

BUDHA DAL PUBLIC SCHOOL, PATIALA
Pre Board Examination (6 December 2025)

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

M.M.70

Time: 3hrs.

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. For the reaction $A + 2B \rightarrow C$, $\text{Rate} = k[A][B]$ if the concentration of reactant B is doubled, keeping the concentration of A constant, the value of rate of reaction will be
- a) decreased by two times b) increased by four times
c) increased by two times d) remain same
- Q2. Which of the following statement is not correct for amines?
- a) Aniline and other arylamines are usually colourless but gets coloured on storage due to atmospheric oxidation.
b) Lower aliphatic amines are gases.
c) Primary amine gives monoalkyl sulphonamide with Hinsberg test.
d) When aniline reacts with sulphuric acid, m-aminobenzene sulphonic acid is formed.
- Q3. Pair of compounds, which give positive test with Tollen's reagent is
- a) Glucose and sucrose b) fructose and sucrose c) glucose and fructose d) all of the above
- Q4. Out of the following alkenes, the one which will produce tertiary butyl alcohol on acid catalysed hydration is
- a) $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$ b) $\text{CH}_3\text{CH}=\text{CH}_2$
c) $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3$ d) $(\text{CH}_3)_2\text{C}=\text{CH}_2$
- Q5. On oxidation, an alcohol gave a product X which reduces Tollens' reagent. Which of the following could be alcohols be?
- I) $\text{CH}_3-\text{CH}_2-\text{CH}_2\text{OH}$
II) $\text{CH}_3-\text{CH}_2-\text{CHOH}-\text{CH}_3$
III) $\text{CH}_3-\text{CH}_2-\text{C}(\text{CH}_3)_2-\text{OH}$
- a) Only I b) Only I and II c) Only II and III d) Any of I, II and III
- Q6. A coordination compound pentaamminebromidocobalt (III) sulphate is dissolved in water. When a few drops of chemical 'X' is added to the solution, it gives white precipitate, The chemical 'X' is
- a) AgNO_3 b) BaCl_2 c) BaSO_4 d) NaCl
- Q7. The rate constant of first order reaction is 10^{-2} min^{-1} . The half-life period of the
- a) 693 min b) 69.3 min c) 6.93 min d) 0.693 min
- Q8. Which one of the following aldehydes does not give Cannizzaro reaction?
- a) Formaldehyde b) Acetaldehyde c) Trimethyl acetaldehyde d) Benzaldehyde

B-1



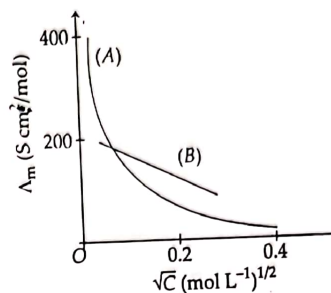
Q9. The major product of the acid catalysed reaction of 3, 3-dimethylbutene is

- a) 2-methylbutanol b) 2, 3-dimethylbutan-2-ol
c) 3, 3-dimethylbutan-2-ol d) 2,2-dimethylbutanol

Q10. Which type of electrolytes are used in A and B?

Select the correct option

- | A | B |
|-----------------------|--------------------|
| a) Weak electrolyte | Strong Electrolyte |
| b) Strong electrolyte | Weak electrolyte |
| c) Weak electrolyte | Weak electrolyte |
| d) Strong electrolyte | Strong electrolyte |



Q11. Halogenation, sulphonation, Friedel-Crafts reaction of haloarene comes under

- a) nucleophilic substitution reaction of benzene
b) electrophilic substitution reaction of benzene
c) addition reaction of benzene
d) elimination reaction of benzene

Q12. Transition metals are known to make interstitial compounds. Formation of interstitial compounds makes the transition metal

- a) more hard b) more soft c) more ductile d) more metallic

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) : Inversion of configuration is observed in S_N2 reaction.

Reason (R) : The reaction proceeds with the formation of carbocation.

Q14. Assertion (A) : Oxidation of ketones is easier than aldehydes.

Reason (R) : C - C bond of ketones is stronger than C - H bond of aldehydes.

Q15. Assertion (A) : p-nitrophenol is more acidic than phenol.

Reason (R) : Nitro group helps in the stabilization of the phenoxide ion by stabilization of the phenoxide ion by dispersal of negative charge due to resonance.

Q16. Assertion (A) : As the lead storage battery gets discharged of electrolyte present in it decrease.

Reason (R) : Lead and lead dioxide both react with sulphuric acid to form lead sulphate.

Section - B

Q17. Write equation of reaction occurring at anode and cathode of dry cell.

Q18. Write hybridisation and magnetic character of $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$

Q19. Give reasons for the following:

- a) Alkyl halides though polar are insoluble in water.
b) Haloarenes are less reactive than haloalkanes towards nucleophilic substitution reaction.

B-2

Q20. Define the following terms :
a) Glycosidic linkage b) Nucleotide

Q21. Write equation of glucose with
a) HCN b) Br₂ water
OR

a) What are the hydrolysis products of (i) Sucrose b) Lactose

Section - C

Q22. Write equation for
a) Rosenmund's reduction b) Swartz Reaction c) Kolbes reaction
OR

- b) Reaction of ethanol with methyl magnesium bromide followed by hydrolysis
- c) Hydration of But-1-ene in the presence of dilute H₂SO₄
- d) Reaction of phenol with Bromine water.

Q23. An organic compound C₉H₁₀O forms 2, 4 - DNP derivative, reduces Tollens reagent and undergoes Cannizzaro reaction.

- a) Identify the compound and write IUPAC name.
- b) Write all the reactions involved

Q24. Answer the following questions:

- a) State Raoult's Law
- b) Calculate the mass of ascorbic acid (C₆H₈O₆) to be dissolved in 75g of acetic acid to lower its melting point by 1.5°C. (K_f = 3.9K Kg/mol)

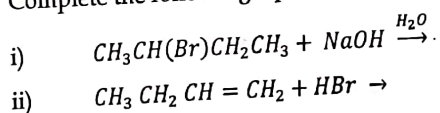
Q25. a) Define Chelate effect

b) Write configuration of d⁵ ion in presence of strong and weak ligand

Q26. a) Arrange the following in increasing order of boiling points:

Bromomethane, Bromoform, Chloromethane, Dibromomethane

b) Complete the following equations:



Q27. Give reasons

- a) Aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis
- b) Ethylamine is soluble in water while Aniline is not
- c) Diazonium salts of aromatic amines are more stable than those of aliphatic amines.

Q28. The half life for radioactive decay of ¹⁴C is 5730 years. An archeological artifact containing wood had only 80% of the ¹⁴C found in a living tree. Estimate the age of tree.

Section - D

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

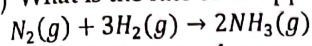
In a reaction, the rate of disappearance of different reactants or rate of formation of different products may not be equal but rate of reaction at any instant of time has the same value expected in terms of any reactant or product. Further, the rate of reaction may not depend upon the stoichiometric coefficients of the balanced chemical equation. The exact powers of molar concentrations of reactants on which rate depends are found experimentally and expressed in terms of 'order of reaction'. Each reaction has a characteristic rate constant which depends upon temperature.

The unit of the rate constant depends upon the order of reaction.

B-3

Based on the above information, answer the following questions:

a) (i) What is the rate of disappearance of hydrogen in the following reaction?



(ii) What is the rate of appearance of NH_3 in the above reaction?

b) For a reaction $A + B \rightarrow \text{product}$, the rate law is given by, $r = k[A]^{1/2}[B]^2$ What is the order of the reaction?

c) Rate constant of the reaction depends on the temperature. Justify

OR

What are the possible values for the order of the reaction?

Read the following passage and answer the questions that follow:

Osmotic pressure is important from a biological view point since the physiological membranes (e.g. red blood cell membranes) are semipermeable membranes. The effect of osmotic pressure on the red blood cells (RBC) can be demonstrated by suspending them in a solution. e.g. Five percent sodium chloride solution which is of greater osmotic pressure than their contents. The water in the RBC's will then pass through the semipermeable cell membranes into the saline solution, i.e. from lower to those of higher osmotic pressure. The cells will consequently experience loss of water, and will shrink and become wrinkled. The process is called crenation.

Conversely, if the RBC's are suspended in a 0.2 percent sodium chloride solution (lower osmotic pressure), the water from the solution will penetrate through the cell walls into the cells causing them to swell, to increase in size and eventually to break, to release haemoglobin. This process is called haemolysis. It is important therefore, to make sure that the osmotic pressure of solution for injection is about the same as that in the blood. Such solutions are called isotonic solutions. Solutions with a higher osmotic pressure are hypertonic and those of a lower osmotic pressure are said to be hypotonic.

Also, to reduce or avoid discomfort on administration of solutions to the delicate membranes (e.g. ophthalmic, nasal, vaginal solutions) it is very important to ensure that the solutions are isotonic with the tissues.

Answer the following questions on the basis of above data.

- (a) State the condition for reverse osmosis.
- (b) What is the application of reverse osmosis?
- When kept in water, raisin swells in size. Name the phenomenon and give one application.
- What is a common medical use of hypotonic solutions in patient care?

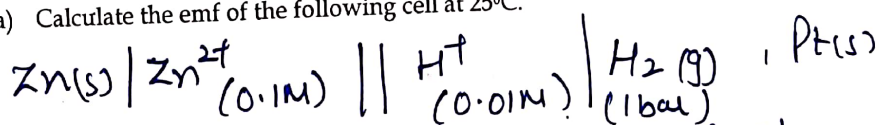
OR

Write an advantage of osmotic pressure measurement.

Section - E

Q31. a) Calculate the emf of the following cell at $25^\circ C$.

(3+2)



Given $E^0_{Zn^{2+}/Zn} = -0.75V$

$E^0_{H^+/H_2} = 0V$
 $\log 10 = 1$

b) State Kohlrausch law of independent migration of ions. Why does the conductivity of solution decreases with dilution.

OR

(2+3)

a) The conductivity of 0.05 M. CH_3COOH solution is found to be 100 ohm. If the cell constant is 0.0354 cm^{-1} . Calculate the molar conductivity of the acetic acid solution.

b) Predict the products of electrolysis of

- A dilute solution of H_2SO_4 with platinum electrode
- An aqueous solution of $CuCl_2$ with platinum electrode

B-4

- Q32. a) Give a chemical test to distinguish between
- Pentan-2-one and pentan-3-one
 - Methylamine and Dimethylamine
 - Phenol and Benzoic acid
- b) Arrange the following in increasing order of their property as indicated
- Acetaldehyde, Acetone, Di-tert-butylketone, Methyl tert butyl ketone (reactivity towards HCN)
 - Benzoic acid, 4-nitro benzoic acid, 3,4-dinitro benzoic acid, 4-methoxy benzoic acid (Acid strength)

OR

- a) Answer the following questions:
- Ortho and para nitro phenols can be separated by steam distillation. Name the isomer which will be steam volatile and why?
 - Carboxylic acid is stronger acid than phenol
 - The α -hydrogen of aldehydes and ketones are acidic in nature
- Q33. I) Account the following:
- Transition metals form complex compounds
 - The $E^\circ \text{Mn}^{2+}/\text{Mn}$ value for Manganese is highly negative whereas $E^\circ \text{Mn}^{3+}/\text{Mn}^{2+}$ is highly positive.
 - Cu^+ ion is unstable in aqueous solution.
- II) Write the equations involved in the preparation of KMnO_4 from pyrolusite ore.

OR

- a) Identify the following:
- Transition metal of 3d series that exhibits only one oxidation state.
 - Transition metal of 3d series that acts as strong reducing agent in +2 oxidation state in aqueous solution.
- b) Complete and balance the following equation.
- I. $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \longrightarrow$
- II. $\text{KMnO}_4 \xrightarrow{\text{Heat}}$
- c) What is Misch metal? Write its one use.