

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)



Time Allowed: 2 Hours

Maximum Marks: 35

General Instructions

- (i) This question paper contains **12 questions**. All questions are compulsory.
- (ii) Section A: Questions 1 to 3 are very short answer questions, carrying 2 marks each.
- (iii) Section B: Questions 4 to 11 are short answer questions, carrying 3 marks each.
- (iv) Section C: Questions 12 are case-based questions, carrying 5 marks each.
- (v) Attempt one alternative where an internal choice is provided. Follow the instructions within each question.
- (vi) Use of calculators is not allowed.

Section A

1. Predict the products formed when $\text{CH}_3\text{CH}_2\text{CHO}$ reacts with the following reagents :
(Any two)

(i) PhMgBr and then H_3O^+

(ii) LiAlH_4

(iii) HCN

2. Define molar conductivity for the solution of an electrolyte. How does it vary with concentration?

3. In a reaction $2\text{N}_2\text{O}_5(\text{g}) \rightarrow 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$, the concentration of N_2O_5 decreases from 0.5 mol L^{-1} to 0.4 mol L^{-1} in 10 minutes. Calculate the average rate of this reaction and rate of production of NO_2 during this period.

Section B

4. Account for the following :

- (i) Transition metals and their compounds show catalytic activities.
- (ii) Zn, Cd and Hg are non-transition elements.
- (iii) Zr and Hf are of almost identical atomic radii.

5.

$E^\ominus_{M^{2+}/M}$	Cr	Mn	Fe	Co	Ni	Cu	Zn
	-0.91	-1.18	-0.44	-0.28	-0.25	+0.34	-0.76

From the given $E^\ominus$ values of the first row transition elements, answer the following questions :

- (i) Why is $E^\ominus_{Mn^{2+}/Mn}$ value highly negative as compared to other elements?
- (ii) What is the reason for the irregularity in the above $E^\ominus$ values?
- (iii) Why is $E^\ominus_{Cu^{2+}/Cu}$ value exceptionally positive?

6. (a) Write three differences between Lyophobic sol and Lyophilic sol.

OR

- (b) (i) Write the dispersed phase and dispersion medium of 'milk'.
- (ii) What is the cause of Brownian movement in colloidal particles?
- (iii) Why does physisorption decrease with increase in temperature?

7. (a) Write the equations involved in the following reactions :

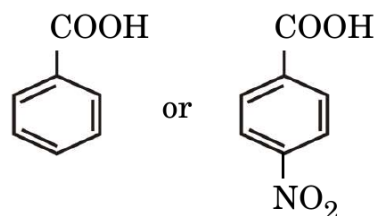
- (i) Cannizzaro reaction
- (ii) Aldol condensation
- (iii) Hell-Volhard-Zelinsky reaction

OR

(b) (i) Which acid of each pair would you expect to be stronger? Give reason.

(I) $F-CH_2-COOH$ or $Cl-CH_2-COOH$

(II)

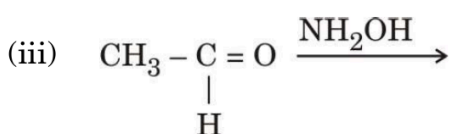
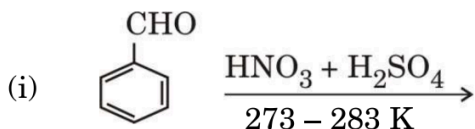


(ii) Distinguish between Propanal and Propanone.

8. A first order reaction takes 30 minutes for 75% decomposition. Calculate $t_{1/2}$.

Given : $[\log 2 = 0.3, \log 3 = 0.48, \log 4 = 0.6, \log 5 = 0.7]$

9. (a) Write the major products in the following :



OR

(b) (i) Oxidation of propanal is easier than propanone. Why?

(ii) How can you distinguish between Acetophenone and Benzophenone?

(iii) Draw the structure of the following derivative : 2,4-Dinitrophenylhydrazone of Propanone.

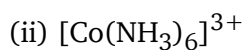
10. Calculate the emf of the following cell :



Given : $E^\circ_{\text{Zn}^{2+}/\text{Zn}} = -0.76 \text{ V}$ and $E^\circ_{\text{Ag}^+/\text{Ag}} = +0.80 \text{ V}$

$[\log 2 = 0.3010, \log 3 = 0.4771, \log 10 = 1]$

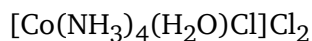
11. (a) Write the hybridisation and magnetic character of the following complexes :



[Atomic number : Ni = 28, Co = 27, Fe = 26]

OR

(b) (i) Write the IUPAC name of the following complex :



(ii) What is the difference between an Ambidentate ligand and a Bidentate ligand?

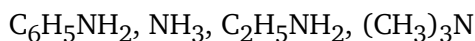
(iii) Out of $[\text{Fe}(\text{NH}_3)_6]^{3+}$ and $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$, which complex is more stable and why?

12. Read the following passage and answer the questions that follow :

Amines constitute an important class of organic compounds derived by replacing one or more hydrogen atoms of ammonia molecule by alkyl/aryl groups. Amines are usually formed from nitro compounds, halides, amides, etc. They exhibit hydrogen bonding which influences their physical properties. Alkyl amines are found to be stronger bases than ammonia. In aromatic amines, electron releasing and withdrawing groups, respectively increase and decrease their basic character. Reactions of amines are governed by availability of the unshared pair of electrons on nitrogen. Influence of the number of hydrogen atoms at nitrogen atom on the type of reactions and nature of products is responsible for identification and distinction between primary, secondary and tertiary amines. Reactivity of aromatic amines can be controlled by acylation process.

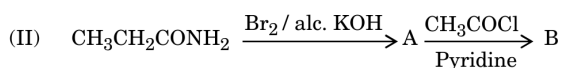
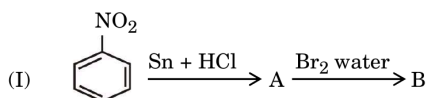
(i) Why does aniline not give Friedel-Crafts reaction?

(ii) Arrange the following in the increasing order of their pK_b values :



(iii) How can you distinguish between $CH_3CH_2NH_2$ and $(CH_3CH_2)_2NH$ by Hinsberg test?

(iv) (a) Write the structures of A and B in the following reactions :



OR

(b) How will you convert the following :

(I) Benzoic acid to aniline

(II) Aniline to p-bromoaniline

- End of Question Paper -