s \cong 48$$

87. Three organic compounds A, B and C were allowed to run in thin layer chromatography using hexane and gave the following result (see figure). The R_f value of the most polar compound is _____ $\times 10^{-2}$.



Sol. **25**

Most polar compound – C – because of lowest moulmerls in upper direction

$$R_f = \frac{\text{Dis tan ce covered by compound}}{\text{Dis tan ce covered by solvent}} = \frac{2}{8} = 0.25 = 25 \times 10^{-2}$$

88. One mole of an ideal gas at 350 K is in a 2.0 L vessel of thermally conducting walls, which are in contact with the surroundings. It undergoes isothermal reversible expansion from 2.0 L to 3.0 L against a constant pressure of 4 atm. The change in entropy of the surroundings (ΔS) is _____ JK^{-1} (Nearest integer)

Given: $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$

Sol. **3**

$$\Delta S_{\text{System}} = nR \ln \left(\frac{V_2}{V_1} \right) = 1 \times 8.314 \ln \left(\frac{3}{2} \right)$$

$$\Delta S_{\text{System}} = 3.37$$

$$\Delta S_{\text{Surr.}} = 3.37$$

89. Values of work function (W_0) for a few metals are gives below

Metal	Li	Na	K	Mg	Cu	Ag
W_0 / eV	2.42	2.3	2.25	3.7	4.8	4.3

The number of metals which will show photoelectric effect when light of wavelength 400 nm falls on it is _____

Given: $h = 6.6 \times 10^{-34} \text{ J s}$

$$c = 3 \times 10^8 \text{ ms}^{-1}$$

$$e = 1.6 \times 10^{-19} \text{ C}$$

Sol. 3

$$E(\text{ev}) = \frac{1240}{400} = 3.1 \text{ ev}$$

Mg, Cu, Ag

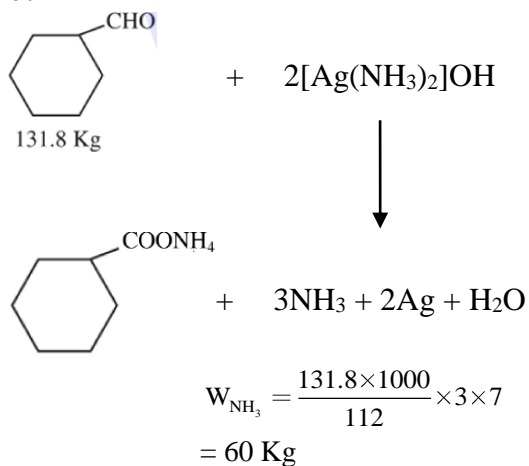
90. The mass of NH_3 produced when 131.8 kg of cyclohexanecarbaldehyde undergoes Tollen's test is _____ kg. (Nearest Integer)

Molar Mass of C = 12 g/mol

N = 14 g/mol

O = 16 g/mol

Sol. 60



Perfect mix of
CLASSROOM Program aided
with technology for sure **SUCCESS.**



Continuing the legacy
for the **last 16 years**



MOTION LEARNING APP

Get 7 days **FREE** trial & experience Kota Learning

MOTION[®]

HAR STUDENT KI CARE

**HAI JAHA
BHAROSA
HAI WAHA!**

मोशन है, तो भरोसा है

JEE | NEET | BOARD | OLYMPIADS



1800 212 1799

ADMISSIONS OPEN

