Bhavan's Tripura Vidyamandir

1st Terminal Examination : (2025-2026)

Class : 12 **Subject:** Chemistry

Time : 3 Hours Total : 70 Marks

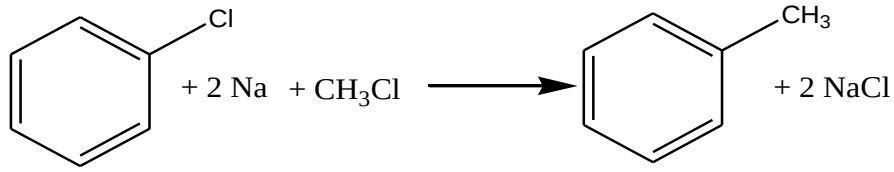
Name of the student: Roll: Sec:

General instructions

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

SECTION A

1. Which of the following will not form ideal solution?
   a) Benzene and toluene b) Ethanol and acetone
   c) n-hexane and n-heptane d) Chloroethane and bromoethane
2. A compound undergoes complete dimerization in the given solvent. The van't Hoff factor(i) is
   a) 2.0 b) 0.5 c) 0.25 d) 1.0
3. In electrochemical process, a salt bridge is used
   a) As a reducing agent
   b) As an oxidising agent
   c) To complete the circuit so that current can flow
   d) None of these.
4. How many faradays are required to reduce 1 mole of Sn+4 to Sn+2
   a) 2.0 b) 4.0 c) 1.0 d) 6.0
5. The unit of the rate of reaction is same as that of rate constant for a
   a) 1st order b) 2nd order
   c) Zero order d) It cannot be same.
6. A reaction follows second order kinetics. How is the rate of reaction affected if the concentration of the reactant is reduced to half? Choose the correct value from the following:
   a) Four times b) Eight times
   c) ¼ of the original value d) Three times.
7. Which of the following is strong oxidising agent?
   a) Mn^{+2} b) Zn^{+2} c) Cr^{3+} d) Sc^{3+}
8. Which of the following transition metals does not show variable oxidation states?
   a) Ti b) Cr c) Cu d) Sc
9. Which reagent will be required for one step conversion of benzene diazonium chloride to phenol?
   a) Cu2Cl2 b) NaOH(aq) c) H2O d) Alcoholic KOH
10. The reaction given bellow:



Is called-
   a) Wurtz reaction b) Wurtz-fittig reaction
   c) Fitting reaction d) None of these.
11. Aspirin is obtained by the acetylation of which of the following compounds:
   a) Salicylic acid b) Salicyldehyde
   c) Acetyl salicylic acid d) Phenol.

12. Phenol on being heated with concentrated H_2SO_4 and then with concentrated HNO_3 gives
    a) o- nitro phenol
    b) 2,4,6-trinitrophenol
    c) p-nitro phenol
    d) m-nitro phenol.

Directions: These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following four responses.
(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

13. **Assertion**: electrolysis of aqueous solution of NaCl gives gas at anode instead of O_2
    Reason: formation of O_2 gas at anode requires over potential.
14. **Assertion**: copper is non-transitional metal.
    Reason: copper has completely filled d orbitals in ground state.
15. **Assertion**: order of reaction is applicable to elementary as well as complex reaction.
    Reason: for a complex reaction molecularity has no meaning.
16. **Assertion**: Boiling points of alkyl halide decreases in the order R-I>R-Br>R-Cl>R-F.
    Reason: van der wall's forces decreases with increase in size of halogen atom.

SECTION B

This section contains 5 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.

17. Define azeotropes. What type of azeotrope is formed by negative deviation from Raoult's law? Give an example.

OR

Predict whether van't hoff factor (i) is less than one or greater than one in the following:
    i. CH_3COOH dissolved in water.
    ii. CH_3COOH dissolved in benzene.

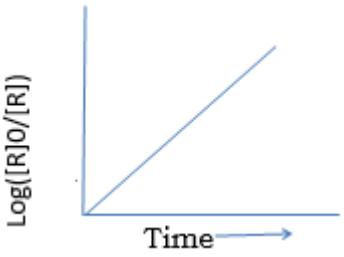
18. A solution of $Ni(NO_3)_2$ is electrolysed between platinum electrode using a current of 5.0 ampere for 20 minutes. What mass of nickel will be deposited at the cathode? [given: at mass of Ni=58.7 g/mol, 1F=96500C]
19. Define half-life of a reaction. Write the expression of half-life for
    i. Zero order reaction and
    ii. First order reaction.
20. Following ions of 3d transition series are given: Ti^{4+}, V^{3+},Cr^{3+},Mn^{3+}
    Identify the ion which is
    i. Most stable in aqueous solution
    ii. A colourless in aqueous solution
21. Write the main product formed when
    i. n- Butyl chloride is treated with alc KOH.
    ii. 2, 4, 6-tri nitro chlorobenzene is subjected to hydrolysis.

SECTION C

This section contains 7 questions with internal choice in two questions. The following questions are short answer type and carry 3 marks each.

22. State Raoult's law for a solution containing non-volatile solute. What type of deviation from Raoult's law is shown by a solution of chloroform and acetone and why?
23. Write anode, cathode and overall reaction of lead storage battery.

24. Observe the graph shown in figure and answer the following questions:



i. What is the order of the reaction?
ii. What is the slope of the curve?
iii. Write the relationship between k and $t_{1/2}$(half-life period.)

25. Give reason for the following statements:
i. Copper does not displace hydrogen from acids.
ii. Transition metals and most of their compounds show paramagnetic behaviour.
iii. Zn, Cd, and Hg are soft metals.

OR

i. Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state.
ii. Complete the following reaction:
$MnO^{4-} + 8H^{+} + 5e^{-} \longrightarrow$
iii. Out of Mn^{+3} and Cr^{+3} which is more paramagnetic.

26. Write chemical equation of reaction.
i. Sandmeyer reaction
ii. Finkelstein reaction
iii. Wurtz – Fitting reaction.

27. Write chemical equation of reaction for the preparation of following compound from Phenol.
i. Salicyldehyde
ii. Anisole
iii. Benzoquinone.

28. i. Derives the relationship between relative lowering of vapour pressure and molar mass of the solute.
ii. Write one application of Henry's law.

SECTION D

The following questions are case-based questions. Each question has an internal choice and carries 4(1+1+2) marks each.

29. Read the passage carefully and answer the questions that follow.
The d-block of the periodic table contains the elements of the 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 the three rows of the transition metals i.e. 3d, 4d, and 5d series. However, Zn, Cd and Hg are not regarded as transition elements. Transition elements exhibit certain characteristics properties like variable oxidation states, complex formation, formation of coloured ions and alloys, catalytic activities etc. transition metals are hard (except Zn, Cd, and Hg) and have a high melting point.
i. Why are Zn, Cd and Hg non transition elements?
ii. Why do transition metals and their compounds show catalytic activity?
iii. Why are melting points of transition metals high?

OR

Why is Cu2+ ion coloured while Zn2+ ion is colourless in aqueous solution?

30. The rate of reaction is considered with decrease in concentration of reactants or increase in concentration of products oer unit time. It can be expressed as instantaneous rate at a particular instant of time and average rate over a large interval of time. Mathematical representation of rate of reaction is given by rate law. Rate constant and order of reaction can be determined from rate law or its integrated rate equation.
i. What is average rate of reaction?
ii. Write two factors which affect the rate of reaction.
iii. (a) what happens to the rate of reaction for zero order reaction?
(b) what is the unit of "k" for zero order reaction.

OR

a. for a reaction $P + 2Q \longrightarrow$ products

Rate=$k[P]^{1/2}[Q]^1$

What is the order of the reaction?

b. Define pseudo first order reaction with an example.

SECTION E

The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.

31. i. state Kohlrausch's law of independent migration of ions with an example.

ii. How much electricity in terms of Faraday is required to produce 40g if Al from molten Al_2O_3.

iii. Define fuel cell and write its two advantages.

OR

i. how much charge is required for the following reductions:

a. 1 mole of Al^{3+} to Al

b. 1 mole of Cu^{2+} to Cu

c. 1 mole of MnO_4^- to Mn^{2+}

ii. for the Galvanic cell write cathode and anode reaction.

32. i. how the following conversions are carried out:

a. aniline to bromobenzene

b. chloromethane to butane

c. ethanol to propane nitrile.

ii. A compound C_3H_9N reacts with CHI_3 and KOH and forms offensive smelling compound. Identify "A" and write the reaction.

OR

i. write chemical equation of reaction

a. friedel crafts acylation of chlorobenzene

b. nitration of chlorobenzene.

ii. what are freons. Give example.

iii. convert : chlorobenzene to para nitrophenol.

33. i. writes the structure of main products formed in the following reactions:

a. propan-2-ol is heated with Cu/573K

b. salicylic acid is treated with $(CH_3CO)_2O/H+$

ii. Account the following

a. phenol is stronger acid than an alcohol.

b. the boiling point of alcohol decreases with increase in branching.

iii. Convert: aniline to phenol.

OR

i. An organic compound "A" having molecular formula C_6H_6O gives a characteristics colour with aq $FeCl_3$ solution. When "A" is treated with CO_2 and NaOH at 400K under pressure "B" is formed. The compound "B" on acidification gives "C" which reacts with acetyl chloride to form "D" which is popular pain killer. Write the structure of A, B, C, D.

ii. Write the structure of the product when butan-2-ol reacts with the following

a. CrO_3 b. $SOCl_2$.