JEE – Advanced 17th May 2026

Paper 01

Question paper and Solution

CHEMISTRY

SECTION 1 (Maximum Marks: 12)

This section contains **FOUR (04)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated **according to the following marking scheme**:
  Full Marks : +3 If **ONLY** the correct option is chosen;
  Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);
  Negative Marks : –1 In all other cases.

SECTION 2 (Maximum Marks: 16)

- This section contains **FOUR (04)** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme:
  Full Marks : +4 ONLY if (all) the correct option(s) is(are) chosen;
  Partial Marks : +3 If all the four options are correct but ONLY three options are chosen;
  Partial Marks : +2 If three or more options are correct but ONLY two options are chosen, both of which are correct;
  Partial Marks : +1 If two or more options are correct but ONLY one option is chosen and it is a correct option;
  Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered); Negative Marks: —1 In all other cases.
- For example, in a question, if (A), (B) and (D) are the ONLY three options corresponding to correct answers, then
  choosing ONLY (A), (B) and (D) will get +4 marks; choosing ONLY (A) and (B) will get +2 marks; choosing ONLY (A) and (D) will get +2 marks; choosing ONLY (B) and (D) will get +2 marks; choosing ONLY (A) will get +1 mark; choosing ONLY (B) will get +1 mark; choosing ONLY (D) will get +1 mark;
  choosing no option (i.e. the question is unanswered) will get 0 marks; and choosing any other combination of options will get –1 marks.

SECTION 3 (Maximum Marks: 16)

- This section contains **FOUR (04)** questions.
- The answer to each question is a **NUMERICAL VALUE.**
- For each question, enter the correct numerical value corresponding to the answer in the designated place using the mouse and the on-screen virtual numeric keypad.
- If the numerical value has more than two decimal places, **truncate/round-off** the value to **TWO** decimal places.
- Answer to each question will be evaluated according to the following marking scheme:
  Full Marks : +4 If ONLY the correct numerical value is entered in the designated place;
  Zero Marks : 0 In all other cases.

SECTION 4 (Maximum Marks: 16)

- This section contains **FOUR (04)** Matching List Sets.
- Each set has **ONE** Multiple Choice Question.
- Each set has **TWO** lists: List-I and List-II.
- List-I has Four entries (P), (Q), (R) and (S) and List-II has Five entries (1), (2), (3), (4) and (5).
- FOUR options are given in each Multiple Choice Question based on List-I and List-II and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.
- Answer to each question will be evaluated **according to the following marking scheme:**
  Full Marks : +4 ONLY if the option corresponding to the correct combination is chosen;
  Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);
  Negative Marks: –1 In all other cases.

Section 1
Multiple choice questions with one correct alternative

1. An ideal gas (0.5 mol), initially at 2 bar pressure, is compressed at a constant temperature of 600 K in two steps: first, against a constant external pressure of P bar ($2 < P < 8$), and then against constant external pressure of 8 bar. At each step, the compression is stopped only when the pressure of the gas becomes equal to the external pressure. The total work done on the gas in these steps is W. Considering all possible values of P ($2 < P < 8$) and taking the gas constant as R (in J K^{-1} mol^{-1}), the minimum value of |W| (in J) is

   (A) 207 R (B) 600 R (C) 630 R (D) 900 R

   Ans (B)

   n = 0.5 mol T = 600 K P_i = 2 bar

   $$I \xrightarrow[1]{} Int \xrightarrow[\text{step 2}]{} F$$

   Work done in step 1

   $$w_1 = -p_{ex}(V_f - V_i) = -p\left(\frac{nRT}{P} - \frac{nRT}{2}\right) = nRT\left(\frac{P}{2} - 1\right)$$

   Work done in Step 2

   $W_2 = -p_{ex}(V_f - V_i)$

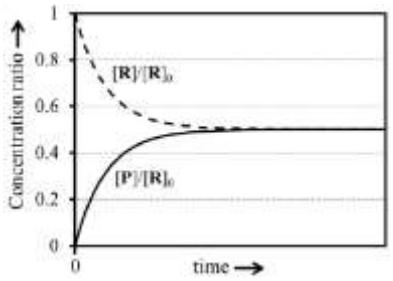
   $$W_2 = -8\left(\frac{nRT}{8} - \frac{nRT}{P}\right) = nRT\left(\frac{8}{P} - 1\right) = nRT\frac{P}{2} - nRT - nRT + nRT\frac{8}{P}$$

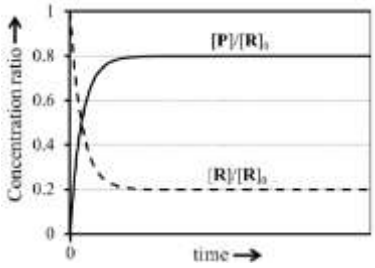
Total work done = $nRT = \left(\frac{P}{2} + \frac{8}{P} - 2\right) = 0.5 \times R \times 600\left(\frac{P}{2} + \frac{8}{p} - 2\right)$

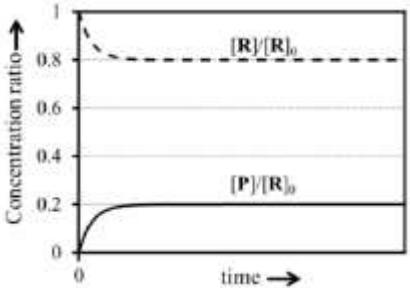
At min work done , $\frac{P}{2} = \frac{8}{P}$ $p = 4$

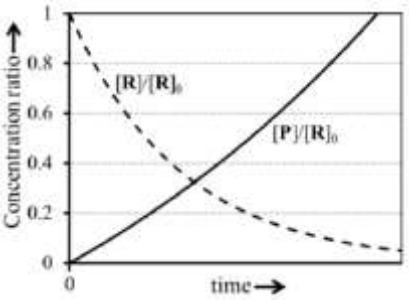
$|W|_{min} = 300\,R(2) = 600\,R$

2. For a reversible reaction **R** $\rightleftharpoons$ **P**, at constant temperature, both the forward and the backward reactions are first order elementary reactions with rate constants k_f and k_b, respectively. At time zero, the concentration of **R** is $[\mathbf{R}]_0$ and the concentration of **P** is zero. At any given time, [**R**] and [**P**] are the concentrations of **R** and **P**, respectively. If $k_b = 4k_f$, the correct graphical representation of the reaction is

(A) 

(B) 

(C) 

(D) 

Ans (C)

$R \underset{k_b}{\overset{k_f}{\rightleftharpoons}} P$

t_0 [R] -

't' [R] [P]

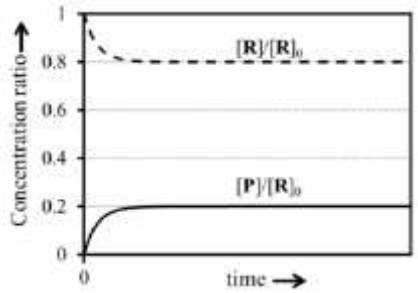
Given $k_b = 4k_f$

$K_c = \frac{k_f}{k_b} \Rightarrow K_c = \frac{k_f}{4k_f}$

$\therefore\ K_c = \frac{1}{4}$

$K_c = \frac{[P]}{[R]} \Rightarrow \frac{1}{4} = \frac{[P]}{[R]}$ $\therefore$ [R] = 4[P]

[R] > [P] $\therefore$ (or) $\frac{[R]}{[R]_0} > \frac{[P]}{[R]_0}$

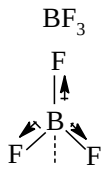


3. The correct order of dipole moments for the given species is

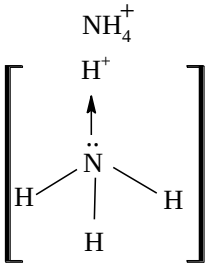
(A) $BF_3 = NH_4^+ < NF_3 < NH_3$ (B) $BF_3 < NH_4^+ < NF_3 < NH_3$

(C) $NH_4^+ < BF_3 < NH_3 < NF_3$ (D) $BF_3 < NH_4^+ < NH_3 < NF_3$

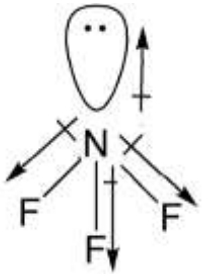
Ans (A)



Trigonal planar dipole moment cancelled out

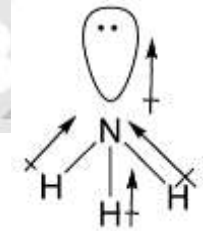


Tetrahedral resultant dipole moment is zero



Due to high eletronegativity of F

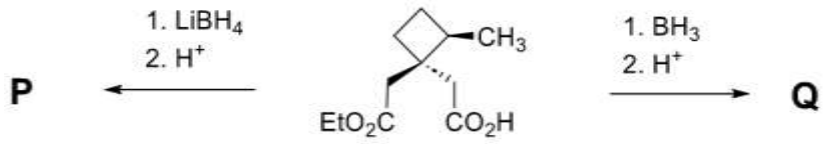
Some dipole moment cancelled out but $\mu \neq 0$

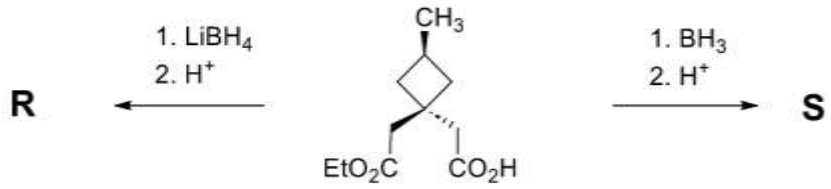


All dipole moments are adding up $\therefore$ has highest dipole moment among the given molecule

$BF_3 = NH_4^+ < NF_3 < NH_3$

4. Considering $LiBH_4$ reduces an ester group to the corresponding alcohol and does not reduce a carboxylic acid group, the correct statement about the major products P, Q. R and S is





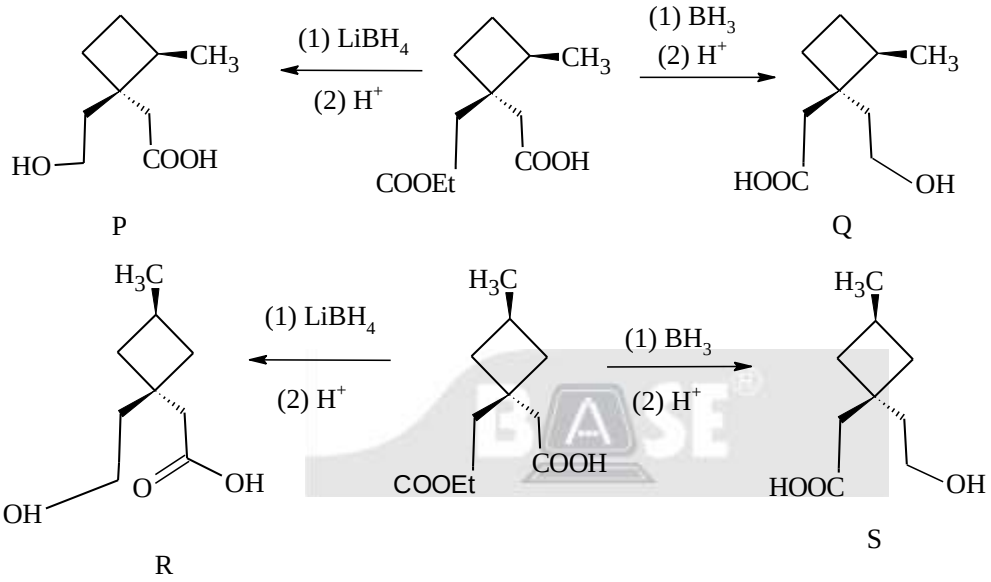
(A) P & Q are identical, and R & S are diastereomers.

(B) P & Q are diastereomers, and R & S are identical.

(C) P & Q are diastereomers, and R & S are diastereomers.

(D) P & Q are identical, and R & S are identical.

Ans (C)



P and Q are diastereomers

R and S are diastereomers

Section - 2
Multiple choice questions with one or more than one correct alternative/s

5. The 2s and the 2p orbital energies of hydrogen atom are $E_{2s}(H)$ and $E_{2p}(H)$, respectively. The 2s and the 2p orbital energies of lithium atom are $E_{2s}(Li)$ and $E_{2p}(Li)$, respectively. The correct option(s) about the orbital energies is(are)

(A) $E_{2s}(Li) < E_{2p}(Li)$ (B) $E_{2s}(H) = E_{2s}(H)$

(C) $E_{2p}(H) = E_{2s}(Li)$ (D) $E_{2s}(H) > E_{2s}(Li)$

Ans (A), (B) and (D)

* for Ie^- atom H, $E_{2s} = E_{2p}$

* for multi e^- atom Li, $E_{2s} < E_{2p}$

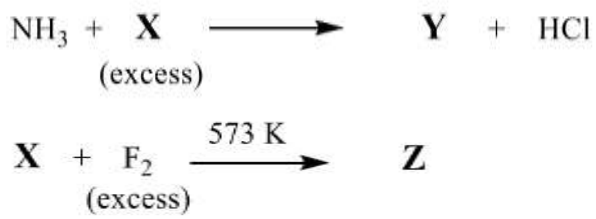
* as Li has 3 protons compare to H has 1P, So, Li attract the 2S e^- more strongly than e^- of 2S in H. So Li has more –ve energy for E_{2s} than energy of E_{2s} of H.

So, E_{2s} H > E_{2S} Li

6. Correct statement(s) about the compounds X, Y and Z is(are)

MnO_2 + Conc. HCl $\rightarrow$ $MnCl_2$ + X + H_2O

(greenish yellow gas)



(A) X is used for sterilizing drinking water.

(B) Y has a planar structure.

(C) Z is used in the enrichment of ^{235}U

(D) Y is a stronger Lewis base than ammonia.

Ans (A) and (C)

$$MnO_2 + 4HCl \longrightarrow MnCl_2 + \underset{X}{Cl_2} + 2H_2O$$

$$NH_3 + \underset{\text{excess}}{3Cl_2} \longrightarrow \underset{Y}{NCl_3} + 3HCl$$

$$Cl_2 + \underset{\text{excess}}{3F_2} \xrightarrow{573\,K} \underset{Z}{2ClF_3}$$

7. Reaction of PtF_6 with oxygen (O_2) gas results in the formation of an ionic compound, X^+Y^-. Correct statement(s) is(are)

(A) The bond order of X is 1.5

(B) Valence d-orbitals of the metal ion in X^+Y^- has 5 electrons.

(C) PtF_6 acts as an oxidant in this reaction.

(D) PtF_6 acts as a fluorinating agent in this reaction.

Ans (B) and (C)

$$PtF_6 + O_2 \rightarrow O_2^+[PtF_6]^-$$

(A) $O_2^+ - \sigma_{1s^2}\sigma^*_{1s^2}\sigma^*_{2s^2}\sigma^*_{2s^2}\sigma^2_{2p_z}\pi^2_{2p_x}\pi^2_{2p_y}\pi^*_{2p_x}$

$$\text{B.O.} = \frac{6-1}{2} = 2.5$$

(B) $[PtF_6]$

Pt – [Xe] $4f^{14}$ $5d^9 6s^1$

x + (–6) = –1

x = +5

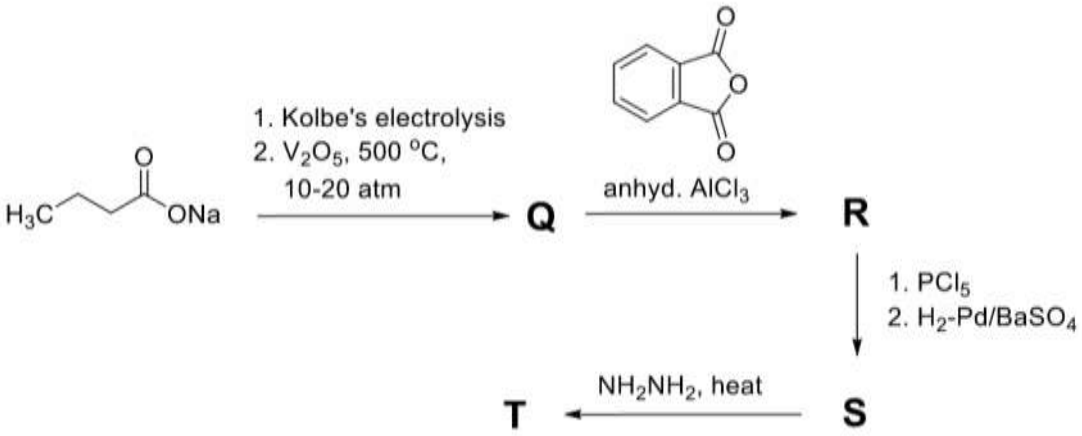
Pt (V) - $[Xe]4f^{14}5d^5$

Valence d orbitals of the metal ion has 5 electrons

(C) PtF_6 acts as an oxidant

(D) PtF_6 acts as a fluorinating agent

8. In the following reaction sequence, Q, R, S and T arc the major products.



The correct statement(s) about Q, R, S and T is(are)

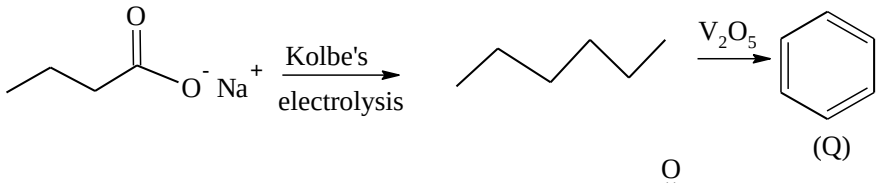
(A) S on warming with ammoniacal $AgNO_3$ results in the formation of silver mirror.

(B) Q on treatment with Cl_2(excess)/UV gives gammaxane.

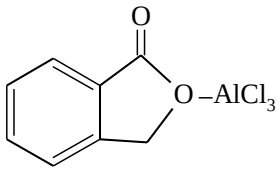
(C) T is a heterocyclic compound.

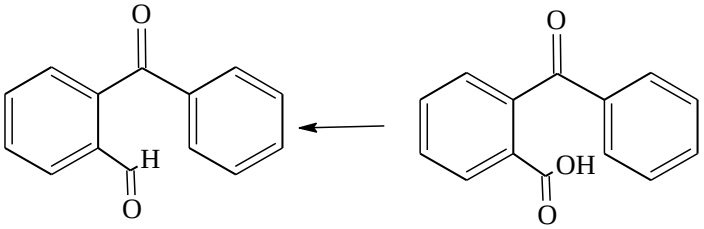
(D) R on acid catalyzed intramolecular cyclization followed by treatment with Zn-Hg/HC1 gives 9,10-dihydroxyanthracene.

Ans (A), (B) and (C)

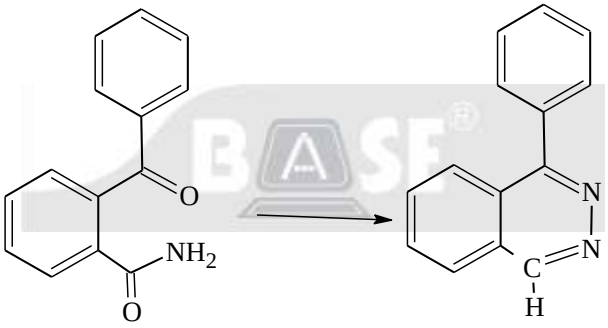

O
O⁻ Na⁺
Kolbe's
electrolysis
V2O5

(Q)

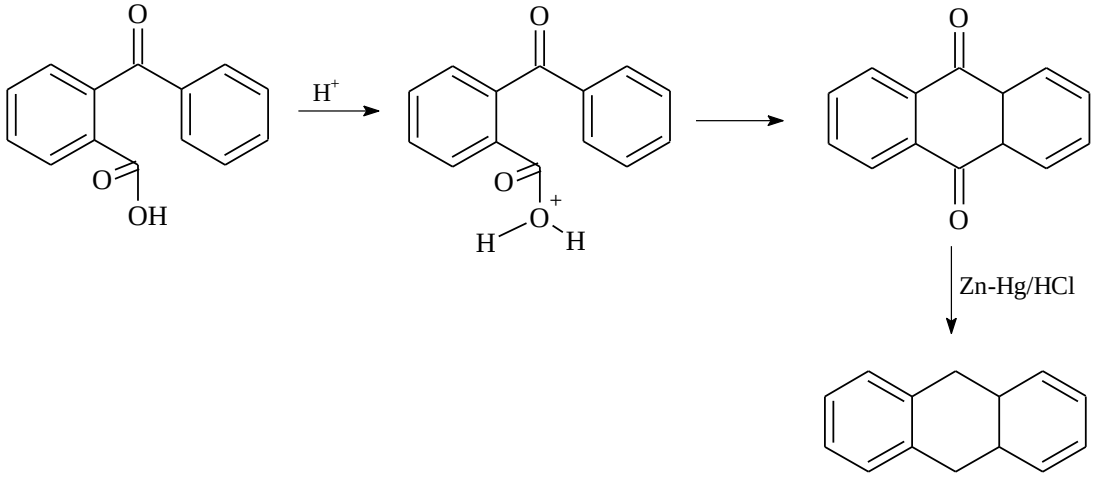

O
O –AlCl3


O
H
O
O
OH
O

(S) (R)


O
NH2
O
N
N
C
H

(T)


O
O
OH
H+
O
O
+
H
H
O
O
Zn-Hg/HCl

Section 3
Numerical problems (Truncate/round off to two decimal places)

9. Two cylinders, both fitted with frictionless pistons, are filled with mixtures of He and Ar gases. In the first cylinder, the masses of He and Ar are m_1 and m_2, respectively. In the second cylinder, the masses of He and Ar are m_2 and m_1, respectively. The molar mass of Ar is 10 times the molar mass of He. The external pressure applied by the piston on the first cylinder needs to be 5 times that on the second cylinder so that the volume of the gas mixtures in both the cylinders are equal at the same temperature. Assuming He and Ar behave like ideal gases, the value of (m_1/m_2) is _____

Ans 9.80

	Cylinder I			Cylinder II	
	He	Ar		He	Ar
w	m_1	m_2	w	m_2	m_1
M	M_{He}	$10M_{He}$	$n_t = n_2 = \frac{m_2}{4} + \frac{m_1}{40}$		
$n_t = n_1 = n_{He} + n_{Ar}$			$P_2 = P_2$		
$= \frac{m_1}{M_{He}} + \frac{m_2}{10M_{He}}$			V and T are constant		
$= \frac{m_1}{4} + \frac{m_2}{40}$					

$$n_1 = \frac{10m_1 + m_2}{40}$$

$P_1 = 5 \times P_2$

$$\frac{5 \times \frac{P}{2}}{P_2} = \frac{10m_1 + m_2}{10m_2 + m_1}$$

$50\ m_2 + 5\ m_1 = 10m_1 + m_2$

$49m_2 = 5m_1$

$$\frac{m_1}{m_2} = \frac{49}{5} = 9.8$$

10. The total number of all possible isomers for the square planar complex with formula $K[M(NCS)(NO_2)(gly)]$ is _____

(M metal ion and gly = $NH_2CH_2COO^-$)

Ans 8.00

It corresponding under the general formula (M(AB)ab)

It has 2 ambidentate ligands NCS and NO_2

So it has linkage isomerism of the combinations

M-NCS and M-NO_2

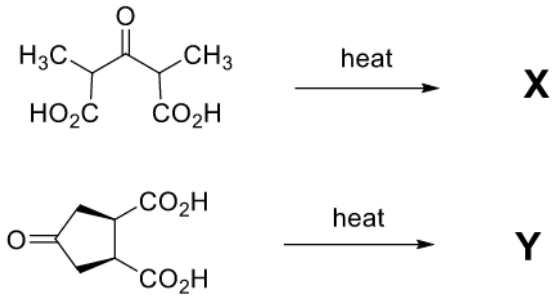
M-NCS and M-ONO

M-SCN and M-NO_2

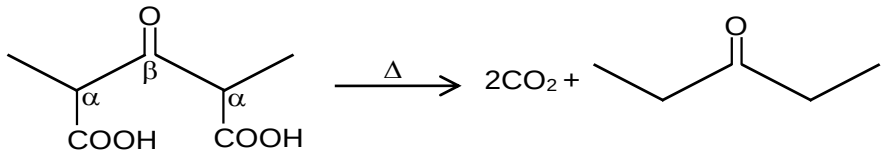
M-SCN and M-ONO

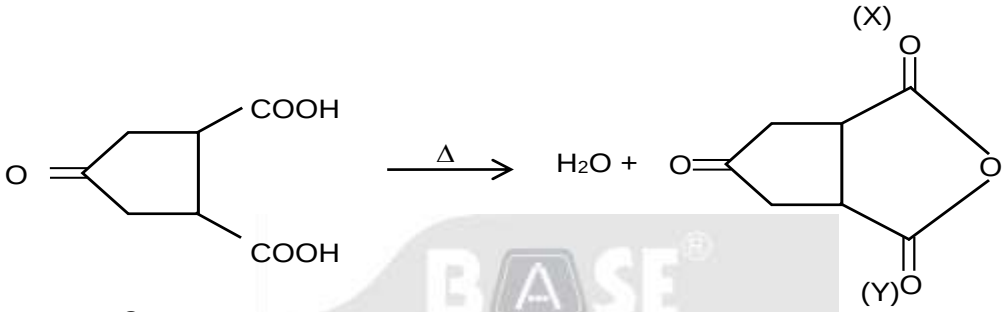
Each case two geometrical. So total $4 \times 2 = 8$ isomers

11. The sum of total number of carbonyl groups (>C=O) present in the major products X and Y in the following reactions is _____



Ans 4.00

(a) 

(b) 

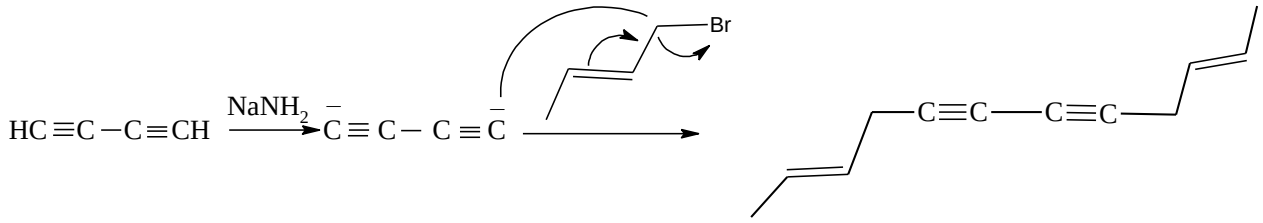
X has one $-\overset{\overset{O}{\|}}{C}-$

Y has 3 $-\overset{\overset{O}{\|}}{C}-$

total $-\overset{\overset{O}{\|}}{C}-$ is 4

12. Treatment of buta-1,3-diyne with $NaNH_2$ (2 equivalents), followed by reaction with excess of trans-CH_3-CH=CH–CH_2–Br gives X as the major product. The maximum number of carbon atoms that are collinear (in a straight line) in X is _____

Ans 6.00



Section 4

Choose the appropriate entry/entries from List II to match each of the entries of the List I. It is possible that an option(s) in List II may be valid more than once, for a given entry in List I.

13. List-I contains various physical/chemical processes, and List-II contains combinations of changes in enthalpy (ΔH) and entropy (ΔS). Match each entry in List-I to the appropriate entry in List-II. and choose the correct option.

List - I		List - II	
(P)	Physisorption	(1)	$\Delta H > 0$ and $\Delta S > 0$
(Q)	Diamond $\rightarrow$ Graphite	(2)	$\Delta H < 0$ and $\Delta S < 0$
(R)	Denaturation of protein	(3)	$\Delta H > 0$ and $\Delta S < 0$
(S)	Propene $\rightarrow$ Cyclopropane	(4)	$\Delta H > 0$ and $\Delta S < 0$
		(5)	$\Delta H < 0$ and $\Delta S > 0$

(A) (P) $\rightarrow$ (2); (Q) $\rightarrow$ (3); (R) $\rightarrow$ (5); (S) $\rightarrow$ (4)
(B) (P) $\rightarrow$ (4); (Q) $\rightarrow$ (3); (R) $\rightarrow$ (5); (S) $\rightarrow$ (1)
(C) (P) $\rightarrow$ (2); (Q) $\rightarrow$ (5); (R) $\rightarrow$ (1); (S) $\rightarrow$ (4)
(D) (P) $\rightarrow$ (2); (Q) $\rightarrow$ (5); (R) $\rightarrow$ (1); (S) $\rightarrow$ (3)

Ans (C)

Physisorption

$\Delta H < 0$

$\Delta H \rightarrow$ –ve (decrease in surface energy appears as heat)

$\Delta S < 0$

$\Delta S \rightarrow$ –ve (decrease in entropy of the system)

$P \rightarrow (2)$

(Q) Diamond $\rightarrow$ graphite

$\Delta H < 0$ $C_{(d)} \rightarrow C_{(g)}$ $\Delta H = -1.9$

$\Delta S > 0 \rightarrow$ diamond is rigid graphite is looser

$Q \rightarrow (5)$

(R) Denaturation of proteins

$R \rightarrow (1)$ $\Delta H > 0$ $\Delta S > 0$

(S) Since cyclopropane is less stable than propene energy is supplied for the conversion and the resulting compound has fewer degrees of freedom it has a lower entropy

14. Consider the following species:
$SOCl_2$, $XeOF_4$, ClF_3, ClF_5, XeF_5^+, SO_3^{2-}, XeF_3^+ XeF3, SF_4

List-I contains different molecular shapes and List-II contains total number of species with same molecular shapes from the given species. Match each entry in List-I with the appropriate entry in List-II and choose the correct option.

List - I		List - II	
(P)	See-saw	(1)	One
(Q)	T-Shaped	(2)	two
(R)	Trigonal Planar	(3)	three

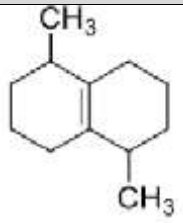
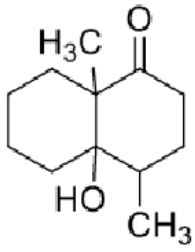
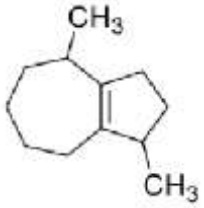
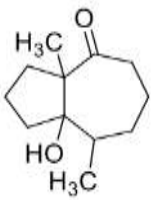
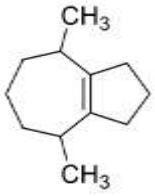
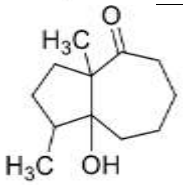
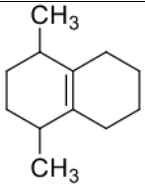
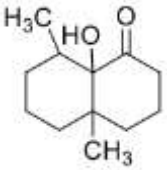
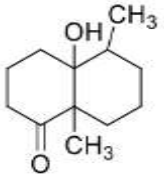
List - I		List - II	
(S)	Square Pyramidal	(4)	four
		(5)	zero

(A) P) → (1); (Q) → (2); (R) → (5); (S) → (3)
(B) (P) → (5); (Q) → (4); (R) → (2); (S) → (3)
(C) (P) → (3); (Q) → (2); (R) → (1); (S) → (4)
(D) (P) → (1); (Q) → (3); (R) → (5); (S) → (4)

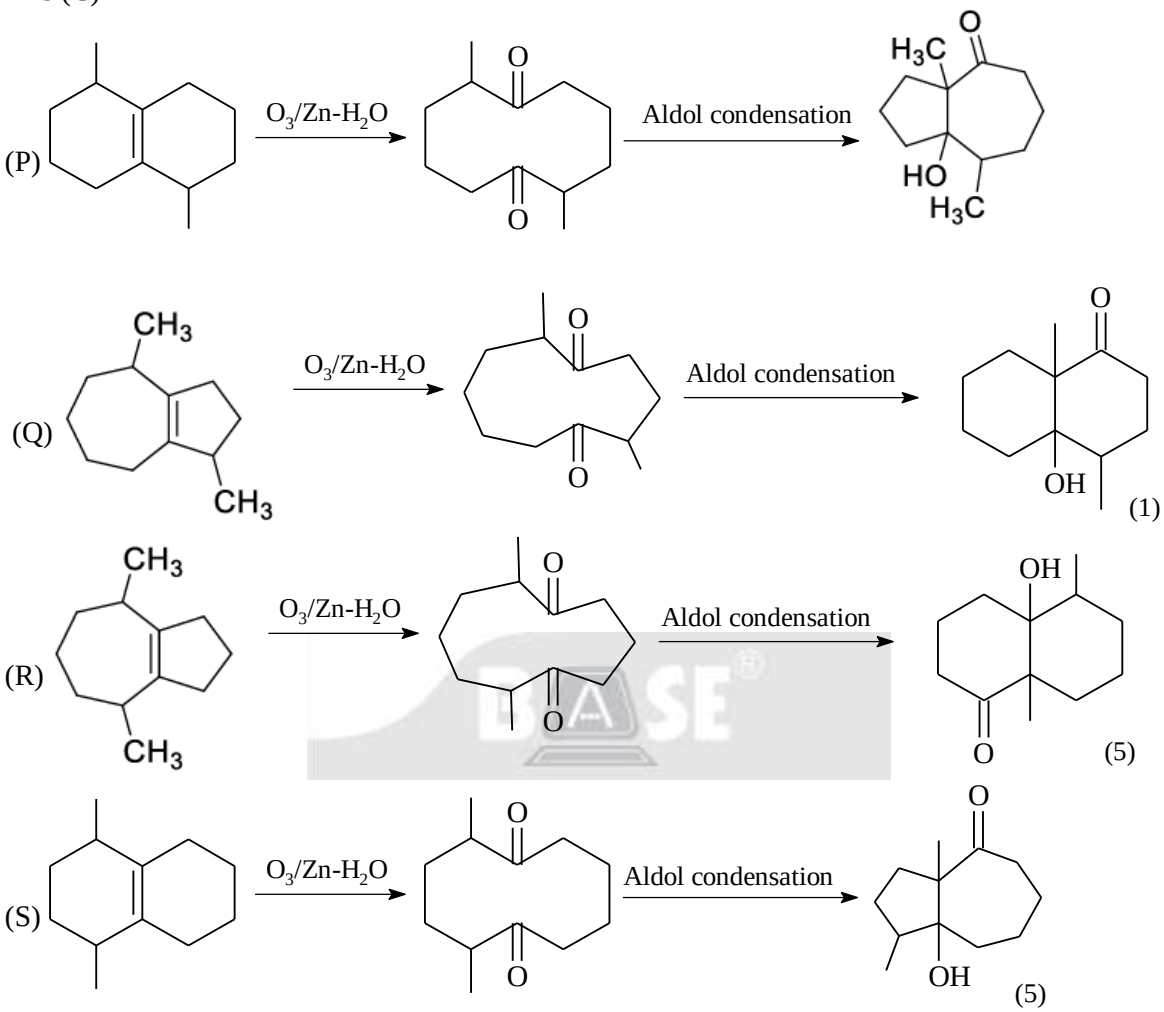
Ans (A)

(P) See-saw : SF_4 (1)
(Q) T-Shape : ClF_3, XeF_3^+ (2)
(R) Trigonal planar: Zero (5)
(S) Square pyramidal: $XeOF_4$, ClF_5, XeF_5^+ (3)

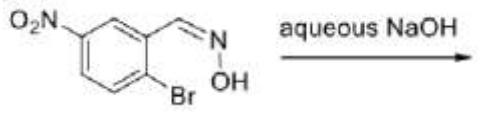
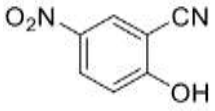
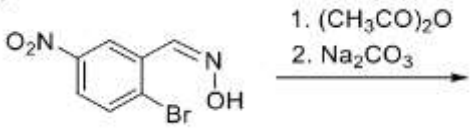
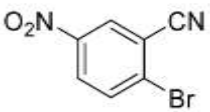
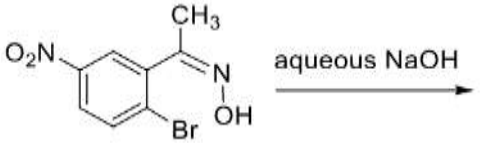
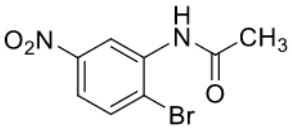
15. The List-II contains products obtained from the reaction of compounds in List-I with O_3/Zn-H_2O followed by cyclization (via more stable enolate) in the presence of aqueous NaOH. Match each entry in List-I with appropriate entry in List-II and choose the correct option.

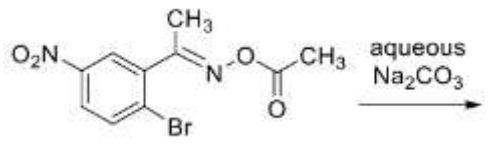
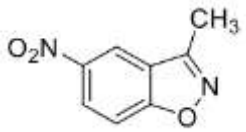
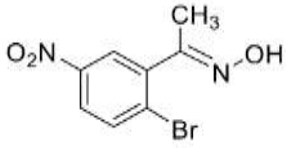
List - I		List - II	
(P)		(1)	
(Q)		(2)	
(R)		(3)	
(S)		(4)	
		(5)	

(A) (P) → (2); (Q) → (4); (R) → (1); (S) → (3)
(B) (P) → (3); (Q) → (4) ; (R) → (5); (S) → (2)
(C) (P) → (3); (Q) → (1) ; (R) → (5); (S) → (3)
(D) (P) → (3); (Q) → (5) ; (R) → (4); (S) → (2)
Ans (C)



16. Match the major products obtained in the reactions given in List-I with the corresponding structures in List-II and choose the correct option.

List - I		List - II	
(P)		(1)	
(Q)		(2)	
(R)		(3)	

List - I		List - II	
(S)		(4)	
		(5)	

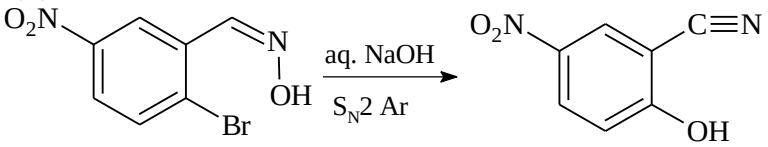
(A) (P) → (2); (Q) → (1); (R) → (5); (S) → (4)

(B) (P) → (1); (Q) → (2) ; (R) → (4); (S) → (5)

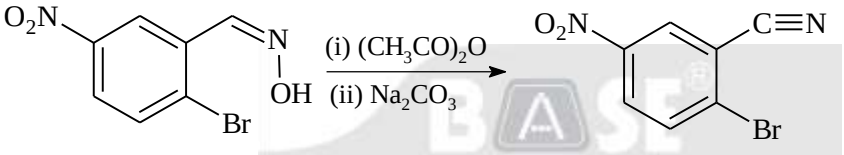
(C) (P) → (1); (Q) → (2) ; (R) → (3); (S) → (4)

(D) (P) → (2); (Q) → (1) ; (R) → (3); (S) → (5)

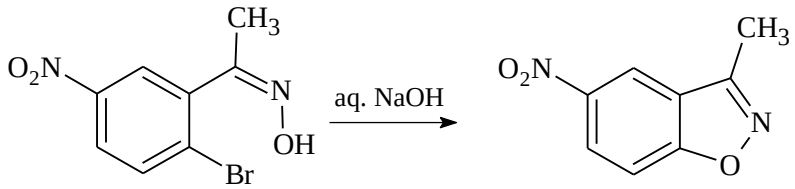
Ans (B)

(P) 

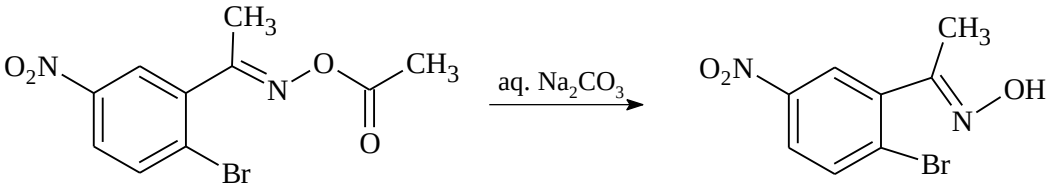
(1)

(Q) 

(2)

(R) 

(4)

(S) 

(5)

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