

Class XII | Session 2026-27
Subject - Chemistry
Sample Question Paper - Set 1

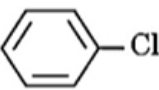
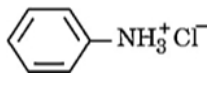
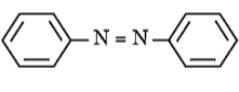
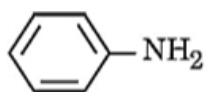
General Instructions:

Read the following instructions carefully.

1. There are **33** questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed.**

Section A

1. Name the following compound as per the IUPAC system [1]

$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{C} = \text{CH} - \text{CH}_3 \\ | \quad | \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$$
 - a) 3, 4, 4 - trimethylpent - 2 - ene
 - b) 2, 2, 3 - trimethylpent - 4 - ene
 - c) 4 diethyl, 2 - ethyl pentene
 - d) 2 diethyl, 3 - ethyl pentene
2. On hydrolysis, which of the following carbohydrates gives only glucose? [1]
 - a) Lactose
 - b) Starch
 - c) Sucrose
 - d) Fructose
3. When nitrobenzene is heated with tin and concentrated HCl, the product formed is: [1]
 - a) 
 - b) 
 - c) 
 - d) 
4. What kind of compounds undergo Cannizaro reactions? [1]
 - a) Aldehydes with no α -hydroge
 - b) Ketones with no α -hydrogen
 - c) Carboxylic acids with α -hydrogen
 - d) Aldehydes with α -hydrogen
5. The rate law for a particular reaction is given as rate = $k[A][B]^2$. [1]

a) becomes half ($\frac{1}{2}$) b) four times
c) three times d) two times

Column I	Column II
(a) Solution of gas in gas	(i) Brass
(b) Solution of solid in solid	(ii) Air
(c) Solution of liquid in gas	(iii) Zinc amalgam
(d) Solution of liquid in solid	(iv) Chloroform in Nitrogen

7. Carbon tetrachloride has a dipole moment: [1]

8. The interstitial compounds of transition metals are [1]

9. Consider the reaction

a) $\frac{d[NH_3]}{dt} = -\frac{3}{2} \frac{d[H_2]}{dt}$ b) $\frac{d[NH_3]}{dt} = -\frac{1}{3} \frac{d[H_2]}{dt}$
c) $\frac{d[NH_3]}{dt} = -\frac{2}{3} \frac{d[H_2]}{dt}$ d) $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

a) Sodium hydroxide solution
b) 2, 4 – DNP reagent
c) Hydrazine
d) Tollen's reagent

a) ethers
b) alkyl halides
c) aldehydes
d) alcohols

a) Sn and HCl b) LiAlH₄

c) H₂/Ni d) Fe and HCl

a) Both A and R are true and R is the correct explanation of A b) Both A and R are true but R is not the correct explanation of A

explanation of A.

correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

14. **Assertion (A):** Isobutanal does not give the iodoform test.

[1]

Reason (R): It does not have alpha-hydrogen.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

15. **Assertion (A):** In monohaloarenes, further electrophilic substitution occurs at ortho and para positions.

[1]

Reason (R): Halogen atom is a ring deactivator.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

16. **Assertion (A):** The boiling point of ethanol is higher than that of dimethyl ether.

[1]

Reason (R): Ethanol molecules are associated through hydrogen bonding whereas in dimethyl ether, it is not possible.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Section B

17. Visha took two aqueous solutions — one containing 7.5 g of urea (Molar mass = 60 g/mol) and the other containing 42.75 g of substance Z in 100 g of water, respectively. It was observed that both the solutions froze at the same temperature. Calculate the molar mass of Z.

[2]

OR

Why are aquatic species more comfortable in cold water in comparison to warm water?

18. What is the basis of formation of spectro-chemical series?

[2]

19. Transition metals can act as catalysts because these can change their oxidation state. How does Fe(III) catalyze the reaction between iodide and persulphate ions?

[2]

20. **Answer the following:**

[2]

(a) a. In a reaction, if the concentration of reactant X is tripled, the rate of reaction becomes twenty-seven times. What is the order of the reaction?

[1]

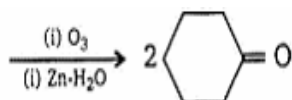
b. State a condition under which a bimolecular reaction is kinetically a first-order reaction. Give an example of such a reaction.

(b) For which type of reactions, order and molecularity have the same value?

[1]

21. Complete the synthesis by giving missing starting material.

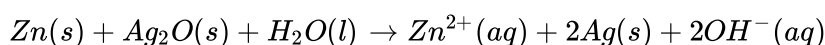
[2]



Section C

22. In the button cell widely used in watches and other devices the following reaction takes place:

[3]



Determine $\Delta_r G^{(-)}$ and $E^{(-)}$ for the reaction

Given $Zn \rightarrow Zn^{2+} + 2e^{-}$, $E^0 = 0.76V$

Given $Ag \rightarrow Ag^{+} + 2e^{-}$, $E^0 = 0.344V$

23. A reaction is first order in A and second order in B. [3]
- Write the differential rate equation.
 - How is the rate affected on increasing the concentration of B three times?
 - How is the rate affected when the concentrations of both A and B are doubled?
24. A compound 'A' with molecular formula $C_4H_{10}O$ on oxidation forms compound 'B' gives positive iodoform test [3] and on reaction with CH_3MgBr followed by hydrolysis gives (c). Identify A, B & C.

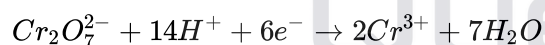
OR

How can you convert the following?

- Phenol to o-hydroxybenzaldehyde.
 - Methanal to ethanol
 - Phenol to phenyl ethanoate.
25. i. Illustrate the following reaction giving suitable chemical equations: Cannizzaro reaction. [3]
- ii. How would you bring about the following conversions? Write the complete equations in each case.
- Ethanal to 3-hydroxybutanal
 - Benzaldehyde to benzophenone
26. Calculate the potential of hydrogen electrode in contact with a solution whose PH is 10. [3]
27. Tert-Butylbromide reacts with aq. NaOH by S_N1 mechanism while n-butylbromide reacts by S_N2 mechanism. [3]

Why?

28. Consider the reaction: [3]



What is the quantity of electricity in coulombs needed to reduce 1 mol of $Cr_2O_7^{2-}$?

Section D

29. Read the following text carefully and answer the questions that follow: [4]

Transition metals have incomplete d-subshell either in neutral atom or in their ions. The presence of partly filled d-orbitals in their atoms makes transition elements different from that of the non-transition elements. With partly filled d-orbitals, these elements exhibit certain characteristic properties such as display of a variety of oxidation states, formation of coloured ions and entering into complex formation with a variety of ligands. The transition metals and their compounds also exhibit catalytic properties and paramagnetic behaviour. The transition metals are very hard and have low volatility. An examination of the $E_{M^{2+}}^0$ values shows the varying trends:

$E_{M^{2+}}^0$	
$\frac{M}{M}$	
V	-1.18
Cr	-0.91
Mn	-1.18
Fe	-0.44
Co	-0.28

Ni	-0.25
Cu	+0.34
Zn	-0.76

Answer the following questions:

- a. On what basis can we say that Cu is a transition element but Zn is not? (Atomic number: Cu = 29, Zn = 30)

(1)

- b. Why do transition elements show variety of oxidation states? (1)

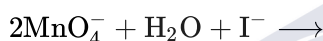
- c. i. Why do $E_{M^{2+}}^0$ values show irregular trend from Vanadium to Zinc?

- ii. How is the variability in oxidation states of transition metals different from that of the non-transition elements? ($2 \times 1 = 2$)

OR

- i. Of the d^4 species, Cr^{2+} is strongly reducing while Mn^{3+} is strongly oxidizing. Why? (Atomic number: Cr = 24, Mn = 25)

- ii. Complete the following ionic equation: ($2 \times 1 = 2$)



30. Read the following text carefully and answer the questions that follow:

[4]

The colligative properties of electrolytes require a slightly different approach than the one used for the colligative properties of non-electrolytes. The electrolytes dissociate into ions in solution. It is the number of solute particles that determines the colligative properties of a solution. The electrolyte solutions, therefore, show abnormal colligative properties. To account for this effect we define a quantity called the van't Hoff factor, given by

$$i = \frac{\text{Actual number of particles in solution after dissociation}}{\text{Number of formula units initially dissolved in solution}}$$

$i = 1$ (for non-electrolytes);

$i > 1$ (for electrolytes, undergoing dissociation)

$i < 1$ (for solutes, undergoing association).

- i. 0.1M $K_4[Fe(CN)_6]$ is 60% ionized. What will be its van't Hoff factor? (1)

- ii. When a solution of benzoic acid dissolved in benzene such that it undergoes in molecular association and its molar mass approaches 244. In which form Benzoic molecules will exist? (1)

- iii. How does van't Hoff factor i and degree of association α are related if benzoic acid undergoes dimerisation in benzene solution? ($i = 1 - \frac{\alpha}{2}$ or $i = 1 + \alpha$) (2)

OR

What do you mean by colligative properties of solutions? (2)

Section E

31. Attempt any five of the following:

[5]

- (a) Why cannot vitamin C be stored in our body?

[1]

- (b) α -Helix is a secondary structure of proteins formed by twisting of the polypeptide chain into right-handed screw like structures. Which type of interactions is responsible for making the α -helix structure stable?

[1]

- (c) Which polymer is stored in the liver of animals?

[1]

- (d) Amino acids can be classified as α -, β -, γ -, δ - and so on depending upon the relative position of

[1]

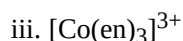
the amino group with respect to the carboxyl group. Which type of amino acids forms a polypeptide chain in proteins?

- (e) Deficiency of which vitamin causes night-blindness. [1]
(f) Name the vitamin whose deficiency causes convulsions. [1]
(g) Name the base that is found in nucleotide of RNA only. [1]

32. $[\text{NiCl}_4]^{2-}$ is paramagnetic while $[\text{Ni}(\text{CO})_4]$ is diamagnetic though both are tetrahedral. Why? [5]

OR

a. Write IUPAC name for each of the following complexes:



b. Draw one of the geometrical isomers of the complex $[\text{Pt}(\text{en})_2\text{Cl}]^{2+}$ which is optically inactive. Also write the name of this entity according to the IUPAC nomenclature.

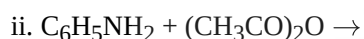
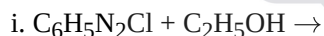
33. i. Give one chemical test to distinguish between ethylamine and aniline. [5]
ii. Describe a method for the identification of primary, secondary and tertiary amines. Also, write chemical equations of the reactions involved.

OR

a. Give plausible explanation for each of the following:

- i. Why are amines less acidic than alcohols of comparable molecular masses?
ii. Why are primary amines highest boiling than tertiary amines?
iii. Why are aliphatic amines stronger bases than aromatic amines?

b. Complete the following reactions:



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