

BUDHA DAL PUBLIC SCHOOL, PATIALA

First Term Examination (8 September 2025)

Class XII (Science)
Subject - Chemistry
(Set-B)

Time: 3hrs.

M.M.70

General Instructions:

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 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

Q1. 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

Q2. Which of the following aqueous solution will have highest boiling point?

- 1.0 M KCl
- 1.0 M K_2SO_4
- 2.0 M KCl
- 2.0 M K_2SO_4

Q3. ΔG and E_{cell}^0 for a spontaneous reaction will be

- Positive, negative
- negative, negative
- negative, positive
- positive, positive

Q4. Charge carried by 1 mole of electrons is

- 6.023×10^{23} coulomb
- 9.65×10^4 coulomb
- 1.6×10^{-19} coulomb
- 6.28×10^{19} coulomb

Q5. For the reaction $A \rightarrow B$, the rate of reaction increases two times on increasing the concentration of A four times, the order of reaction is

- 2
- 0
- $\frac{1}{2}$
- 3

Q6. The rate constant of reaction is 2.0×10^{-6} mol⁻² L² S⁻¹. The order of the reaction is

- 0
- 2
- 1
- 3

Q7. For the reaction $3A \rightarrow 2B$, rate of reaction $+ \frac{d[B]}{dt}$ is equal to

- $\frac{-3}{2} \frac{d[A]}{dt}$
- $\frac{-2}{3} \frac{d[A]}{dt}$
- $\frac{-1}{3} \frac{d[A]}{dt}$
- $+ \frac{2d[A]}{dt}$

Q8. The electronic configuration of Cu(II) is $3d^9$ whereas that of Cu(I) is $3d^{10}$. Which of the following is correct?

- Cu(II) is more stable
- Cu(II) is less stable
- Cu(I) and Cu(II) are stable
- Stability of Cu(I) and Cu(II) depends on nature of copper salts

Q9. Which of the following analogy is correct?

- Actinides : Radioactive :: Lanthanides : Non-radioactive
- Ti : Soft :: Zn : hard
- Zn^{2+} : Paramagnetic :: Co^{2+} : Diamagnetic
- Lawrencium : $5f^{14} 6d^1 7s^2$:: Cerium : $4f^3 5d^1 6s^2$

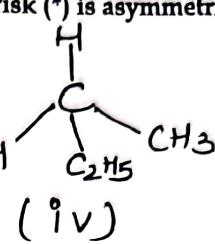
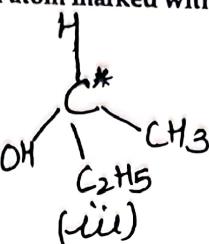
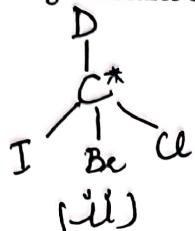
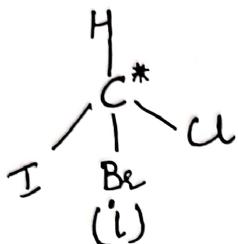
B - I

Q10. Which is the correct IUPAC name for $\text{CH}_3 - \overset{\text{C}_2\text{H}_5}{\text{CH}} - \text{CH}_2 - \text{Br}$?



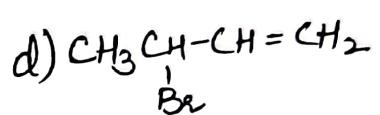
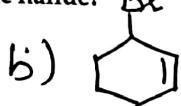
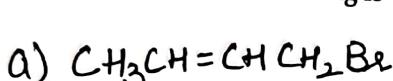
- a) 1-Bromo-2-ethylpropane
- b) 1-Bromo-2-ethyl-2-methylethane
- c) 1-Bromo-2-methylbutane
- d) 2-Methyl-1-bromobutane

Q11. In which of the following molecules carbon atom marked with asterisk (*) is asymmetric?



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

Q12. Which of the following is vinylic halide?



In the following questions, two statements are given – one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to the questions from the codes (a), (b), (c) and (d) as given below:

- a) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
- b) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is not the correct explanation of the Assertion (A).
- c) Assertion (A) is correct, but Reason (R) is incorrect statement.
- d) Assertion (A) is incorrect, but Reason (R) is correct statement.

Q13. Assertion (A) : Aquatic species are more comfortable in cold water rather than in warm water.

Reason (R) : Different gases have different K_H values at the same temperature.

Q14. Assertion (A) : Conductivity decrease with decrease in concentration of electrolyte.

Reason (R) : Number of ions per unit volume that carry the current in a solution decreases on dilution.

Q15. Assertion (A) : If the activation energy of a reaction is zero, temperature will have no effect on the rate constant.

Reason (R) : Lower the activation energy, faster is the reaction.

Q16. Assertion (A) : Ce^{4+} is used as an oxidizing agent in volumetric analysis.

Reason (R) : Ce^{4+} has the tendency of attaining +3 oxidation state.

Section - B

Q17. State Henry's Law. Write its one application.

OR

- a) Why is an increase in temperature observed on mixing chloroform and acetone?
- b) Why does sodium chloride solution freeze at a lower temperature than water?

Q18. Write reactions occurring at anode, cathode and overall reaction for discharging of lead storage battery.

Q19. A first order reaction takes 40 min for 30% decomposition. Calculate $t_{1/2}$.

B - 2

d. Write one difference and one similarity between Lanthanoids and actinoids based on electronic configuration.

1. a) Out of $C_6H_5CH_2Cl$ and $C_6H_5CHClC_6H_5$ which is more easily hydrolysed by aqueous KOH and why?

b) p-Dichlorobenzene has higher m.p. than those of o- and m-isomers. Discuss.

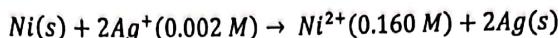
Section - C

Q22. Determine the osmotic pressure of a solution prepared by dissolving 25mg of K_2SO_4 in 2 litre of water at $25^\circ C$, assuming that it is completely dissociated. ($K = 39$ u, $S = 32$ u, $O = 16$ u)

Q23. a) Define *Azeotropes*.

b) Calculate the mass of ascorbic acid (Vitamin C, $C_6H_8O_6$) to be dissolved in 75g of acetic acid to lower its melting point by $1.5^\circ C$. $K_f = 3.9 \text{ kg mol}^{-1}$.

Q24. a) Calculate the emf of the cell in which the following reaction takes place?



Given that $E_{cell}^0 = 1.05 \text{ V}$, $\log 4 = 0.6020$

b) Write relation between specific conductance and cell constant.

Q25. Conductivity of 0.00241 M acetic acid is $7.896 \times 10^{-5} \text{ S cm}^{-1}$. Calculate its molar conductivity. If Δ_m^0 for acetic acid is $390.5 \text{ S cm}^2 \text{ mol}^{-1}$, what is its dissociation constant?

OR

a) Why does a dry cell become dead after a long time even if it has not been used?

b) Unlike dry cell, the mercury cell has a constant cell potential throughout its useful life. Why?

Q26. The rate of a reaction quadruples when the temperature changes from 293 K to 313 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature. $\log 4 = 0.6020$

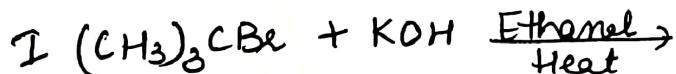
Q27. Explain giving reasons :

a) The enthalpies of atomization of the transition metals are high.

b) The transition metals generally form coloured compounds.

c) Transition metals and their many compounds act as good catalyst.

Q28. Write the structure of the major organic product in each of the following reactions:



Section - D

Q29. Read the passage given below and answer the following questions:

The spontaneous flow of the solvent through a semipermeable membrane from a pure solvent to a solution or from a dilute solution to a concentrated solution is called osmosis. The phenomenon of osmosis can be demonstrated by taking two eggs of the same size. In an egg, the membrane below the shell and around the egg material is semi-permeable. The outer hard shell can be removed by putting the egg in dilute hydrochloric acid. After removing the hard shell, one egg is placed in distilled water and the other in a saturated salt solution. After some time, the egg placed in distilled water swells-up while the egg placed in salt solution shrinks.

B-3

The external pressure applied to stop the osmosis is termed as osmotic pressure (a Colligative property). Reverse osmosis takes place when the applied external pressure becomes larger than the osmotic pressure.

- What are isotonic solutions?
- Name one SPM which can be used in the process of reverse osmosis.
- What do you expect to happen when red blood corpuscles (RBC's) are placed on 0.5% NaCl solution?

OR

- Which one of the following will have higher osmotic pressure in 1 M KCl or 1 M urea solution?

Q30 Read the following passage and answer the questions that follow:

The rate of reaction is concerned with decrease in concentration of reactants or increase in the concentration of products per 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 a reaction can be determined from rate law or its integrated rate equation.

- What is average rate of reaction?
- Write two factors that affect the rate of reaction.
- (i) What happens to rate of reaction for zero order reaction?
(ii) What is the unit of k for zero order reaction?

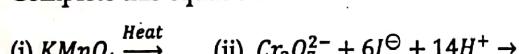
OR

- (i) For a reaction $P + 2Q \rightarrow \text{Products}$

Rate = $k[P]^{1/2}[Q]^1$. What is the order of the reaction?

- (ii) Define pseudo first order reaction with an example.

Q31. a) Write reaction for the preparation of potassium dichromate from chromite ore.
b) Complete this equation



c) Define disproportionation reaction.

Q32. a) Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration.
b) Predict the products of electrolysis in each of the following:

- An aqueous solution of $AgNO_3$ with platinum electrodes.
- A dilute solution of H_2SO_4 with platinum electrodes.

OR

- State Faraday's Law of electrolysis.
- State Kohlrausch law of migration.
- How much charge is required for the following reduction:
(i) 1 mol of Cu^{2+} to Cu (ii) 1 mol of MnO_4^- to Mn^{2+}

B-4

Q8. a) Write equation for

i) Swarts reaction ii) Sandmeyer reaction

b) In the following pairs of halogen compounds, which compound undergoes faster S_N1 reaction?

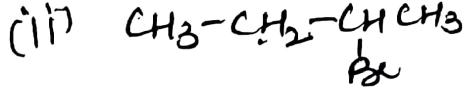
(1)



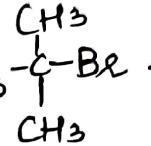
and



(i)



Br



Br

c) Arrange set of compound in the order of increasing boiling points.

(i) Bromomethane, Bromoform, Chloromethane, Dibromomethane

OR

a) Why haloarenes are less reactive than haloalkanes towards nucleophilic substitution reaction.

b) How will you bring the following conversions?

(i) But-1-ene to but-2-ene (ii) 1-Chlorobutane to n-octane

c) Define ambident nucleophile. Give example.

B-5