

Class XII | Session 2026-27
Subject - Chemistry
Sample Question Paper - Set 5

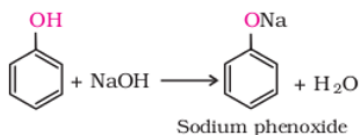
General Instructions:

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. Clemmensen reduction of a ketone is carried out in the presence of which of the following? [1]
 - a) LiAlH_4
 - b) $\text{Zn} - \text{Hg}$ with HCl
 - c) H_2 and Pt as catalyst
 - d) Glycol with KOH
2. When a haloalkane with β – hydrogen atom is heated with alcoholic solution of potassium hydroxide then: [1]
 - a) elimination of hydrogen atom from β – carbon
 - b) All of these
 - c) alkene is formed as a product
 - d) elimination of halogen atom from α – carbon
3. Which one is not the essential amino acid in the ones given below? [1]
 - a) Proline
 - b) Valine
 - c) Leucine
 - d) Arginine
4. The reagent which can be used to distinguish acetophenone from benzophenone is: [1]
 - a) 2, 4-dinitrophenyl hydrazine
 - b) Benedict solution
 - c) aqueous solution of NaHSO_3
 - d) I_2 and Na_2CO_3
5. In the reaction [1]



- a) Cleavage of O - H bond
 b) Phenols are acidic in nature.
 c) All of these
 d) They can donate a proton to a stronger base

6. Match the items given in column I with that in column II:

[1]

Column I	Column II
(a) Urea	(i) $i < 1$
(b) FeCl_3	(ii) $i = 1$
(c) Benzoic acid in Benzene	(iii) $i = 2$
(d) MgSO_4	(iv) $i = 4$

- a) (a) - (ii), (b) - (i), (c) - (iii), (d) - (iv)
 b) (a) - (iv), (b) - (ii), (c) - (iii), (d) - (i)
 c) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)
 d) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)

7. The rate law for a particular reaction is given as $\text{rate} = k[\text{A}][\text{B}]^2$.
 How is the rate of reaction affected if we double the concentration of B?

[1]

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

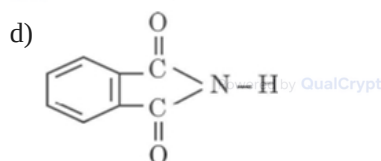
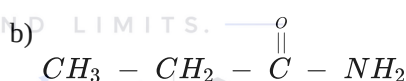
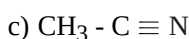
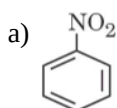
8. Ethylidene chloride is a/an _____.

[1]

- a) gem-dihalide
 b) vic-dihalide
 c) vinylic halide
 d) allylic halide

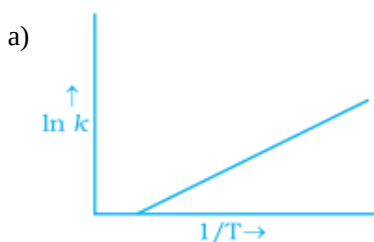
9. Hoffmann Bromamide Degradation reaction is given by:

[1]

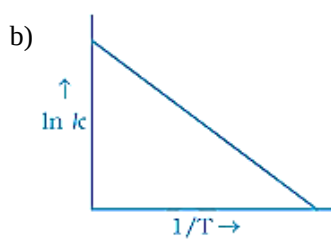


10. According to the Arrhenius equation rate constant k is equal to $Ae^{-E_a/RT}$. Which of the following options represents the graph of $\ln k$ vs $\frac{1}{T}$?

[1]



c)



d)

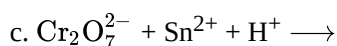
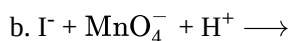
19. State Henry's law. Calculate the solubility of CO_2 in water at 298 K under 760 mm Hg. (K_H for CO_2 in water at 298 K is 1.25×10^6 mm Hg) [2]

OR

Define the term: Molality.

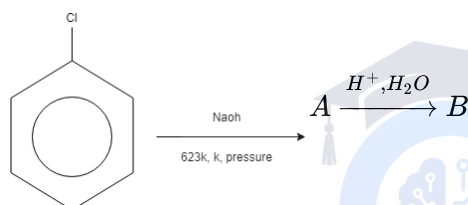
20. Answer the following: [2]
 (a) Define rate of reaction? [1]
 (b) For a reaction $\text{R} \rightarrow \text{P}$, half-life ($t_{1/2}$) is observed to be independent of the initial concentration of reactants. What is the order of reaction? [1]

21. Complete the following reactions: [2]



Section C

22. Complete the following reaction: [3]

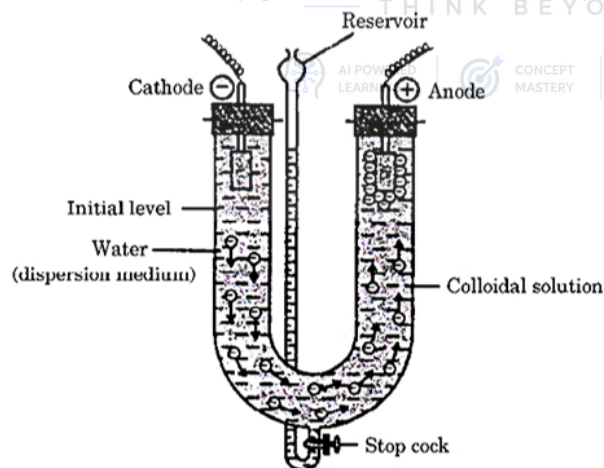


23. In a pseudo first order hydrolysis of ester in water, the following results were obtained: [3]

t/s	0	30	60	90
[Ester] molL ⁻¹	0.55	0.31	0.17	0.085

- i. Calculate the average rate of reaction between the time interval 30 to 60 seconds.
 ii. Calculate the pseudo first order rate constant for the hydrolysis of ester.

24. Answer the following questions on the basis of the given figure: [3]



- a. Define the process depicted in the above figure.
 b. Can this process be used in the coagulation of the lyophobic sols?
 c. What is coagulation?

25. Calculate the emf of the cell $\text{Mg(s)} \parallel \text{Mg}^{2+}(0.1 \text{ M}) \parallel \text{Cu}^{2+}(1 \times 10^{-3} \text{ M}) \mid \text{Cu(s)}$ [3]

Given : $E^0(\text{Cu}^{2+}/\text{Cu}) = +0.34\text{V}$

$E^0(\text{Mg}^{2+}/\text{Mg}) = -2.37\text{V}$

26. What is an electrochemical series? How does it help in calculating the e.m.f of a standard cell? [3]
27. Complete the following reaction: [3]
- $$\text{CH}_3\text{CHO} + \text{CH}_3\text{CH}_2\text{CHO} \xrightarrow[\text{(ii) Heat}]{\text{(i) dil NaOH}}$$
28. Write the mechanism of the reaction of HI with methoxymethane. [3]

OR

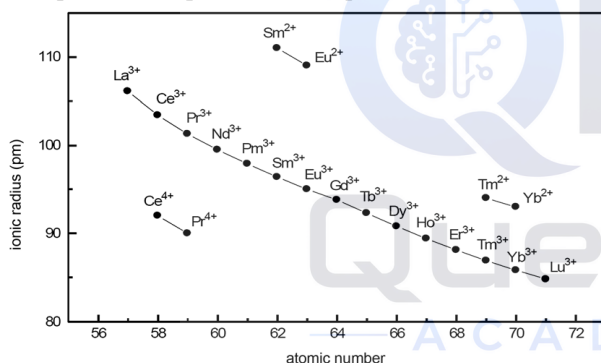
Name the reagents used in the following reactions:

- Oxidation of a primary alcohol to carboxylic acid.
- Oxidation of a primary alcohol to an aldehyde.
- Bromination of phenol to 2, 4, 6-tribromophenol.

Section D

29. Read the text carefully and answer the questions: [5]

The f-block consists of the two series, lanthanoids (the fourteen elements following lanthanum) and actinoids (the fourteen elements following actinium). Because lanthanum closely resembles the lanthanoids. The chemistry of the actinoids is much more complicated. The complication arises partly owing to the occurrence of a wide range of oxidation states in these elements and partly because their radioactivity creates special problems in their study. The overall decrease in atomic and ionic radii from lanthanum to lutetium (the lanthanoid contraction) is a unique feature in the chemistry of the lanthanoids. In the lanthanoids, La(II) and Ln(III) compounds are predominant species.



- (a) Which metal in the first transition series (3d series) exhibits +1 oxidation state most frequently and why?

OR

The transition metals (with the exception of Zn, Cd and Hg) are hard and have high melting and boiling points. Give reason.

- (b) Both O₂ and F₂ stabilize high oxidation states of transition metals but the ability of oxygen to do so exceeds that of fluorine. Give reason.
- (c) The atomic radii of the metals of the third (5d) series of transition elements are virtually the same as those of the corresponding members of the second (4d) series. Give reason.

30. Read the text carefully and answer the questions: [4]

Many chemical and biological processes depend on osmosis, the selective passage of solvent molecules through the porous membrane from a dilute solution to a more concentrated one. The osmotic pressure π depends on molar concentration of the solution ($\pi = CRT$). If two solutions are of equal solute concentration and, hence, have the same osmotic pressure, they are said to be isotonic. If two solutions are of unequal osmotic pressures, the more concentrated solution is said to be hypertonic and the more diluted solution is described as hypotonic. Osmosis is the major mechanism, for transporting water upward in the plants. Transpiration in the leaves supports the transport mechanism of water. The osmotic pressure of seawater is about 30 atm; this is the pressure

that must be applied to the seawater (separated from pure water using a semi-permeable membrane) to get drinking water.

- (a) What will happen if a plant cell kept in a hypertonic solution?
- (b) Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we place blood cells in a solution containing in 1.2% sodium chloride solution?
- (c) What happens when the external pressure applied becomes more than the osmotic pressure of solution?

OR

Which mechanisms helps in the transportation of water in a plant?

Section E

31. Attempt any five of the following: [5]

- (a) State a use of streptokinase in protein. [1]
- (b) What are any two good sources of vitamin A? [1]
- (c) What are heterocyclic bases? [1]
- (d) What is the information given by primary structure of proteins? [1]
- (e) Deficiency of which vitamin causes night-blindness. [1]
- (f) Give an example of fibrous protein. [1]
- (g) Write the product obtained when D-glucose reacts with $\text{H}_2\text{N}-\text{OH}$. [1]

32. I. Give reasons: [5]

- i. Aniline on nitration gives good amount of m-nitroaniline, though $-\text{NH}_2$ group is o/p directing in electrophilic substitution reactions.
- ii. $(\text{CH}_3)_2\text{NH}$ is more basic than $(\text{CH}_3)_3\text{N}$ in an aqueous solution.
- iii. Ammonolysis of alkyl halides is not a good method to prepare pure primary amines.

II. Write the reaction involved in the following:

- i. Carbyl amine test
- ii. Gabriel phthalimide synthesis

Give the reasons for the following:

- i. Aniline does not undergo Friedel-Crafts reaction.
- ii. $(\text{CH}_3)_2\text{NH}$ is more basic than $(\text{CH}_3)_3\text{N}$ in an aqueous solution.
- iii. Primary amines have a higher boiling point than tertiary amines.

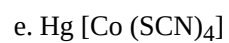
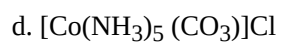
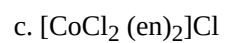
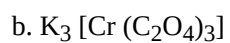
33. Write down the IUPAC name for each of the following complexes and indicate the oxidation state, electronic configuration, and coordination number. Also, give stereochemistry and magnetic moment of the complex: [5]

- a. $\text{K}[\text{Cr}(\text{H}_2\text{O})_2](\text{C}_2\text{O}_4)_2 \cdot 3\text{H}_2\text{O}$
- b. $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
- c. $\text{CrCl}_3(\text{py})_3$
- d. $\text{Cs}[\text{FeCl}_4]$
- e. $\text{K}_4[\text{Mn}(\text{CN})_6]$

OR

Write the IUPAC names of the following coordination compounds:

- a. $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NO}_2)]$



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