

Sample Paper 12

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. Order of reaction can be
 - (a) zero
 - (b) fraction
 - (c) whole number
 - (d) integer, fraction, zero
2. For an electrolyte, elevation of B.P. is directly proportional to:
 - (a) molarity
 - (b) molality
 - (c) mole fraction
 - (d) all of these
3. The complexes $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ and $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$ are the examples of which type of isomerism ?
 - (a) Linkage isomerism
 - (b) Ionisation isomerism
 - (c) Coordination isomerism
 - (d) Geometrical isomerism
4. Colligative properties of the solution depend on:
 - (a) Nature of solute
 - (b) Nature of solvent
 - (c) Number of particles present in the solution
 - (d) Number of moles of solvent only
5. The fuel used in the cell used in Apollo mission was
 - (a) H_2
 - (b) $\text{H}_2 - \text{O}_2$
 - (c) CH_4
 - (d) O_2

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6. The rate of a chemical reaction
- (a) increases as the reaction proceeds
 - (b) decreases as the reaction proceeds
 - (c) may increase or decrease during the reaction
 - (d) remains constant as the reaction proceeds
7. An example of a compound with functional group $-O-$ is :
- (a) Acetic acid
 - (b) Methyl alcohol
 - (c) Diethyl ether
 - (d) Acetone
8. Acetamide is treated with the following reagents separately. Which one of these would yield methylamine?
- (a) $\text{NaOH} - \text{Br}_2$
 - (b) Sodalime
 - (c) Hot con. H_2SO_4
 - (d) PCl_5
9. In a hydrogen-oxygen fuel cell, combustion of hydrogen occurs to
- (a) produce high purity water
 - (b) create potential difference between two electrodes
 - (c) generate heat
 - (d) remove absorbed oxygen from electrode surfaces
10. Which of the following is a disaccharide?
- (a) Lactose
 - (b) Starch
 - (c) Cellulose
 - (d) Fructose
11. Which reagent cannot be used to prepare an alkyl halide from an alcohol ?
- (a) $\text{HCl} + \text{ZnCl}_2$
 - (b) NaCl
 - (c) PCl_5
 - (d) SOCl_2
12. Which of the following represents the correct order of the acidity in the given compounds?
- (a) $\text{FCH}_2\text{COOH} > \text{CH}_3\text{COOH} > \text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH}$
 - (b) $\text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{CH}_3\text{COOH}$
 - (c) $\text{FCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{BrCH}_2\text{COOH} > \text{CH}_2\text{COOH}$
 - (d) $\text{CH}_3\text{COOH} > \text{BrCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{FCH}_2\text{COOH}$

Directions (Q. Nos. 13-16) : Each of the following questions consists of two statements, one is Assertion and the other is Reason. Give answer :

- 13. Assertion :** Benzene diazonium salt on boiling with water forms phenol.
Reason : C-N bond is polar.
- (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 :** In acidic medium, $K_2Cr_2O_7$ exists as $Cr_2O_7^{2-}$ (orange) while in basic medium it is converted to CrO_4^{2-} (yellow).
Assertion : $K_2Cr_2O_7$ is hygroscopic in nature and changes colour on reaction with water.
- (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 :** $[Co(NO_2)_3(NH_3)_3]$ does not show optical isomerism.
Reason : It has a plane of symmetry.
- (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 :** Benzene diazonium chloride does not give test for nitrogen.
Reason : Loss of N_2 gas takes place during heating.
- (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. What is salt bridge? What are its uses?
18. Why the properties of third transition series are very similar to second transition series?
19. How will you convert Phenol to benzene?
20. Define Order of a reaction. Illustrate your answer with an example.
or
What are complex reactions? Name one complex reaction.
21. What are reducing and non reducing sugars?

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. Derive the structure of cyclohex-3-en-1-ol.
23. State colligative properties of dilute solution. Write down the different types of colligative properties.
24. Explain magnetic behaviour of transition metals.
25. Draw the structure of all isomeric alcohols of molecular formula $C_4H_{10}O$ and give their IUPAC names.
26. What are the common types of secondary (2°) structure of proteins?
27. Write the following reactions of Benzene diazonium chloride.
 - (i) Sandmeyer reaction
 - (ii) Gatterman reaction

or

What do you mean by invert sugar?

28. (i) Define the following terms:
- Enantiomers
 - Racemic mixture
- (ii) Why is chlorobenzene resistant to nucleophilic substitution 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. Carbohydrates are polyhydroxy aldehydes and ketones and those compounds which on hydrolysis give such compounds are also carbohydrates. The carbohydrates which are not hydrolysed are called monosaccharides. Monosaccharides with aldehydic group are called aldose and those which free ketonic groups are called ketose. Carbohydrates are optically active. Number of optical isomers = 2^n .

Where n = number of asymmetric carbons. Carbohydrates are mainly synthesised by plants during photosynthesis. The monosaccharides give the characteristic reactions of alcohols and carbonyl group (aldehydes and ketones). It has been found that these monosaccharides exist in the form of cyclic structures. In cyclization, the $-OH$ groups (generally C_5 or C_4 in aldohexoses and C_5 or C_6 in ketohexoses) combine with the aldehyde or keto group. As a result, cyclic structures of five or six membered rings containing one oxygen atom are formed, e.g., glucose forms a ring structure. Glucose contains one aldehyde group, one 1° alcoholic group and four 2° alcoholic groups in its open chain structure.

Answer the following questions :

- What is the name the first member of ketose sugar?
- How many optical isomers are present in $CH_2OH(CHOH)_4CHO$?
- Write the reaction of glucose with hydroxylamine.

or

- How many moles of acetic anhydride are needed for acetylation of glucose? What does it confirm?

30. A solution containing 30 g of non-volatile solute exactly in 90 g of water has a vapour pressure of 2.8 K Pa at 298 K Further 18 g of water is added to this solution. The new vapour pressure becomes 2.9 k Pa at 298 K When a non-volatile solute is added to a solvent, the surface has molecules of solute and solvent both. Thus, the number of molecules of solvent present in upper surface is less. The number of solvent molecules escaping from the surface is reduced.

Answer the following questions :

- Write down the expression for relative lowering of vapour pressure with the mole fraction of the solute.
- Calculate the vapour pressure of water at 298 K.
- Find out the molecular mass of solute?

or

- Name two factors on which the vapour pressure of the liquid depends.

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. Give two reactions that show the acidic nature of Phenol. Compare its acidity with that of ethanol.
32. (a) Differentiate between Osmosis and diffusion. How is osmotic pressure determined by Berkeley-Hartley method?
(b) 18 g of glucose ($C_6H_{12}O_6$) was added to 1 kg water at 1.013 bar atmospheric pressure in a vessel. At which temperature will water boil? K_b for water is $0.52 \text{ K Kg mol}^{-1}$.

or

- (a) What do you mean by the term 'elevation of boiling point'?
(b) State Raoult's law. How is it useful in determining the molecular weight of non-electrolyte solute?
33. Arrange the compounds of each set in order of reactivity towards S_N2 displacement:
- (i) (a) 2-Bromo-2-methylbutane
(b) 1-Bromopentane
(c) 2-Bromopentane
- (ii) (a) 1-Bromobutane-3-methylbutane
(b) 2-Bromo-2-methylbutane
(c) 2-Bromo-3-methylbutane
- (iii) (a) Bromobutane
(b) 1-Bromo-2, 2-dimethylpropane
(c) 1-Bromo-2-methylbutane
(d) 1-Bromo-3-methylbutane.

or

Write the structure of the major organic product in each of the following reaction :

- $CH_3CH_2CH_2Cl + NaI \xrightarrow{\text{acetone, heat}}$
- $(CH_3)_3CBr + KOH \xrightarrow{\text{ethanol heat}}$
- $CH_3CH(Br)CH_2CH_3 + NaOH \xrightarrow{\text{Water}}$
- $CH_3CH_2Br + KCN \xrightarrow{\text{aq ethanol}}$
- $C_6H_5ONa + C_2H_5Cl \longrightarrow$
- $CH_3CH_2CH_2OH + SOCl_2 \longrightarrow$
- $CH_3CH_2CH=CH_2 + HBr \xrightarrow{\text{Peroxide}}$
- $CH_3CH=C(CH_3)_2 + HBr \longrightarrow$

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