

Bhavan's Tripura Vidyamandir

Pre-board Examination : (2024-2025)

Class:- 12

Time:- 3 Hours

Subject:- Chemistry

Total :- 80 Marks

Name of the student:

Roll:

Stream:

General Instructions:

Read the following instructions carefully and follow them.

- This question paper contains **33** questions. **All** questions are **compulsory**.
- This question paper is divided into five sections-**Section A, B, C, D** and **E**.
- Section A**- question no **1** to **16** are multiple choice questions. Each question carries **1** mark.
- Section B**- question no **17** to **21** are very short answer type questions. Each question carries **2** marks.
- Section C**- question no **22** to **28** are short answer type questions. Each question carries **3** marks.
- Section D**- question no **29** and **30** are case based questions. Each question carries **4** marks.
- Section E** – question number **31** to **33** are long answer type questions. each question carries **5** marks.
- There is no overall choice given in the question paper. However an internal choice has been provided in few questions in all the section except section A.
- Use of calculator is **not** allowed.

Section AQuestion no **1** to **16** are Multiple Choice Questions, carrying **1** mark each.

- Low concentration of oxygen in the blood and tissues of people living at high altitude is due to
 - High atmospheric pressure
 - Low temperature
 - Low atmospheric pressure
 - Both low temperature and high atmospheric pressure.
- Which of the following formula represents Raoult's law for a solution containing non volatile solute?
 - $P_{\text{solute}} = P^0_{\text{solute}} \cdot X_{\text{solute}}$
 - $P = K_H \cdot X$
 - $P_{\text{total}} = P_{\text{solvent}}$
 - $P_{\text{solute}} = p^0_{\text{solvent}} \cdot X_{\text{solvent}}$
- An electrochemical cell behaves like an electrolytic cell when
 - $E_{\text{cell}} = E_{\text{external}}$
 - $E_{\text{cell}} = 0$
 - $E_{\text{external}} > E_{\text{cell}}$
 - $E_{\text{external}} < E_{\text{cell}}$
- Which of the following cell was used in Apollo space programme
 - Mercury cell
 - Daniel cell
 - $\text{H}_2\text{-O}_2$ cell
 - Dry cell
- The order of the reaction
$$\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \longrightarrow 2\text{HCl}(\text{g})$$
 is
 - 2
 - 1
 - 0
 - 3
- The half life period for a zero order reaction is equal to
 - $\frac{0.693}{k}$
 - $\frac{2k}{[R]^0}$
 - $\frac{2.303}{K}$
 - $\frac{[R]^0}{2k}$

7. Which of the following is a diamagnetic ion

- a. V^{2+} b. Sc^{3+} c. Cu^{2+} d. Mn^{3+}

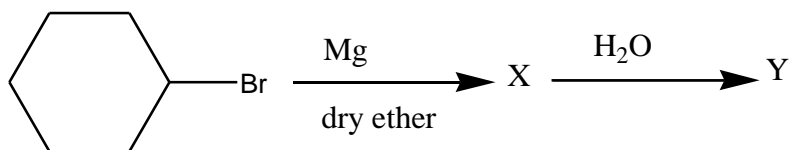
8. The most common and stable oxidation state of lanthanoid is

- a. +2 b. +3 c. +4 d. +6

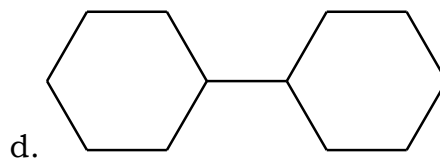
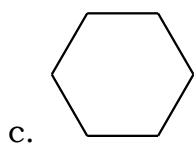
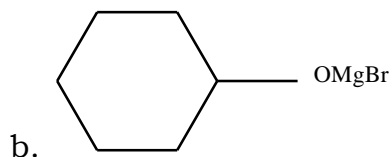
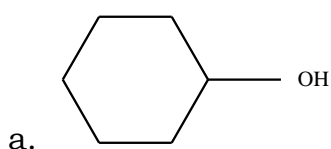
9. Which of the following halides contain Csp^2-X bond?

- a. Allyl halide b. Alkyl halide
c. Benzyl halide d. Vinyl halide

10. In the reaction



Compound Y is



11. Which of the following alcohols will not undergo oxidation?

- a. Butanol b. Butan-2-ol
c. 2-methylbutan-2-ol d. 3-methylbutan-2-ol

12. Which of the following acids reacts with acetic anhydride to form aspirin

- a. Benzoic acid b. Salicylic acid
c. Phthalic acid d. Acetic acid

Directions: Each of these questions contains two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.

- (a) Assertion is correct; reason is a correct explanation for assertion.
(c) Assertion is correct, reason is incorrect
(b) Assertion is correct, reason is not a correct explanation for assertion
(d) Assertion is incorrect, reason is correct.

13. **Assertion:** conductivity of an electrolyte increases with decrease in concentration

Reason: number of ions per unit volume decrease on dilution.

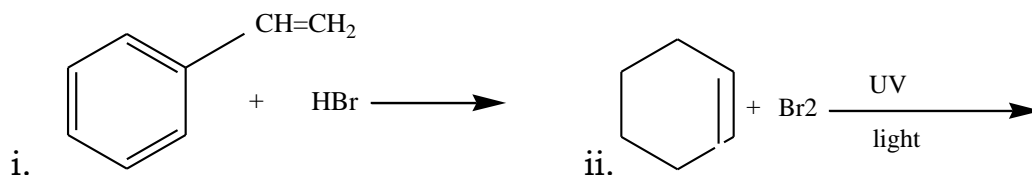
14. **Assertion:** order of reaction is applicable to elementary as well as complex reaction
Reason: for a complex reaction molecularity has no meaning.
15. **Assertion:** chlorobenzene is less reactive towards nucleophilic substitution reaction.
Reason: nitro group in chlorobenzene increases its reactivity towards nucleophilic substitution reaction.
16. **Assertion:** the C-O-H bond angle in alcohols is slightly less than the tetrahedral angle.
Reason: this is due to the repulsive interaction between the two lone electron pairs on oxygen.

Section B

17. Write anode, cathode and overall reaction of lead storage battery.

OR

- State Kohlrausch's law of independent migration of ions.
 - Write an expression for limiting molar conductivity of acetic acid according to Kohlrausch's law.
18. State Henry's law and write one application of it.
19. What is meant by disproportionation reaction? Give example.
20. Draw the structure of major monohalo product in each of the following reaction.



21. Explain the mechanism of acid catalysed of ethene to form ethanol.

Section C

22. Define azeotrope. What type of azeotrope is formed by negative deviation from Raoult's law? Give an example.
23. i. state Faraday's first law of electrolysis.
 ii. How much charge is required for the reduction of 1 mole of MnO_4^- to Mn^{2+} ?
24. i. show that the time required for 99.9% completion in a 1st order reaction is 10 times of half-life of the reaction.
 ii. Write the unit of rate constant for 1st order reaction.
25. Write the expression of integrated rate equation for zero order reaction and also write the expression of half life reaction for zero order.

OR

- A first order reaction takes 30 minutes for 75% decomposition. Calculate half life of reaction.
- Write SI unit of zero order of reaction.

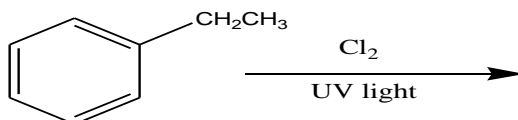
26. Give reason.

- Transition element acts as catalyst.
- Transition elements form alloy.

27.i. in the following pair of compound which compound undergoes S_N2 reaction faster and why.

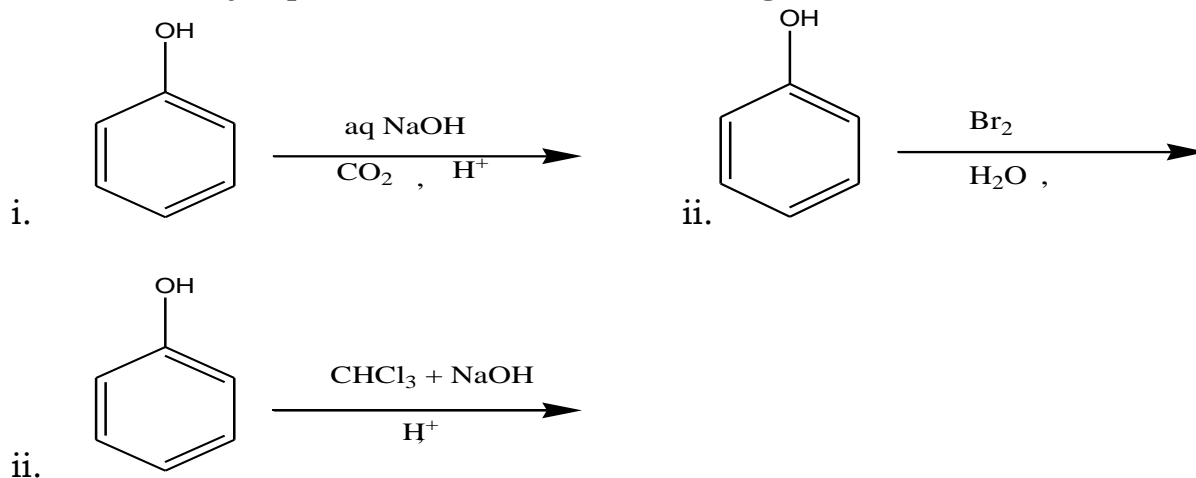


ii. Write the major product in the following.



iii. Why is chloroform is stored in dark coloured bottle..

28. Write the major product form in the following reaction.



Section D

The following questions are case-based questions. Read the passage carefully and answer the questions that follow.

29. Rahul set up an experiment to find resistance of aq KCl solution for different concentrations at 298K using conductivity cell connected to a Wheatstone bridge. He fed the Wheatstone bridge with a.c. power in the audio frequency range 550 to 5000 cycles per second. Once the resistance was calculated from null point he also calculated the conductivity k (κ) and molar conductivity λ_m and recorded his readings in tabular form.

Sl no	Conc (M)	$K(\text{Scm}^{-1})$	$\lambda_m(\text{Scm}^{-1})$
1.	1.00	111.3×10^{-3}	111.3
2.	0.10	12.9×10^{-3}	129.0
3.	0.01	1.41×10^{-3}	141.0

Answer the following questions:

- a. Why does conductivity increase though the conductivity decrease with dilution?
- b. If λ_m of KCl is $150.0 \text{ S cm}^2 \text{ mol}^{-1}$, calculate the degree of dissociation of 0.01 M KCl.
- c. If Rahul had used HCl instead then would you expect the λ_m values to be more or less than those per KCl for a given concentration. Justify.

30. The d-block of the periodic table contains the elements of group 3-12 and is known as transition elements. In general the electronic configuration of these elements is $(n-1) d^{1-10} ns^{1-2}$. The d-orbitals of the penultimate energy level in their atoms receive electrons giving rise to three rows of the transition elements i.e. 3d, 4d and 5d series. However Zn, Cd and Hg are not regarded as transition elements. Transition elements exhibit certain characteristic properties like variable oxidation state, complex formation, formation of coloured ions and alloys, catalytic activity etc. transition metals are hard (except Zn, Cd, Hg) and have a high melting point.

Answer the following questions.

- a. Which transition metal of 3d series does not show variable oxidation state?
- b. Which one is coloured: Cu^{2+} or Zn^{2+} .
- c. Why Zn, Cd, Hg are non-transition elements.

OR

Why is melting point of transition metal high?

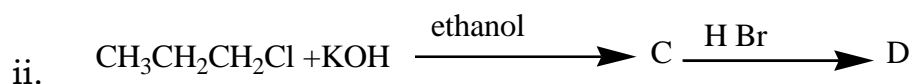
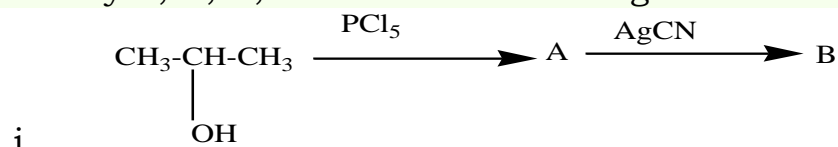
SECTION E

31.i. for a 5% solution of urea (molar mass 60 g/mol), calculate the osmotic pressure at 300 K ($R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1}$)

ii. give reasons

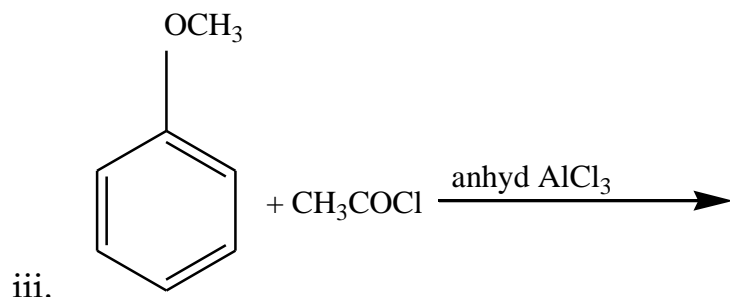
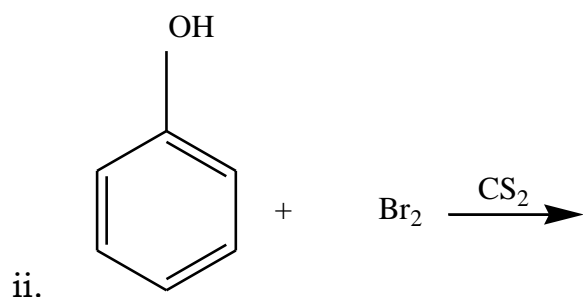
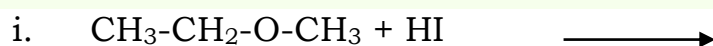
- a. Cooking is faster in pressure cooker than in cooking pan.
 - b. Red blood cells (RBC) shrink when placed in saline water but swell in distilled water.
- iii. Out of 1 M glucose and 2 M glucose which one has higher boiling point and why.

32. a. Identify A, B, C, and D in the following reaction.



b. which isomer of C_5H_{10} gives a single monochloro compound $\text{C}_5\text{H}_9\text{Cl}$ in bright sunlight.

33. a. Write the product of the following reactions:



b. name the reagents used in the following reactions.

i. phenol to benzene.

ii. Oxidation of primary alcohol to aldehyde.

OR

a. Write two reactions to show the acidic nature of phenol.

b. Write chemical equation of reaction for the preparation of anisole.

c. Identify the product A

