

Sample Paper 19

Class XII 2023-24

Chemistry

Time: 3 Hours

Max. Marks: 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 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.
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SECTION-A

Directions (Q. Nos. 1-16) : The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

1. When one Faraday of electric current is passed, the mass deposited, equal to
 - (a) One gram equivalent
 - (b) One gram mole
 - (c) Electrochemical equivalent
 - (d) Half gram equivalent
2. The most convenient method to protect the bottom of ship made of iron is
 - (a) Coating it with red lead oxide
 - (b) White tin plating
 - (c) Connecting it with Mg Block
 - (d) Connecting it with Pb block
3. Aldehydes and ketones will not form crystalline derivatives with
 - (a) Sodium bisulphite
 - (b) Phenylhydrazine
 - (c) Semicarbazide hydrochloride
 - (d) Dihydrogen sodium phosphate
4. Actinides;
 - (a) Are all synthetic elements
 - (b) Include element 104
 - (c) Have any short lived isotopes
 - (d) Have variable valency
5. AgNO_3 does not give precipitate with CHCl_3 because
 - (a) CHCl_3 does not ionise in water
 - (b) CHCl_3 does not react with AgNO_3
 - (c) CHCl_3 is chemically inert
 - (d) None of these

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6. At 25°C, the highest osmotic pressure is exhibited by 0.1 M solution of :
- (a) CaCl_2 (b) KCl
(c) Glucose (d) Urea
7. The bad smelling substance formed by the action of alcoholic caustic potash on chloroform and aniline is:
- (a) Acetic acid (b) Acetone
(c) Methanol (d) Methylamine
8. RNA is different from DNA because RNA contains
- (a) ribose sugar and thymine
(b) ribose sugar and uracil
(c) deoxyribose sugar and thymine
(d) deoxyribose sugar and uracil.
9. For a first order reaction $A \longrightarrow B$ the reaction rate at reactant concentration of 0.01 M is found to be $2.0 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}$. The half life period of the reaction is
- (a) 30 s (b) 220 s
(c) 300 s (d) 347 s
10. Correct name of $\text{K}_4[\text{Fe}(\text{CN})_6]$ is
- (a) Potassium ferricyanide
(b) Potassium ferrocyanide
(c) Potassium hexacyanoferrate (II)
(d) Potassium hexacyanoferrate (III)
11. Which of the following compounds is oxidised to prepare methyl ethyl ketone ?
- (a) 2-Propanol (b) 1-Butanol
(c) 2-Butanol (d) t-Butyl alcohol
12. For the reaction $A \longrightarrow B$, the rate law expression is : $\text{rate} = k[A]$. Which of the following statements is incorrect?
- (a) The reaction follows first order kinetics
(b) The $t_{1/2}$ of reaction depends on initial concentration of reactants.
(c) k is constant for the reaction at a constant temperature.
(d) The rate law provides a simple way of predicting the concentration of reactants and products at any time after the start of the products at any time after the start of the reaction.

Directions (Q. No. 13-16) : Each of the following questions consists of two statements, one is Assertion and the other is Reason. Give answer :

- 13. Assertion :** Isobutanal does not give iodoform test.
Reason : It does not have α -hydrogen
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
- 14. Assertion :** The rate of a reaction sometimes does not depend on concentrations.
Reason : Lower the activation energy faster is the reaction.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
- 15. Assertion :** $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ gives white precipitate with barium chloride.
Reason : The complex dissociates in the solution to give Br^- and SO_4^{2-} .
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
- 16. Assertion :** Nitration of benzoic acid gives *m*-intro-benzoic acid.
Reason : Carboxyl group increases the electron density at meta-position.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.

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SECTION-B

Directions (Q. Nos. 17-21) : This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.

17. Define ideal solution.
18. What are symmetrical and unsymmetrical ether ?
19. Name the two half-cell reactions that are taking place in the Daniel cell.
20. Name the following compounds according to IUPAC system of nomenclature :
 1. $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{CHO}$
 2. $\text{CH}_3\text{CH}_2\text{COCH}(\text{C}_2\text{H}_5)\text{CH}_2\text{CH}_2\text{Cl}$
 3. $\text{CH}_3\text{CH}=\text{CHCHO}$
 4. $\text{CH}_3\text{COCH}_2\text{COCH}_3$

or

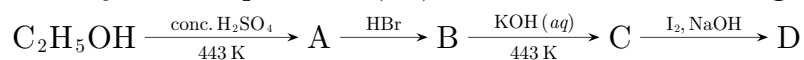
Write natural sources of formic acid, acetic acid and butyric acid.

21. Predict the geometrical shapes of all following :
 - (a) sp^3
 - (b) $d^2\text{sp}^3$

SECTION-C

Directions (Q. Nos. 22-28) : This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.

22. Identify the compounds A, B, C and D in the following sequence of reactions :



23. How is a galvanic cell represented on paper as per IUPAC convention? Give one example.
24. Derive equilibrium constant from Nernst equation
25.
 - (a) Give the IUPAC name of the complex salt $\text{K}_3[\text{Fe}(\text{CN})_6]$.
 - (b) Calculate EAN (Effective Atomic Number) of Fe in this complex salt.

26. Point out the difference between :
- Chirality and chiral centre.
 - Diastereoisomers and Enantiomers.
27. Arrange the following compounds in increasing order of their reactivity toward HCN. Acetaldehyde, Acetone, Di-tert-butyl ketone, Methyl tert-butyl ketone.

or

Explain why is ortho-nitrophenol more acidic than ortho-methoxy phenol ?

28. In a reaction, the rates of disappearance of different reactants or rates of formation of different products may not be equal but rate of reaction at any instant of time has the same value expressed 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 depends upon temperature. The units of the rate constant depend upon the order of reaction.

Answer the following questions :

- The rate constant of a reaction is found to be $3 \times 10^{-3} \text{ mol}^{-2} \text{ L}^2 \text{ sec}^{-1}$. What is the order of the reaction?
- Rate of a reaction can be expressed by following rate expression, $\text{Rate} = k[A]^2[B]$, if concentration of A is increased by 3 times and concentration of B is increased by 2 times, how many times rate of reaction increases?
- The rate of a certain reaction is given by, $\text{rate} = k[\text{H}^+]^n$. The rate increases 100 times when the pH changes from 3 to 1. What is the order (n) of the reaction ?

or

- In a chemical reaction $A + 2B \rightarrow \text{products}$, when concentration of A is doubled, rate of the reaction increases 4 times and when concentration of B alone is doubled rate continues to be the same. What is the order of the reaction ?

SECTION-D

Directions (Q. Nos. 29-30) : The following questions are case-based questions. Each question has an internal choice and carries 4 marks each. Read the passage carefully and answer the questions that follow.

29. The solubility of gases increases with increase of pressure. William Henry made a systematic investigation of the solubility of a gas in a liquid. According to Henry's law "the mass of a gas dissolved per unit volume of the solvent at constant temperature is directly proportional to the pressure of the gas in equilibrium with the solution". Dalton during the same period also concluded independently that the solubility of a gas in a liquid solution depends upon the partial pressure of the gas. If we use the mole fraction of gas in the solution as a measure of its solubility, then Henry's law can be modified as "the partial

pressure of the gas in the vapour phase is directly proportional to the mole fraction of the gas in the solution.”

Read the above passage and answer the following questions:

- What is the relation of K_H with temperature ?
- Write expression for Henry's law.
- Calculate solubility of methane in benzene at 298 K under 760 mm Hg. (Given Henry's constant = 4.27×10^5 mm Hg) ?

or

- The partial pressure of ethane over a saturated solution containing 6.56×10^{-2} g of ethane is 1 bar. If the solution contains 5.00×10^{-2} g of ethane then what will be the partial pressure (in bar) of the gas ?

30. Proteins are high molecular mass complex biomolecules of amino acids. The important proteins required for our body are enzymes, hormones, antibodies, transport proteins, structural proteins, contractile proteins etc. Except for glycine, all α -amino acids have chiral carbon atom and most of them have *L*-configuration. The amino acids exist as dipolar ion called zwitter ion, in which a proton goes from the carboxyl group to the amino group. A large number of α -amino acids are joined by peptide bonds forming polypeptides. The peptides having very large molecular mass (more than 10,000) are called proteins. The structure of proteins is described as primary structure giving sequence of linking of amino acids; secondary structure giving manner in which polypeptide chains are arranged and folded; tertiary structure giving folding, coiling or bonding polypeptide chains producing three dimensional structures and quaternary structure giving arrangement of sub-units in an aggregate protein molecule.

Answer the following questions :

- What do you mean by proteins ?
- What is Zwitter ion ?
- Which type of bond is present in polypeptide? Give example ?

or

- Which type of bonding is present in α -helix and (β -pleated structure of proteins.

SECTION-E

Directions (Q. Nos. 31-33) : The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.

31. Define the following as related to proteins.

- Peptide linkage.
- Primary structure.
- Denaturation.

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32. Define order of reaction and molecularity of reaction. Derive a general expression for specific rate constant of first order reaction.

or

Explain the effect of temperature on rate of a reaction.

33. Explain giving reasons:

1. Transition metals and many of their compounds show paramagnetic behaviour.
2. The enthalpies of atomisation of the transition metals are high.
3. The transition metals generally form coloured compounds.
4. Transition metals and their many compounds act as good catalysts.

or

Describe the preparation of potassium permanganate. How does the acidified permanganate solution react with (i) Fe^{2+} ion (ii) SO_2 and (iii) oxalic acid? Write the ionic equations.

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