JEE (ADVANCED) EXAM-2025

CHEMISTRY (PAPER-2)

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.

1. During sodium nitroprusside test of sulphide ion in an aqueous solution, one of the ligands coordinated to the metal ion is converted to

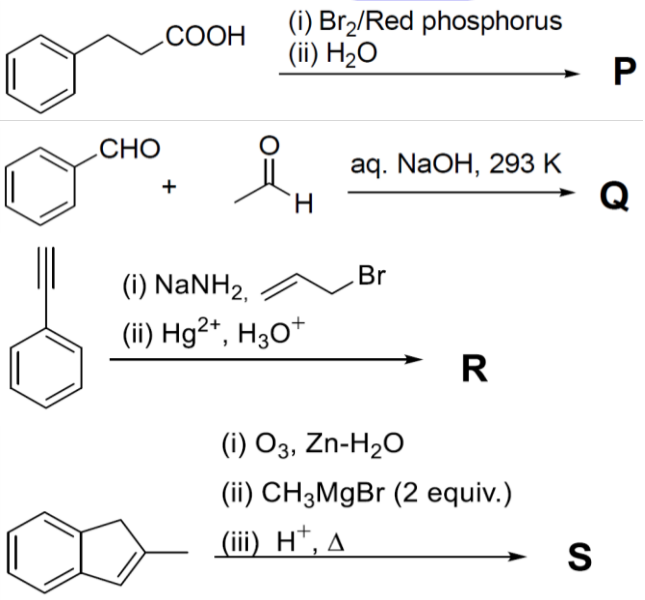
(A) NOS^- (B) SCN^- (C) SNO^- (D) NCS^-

2. The complete hydrolysis of ICl, ClF_3 and BrF_5, respectively, gives

(A) IO^-, ClO_2^- and BrO_3^- (B) IO_3^-, ClO_2^- and BrO_3^-

(C) IO^-, ClO^- and BrO_2^- (D) IO_3^-, ClO_4^- and BrO_2^-

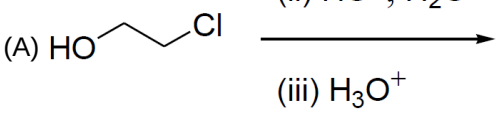
3. Monocyclic compounds $\mathbf{P}, \mathbf{Q}, \mathbf{R}$ and $\mathbf{S}$ are the major products formed in the reaction sequences given below.

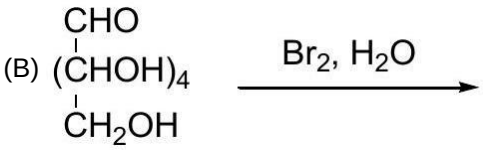


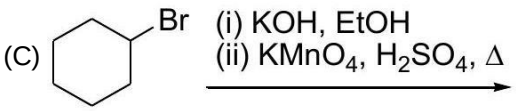
The product having the highest number of unsaturated carbon atom(s) is

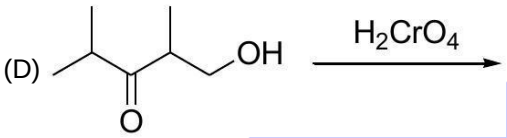
(A) **P** (B) **Q** (C) **R** (D) **S**

4. The correct reaction/reaction sequence that would produce a dicarboxylic acid as the major product is

(A) 

(B) 

(C) 

(D) 

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 : -2 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 -2 marks.

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5. The correct statement(s) about intermolecular forces is(are)

(A) The potential energy between two point charges approaches zero more rapidly than the potential energy between a point dipole and a point charge as the distance between them approaches infinity.

(B) The average potential energy of two rotating polar molecules that are separated by a distance r has $1/r^3$ dependence.

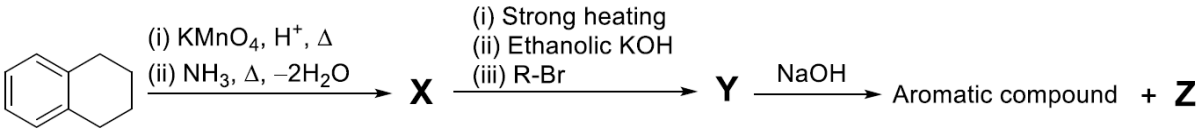
(C) The dipole-induced dipole average interaction energy is independent of temperature.

(D) Nonpolar molecules attract one another even though neither has a permanent dipole moment.

6. The compound(s) with $P-H$ bond(s) is(are)

(A) H_3PO_4 (B) H_3PO_3 (C) $H_4P_2O_7$ (D) H_3PO_2

7. For the reaction sequence given below, the correct statement(s) is(are)



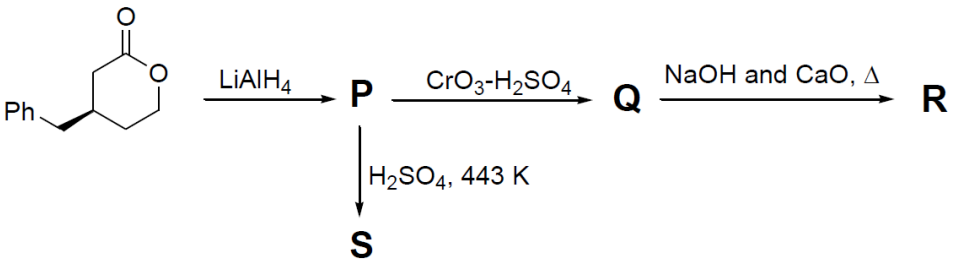
(A) Both $\mathbf{X}$ and $\mathbf{Y}$ are oxygen containing compounds.

(B) $\mathbf{Y}$ on heating with $CHCl_3/KOH$ forms isocyanide.

(C) $\mathbf{Z}$ reacts with Hinsberg's reagent.

(D) $\mathbf{Z}$ is an aromatic primary amine.

8. For the reaction sequence given below, the correct statement(s) is(are)



(A) P is optically active.

(B) S gives Bayer's test.

(C) Q gives effervescence with aq. $NaHCO_3$.

(D) R is an alkyne.

SECTION-3 (Maximum Marks: 32)

- This section contains **EIGHT (08)** questions.
- The answer to each question is a **NUMERICAL VALUE**.
- For each question, enter the correct numerical value of the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.
- 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.

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9. The density (in $\mathrm{gcm^{-3}}$) of the metal which forms a cubic close packed (ccp) lattice with an axial distance (edge length) equal to 400 pm is _____.

Use: Atomic mass of metal $=105.6\mathrm{amu}$ and Avogadro's constant $=6\times10^{23}\,\mathrm{mol^{-1}}$

10. The solubility of barium iodate in an aqueous solution prepared by mixing 200 mL of 0.010 M barium nitrate with 100 mL of 0.10 M sodium iodate is $\mathbf{X}\times10^{-6}\,\mathrm{moldm^{-3}}$. The value of $\mathbf{X}$ is _____.

Use: Solubility product constant (K_{sp}) of barium iodate $=1.58\times10^{-9}$

11. Adsorption of phenol from its aqueous solution on to fly ash obeys Freundlich isotherm. At a given temperature, from $10\mathrm{mgg^{-1}}$ and $16\mathrm{mgg^{-1}}$ aqueous phenol solutions, the concentrations of adsorbed phenol are measured to be $4\mathrm{mgg^{-1}}$ and $10\mathrm{mgg^{-1}}$, respectively. At this temperature, the concentration (in $\mathrm{mgg^{-1}}$) of adsorbed phenol from $20\mathrm{mgg^{-1}}$ aqueous solution of phenol will be _____.

Use: $\log_{10}2=0.3$

12. Consider a reaction $A+R\rightarrow$ Product. The rate of this reaction is measured to be k[A] [R]. At the start of the reaction, the concentration of $R,[R]_0$, is 10 -times the concentration of $A,[A]_0$. The reaction can be considered to be a pseudo first order reaction with assumption that $k[R]=k'$ is constant. Due to this assumption, the relative error (in \%) in the rate when this reaction is 40% complete, is _____.

[k and k' represent corresponding rate constants]

13. At 300 K, an ideal dilute solution of a macromolecule exerts osmotic pressure that is expressed in terms of the height (h) of the solution (density $=1.00\,\mathrm{g\,cm^{-3}}$) where h is equal to 2.00 cm . If the concentration of the dilute solution of the macromolecule is $2.00\,\mathrm{gdm^{-3}}$, the molar mass of the macromolecule is calculated to be $\mathbf{X}\times10^4\,\mathrm{g\,mol^{-1}}$. The value of $\mathbf{X}$ is _____.

Use: Universal gas constant $(R)=8.3\,\mathrm{J\,K^{-1}\,mol^{-1}}$ and acceleration due to gravity $(g)=10\,\mathrm{m\,s^{-2}}$

14. An electrochemical cell is fueled by the combustion of butane at 1 bar and 298 K . Its cell potential is $\frac{\mathbf{X}}{F} \times 10^3$ volts, where F is the Faraday constant. The value of $\mathbf{X}$ is _____.

Use: Standard Gibbs energies of formation at 298 K are: $\Delta_f G^o_{CO_2} = -394\,\text{kJ mol}^{-1}; \Delta_f G^o_{\text{water}} = -237\,\text{kJ mol}^{-1}; \Delta_f G^o_{\text{butane}} = -18\,\text{kJ mol}^{-1}$

15. The sum of the spin only magnetic moment values (in B.M.) of $\left[\text{Mn(Br)}_6\right]^{3-}$ and $\left[\text{Mn(CN)}_6\right]^{3-}$ is _____.

16. A linear octasaccharide (molar mass $= 1024\,\text{g mol}^{-1}$) on complete hydrolysis produces three monosaccharides: ribose, 2-deoxyribose and glucose. The amount of 2-deoxyribose formed is $58.26\%(\text{w/w})$ of the total amount of the monosaccharides produced in the hydrolyzed products. The number of ribose unit(s) present in one molecule of octasaccharide is _____.

Use: Molar mass (in g mol^{-1}) : ribose $= 150$, 2-deoxyribose $= 134$, glucose $= 180$; Atomic mass (in amu): $\text{H} = 1, \text{O} = 16$

NTA FINAL ANSWERS

1.	**(A)**	**2.**	**(A)**	**3.**	**(D)**	**4.**	**(C)**	**5.**	**(C,D)**
6.	**(B, D)**	**7.**	**(A, C)**	**8.**	**(B, C)**	**9.**	**10.85 to 11.1**		
10.	**3.85 to 4.15**	**11.**	**15.5 to 16.5**	**12.**	**4 to 4.25**	**13.**	**2.4 to 2.55**		
14.	**105.4 to 105.6**	**15.**	**7.5 to 7.8**	**16.**	**2**				