

# Sample Paper 5

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. A Grignard reagent is prepared by the action of magnesium in dry ether on:  
(a)  $C_2H_5OH$  (b)  $C_2H_6$   
(c)  $C_2H_5Cl$  (d)  $C_2H_5CN$
2. Azeotropic mixture of HCl and  $H_2O$  has:  
(a) 48% HCl (b) 22.2% HCl  
(c) 36% HCl (d) 20.2% HCl
3. If the rate of a reaction is expressed by,  $Rate = k[A]^2[B]$ . Then the order of reaction will be  
(a) 2 (b) 3  
(c) 1 (d) 0
4. For a zero order reaction:  
(a)  $t_{1/2} \propto a$  (b)  $t_{1/2} \propto \frac{1}{a}$   
(c)  $t_{1/2} \propto a^2$  (d)  $t_{1/2} \propto \frac{1}{a^2}$
5. The cannizzaro's reaction is not given by –  
(a) Formaldehyde (b) Acetaldehyde  
(c) Benzaldehyde (d) Furfural

6. Copper sulphate solution on treatment excess of KI gives white precipitate. The precipitate is  
 (a)  $\text{CuI}_2$  (b)  $\text{Cu}_2\text{I}_2$   
 (c)  $\text{Cu}_2\text{SO}_4$  (d)  $\text{I}_2$
7. An organic compound reacts with benzene sulfonyl chloride and product dissolves in aqueous NaOH. The compound is –  
 (a)  $\text{R-NH}_2$  (b)  $\begin{array}{l} \text{R} \\ \diagdown \\ \text{NH} \\ \diagup \\ \text{R} \end{array}$   
 (c)  $\begin{array}{l} \text{R} \\ \diagdown \\ \text{R} \rightarrow \text{N} \\ \diagup \\ \text{R} \end{array}$  (d) All of these
8. Sweetest of all sugars is:  
 (a) Glucose (b) Lactose  
 (c) Sucrose (d) Fructose
9. The van't Hoff's factor of 0.1 M  $\text{Ba}(\text{NO}_3)_2$  solution is 2.74. The degree of association is -  
 (a) 91.3% (b) 87%  
 (c) 100% (d) 74%
10. A dilute aqueous solution of sodium fluoride is electrolysed; the products at the anode and cathode are :  
 (a)  $\text{F}_2, \text{Na}$  (b)  $\text{F}_2, \text{H}_2$   
 (c)  $\text{O}_2, \text{Na}$  (d)  $\text{O}_2, \text{H}_2$
11. Which of the following compounds has tetrahedral geometry?  
 (a)  $[\text{Ni}(\text{CN})_4]^{2-}$  (b)  $[\text{Pd}(\text{CN})_4]^{2-}$   
 (c)  $[\text{PdCl}_4]^{2-}$  (d)  $[\text{NiCl}_4]^{2-}$
12.  $\text{R-OH} + \text{CH}_2\text{N}_2 \longrightarrow$  Leaving group in this reaction is –  
 (a)  $\text{CH}_3$  (b) R  
 (c)  $\text{N}_2$  (d)  $\text{CH}_2$

**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 :**  $\text{S}_\text{N}^2$  reaction of an optically active aryl halide with an aqueous solution of KOH always gives an alcohol with opposite sign of rotation.  
**Reason :**  $\text{S}_\text{N}^2$  reactions always proceed with retention of configuration.

- (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 :** DNA as well as RNA molecules are found in the nucleus of a cell.  
**Reason :** On heating, the enzymes do not lose their specific activity.
- (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 :** The rate of the reaction is the rate of change of concentration of a reactant or a product.  
**Reason :** Rate of reaction remains constant during the course of 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.
16. **Assertion :** Disruption of the natural structure of a protein is called denaturation.  
**Reason :** The change in colour and appearance of egg during cooking is due to denaturation.
- (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.

## 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. State the main advantage of molality over molarity as the unit of concentration.
18. Why do transition metals show variable oxidation state?

19. If in a chemical reaction  $A + B \longrightarrow$  product, rate law is given by  $R = K[A]^{\frac{1}{2}}[B]^{\frac{3}{2}}$ , find the order of reaction.
20. P-Nitrophenol is more acidic than P-methyl phenol. Why?  
**or**  
Write the structural formulae of the following :
1. 4, 4 dimethyl-2-pentanol
  2. 2-butanol
21. What is chemical kinetics?

## 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. Account for the following:  
The treatment of an alkyl chloride with aqueous KOH leads to the formation of alcoholic whereas in the presence of alcoholic KOH, alkene is the major product.
23. Differentiate between molarity and molality of a solution. How can we change molality value of a solution into molarity value?
24. Define standard electrode potential.
25. What are the characteristics of the transition elements and why are they called transition elements? Which of the *d*-block elements may not be regarded as the transition elements?
26. Give the structures and IUPAC names of products expected from the following reactions :
1. Catalytic reduction of butanal.
  2. Hydration of propene in presence of concentrated sulphuric acid.
  3. Reaction of propanone with methyl magnesium bromide followed by hydrolysis.
27. How will you distinguish between methanoic acid and ethanoic acid?  
**or**  
What are aldehydes, ketones, carboxylic acid?
28. Give the IUPAC names of the following:
- (i)  $\text{Cl} - \text{CH}_2\text{C} \equiv \text{C} - \text{CH}_2 - \text{Br}$
  - (ii)  $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}(\text{C}_2\text{H}_5)\text{Cl}$

## 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.** There are 13 vitamins known till today. Four of which are fat soluble (A, D, E, K) and rest of which are water soluble ( $B_1$ ,  $B_2$ ,  $B_3$ ,  $B_5$ ,  $B_6$ ,  $B_7$ ,  $B_9$ ,  $B_{12}$ , C). Let's know the history how vitamins were discovered. By the end of mid-1800 scientists had discovered that pathogens caused various diseases. It was assumed that patchy skin, falling eye-sight etc. is also caused by germs instead of vitamin deficiency. Dutch Bio Scientist Dr. Christiaan Eijkman reported in 1895, that chickens that ate polished rice developed beri-beri. He was awarded Noble Prize in 1929 for his contribution in discovery of vitamins. 'Vita' (Latin—for important to life), amine (a specific group which Funk believed is present in all vitamins). In the beginning vitamin C was called Scurvy Vitamin, Vitamin-B was called Beri-Beri vitamin when rats were fed a diet heavy in lard and olive oil, they died but with the addition of tiny amount of butter fat they survived. McCollum called vitamin in butter fat. Fat soluble Vitamin A, Vitamin  $B_{12}$  and Vitamin D were discovered later. Now we also know vitamin E, K and H also.

Answer the following questions:

- Name four vitamins that are stored in liver and adipose (fat storing) tissues.
- Out of B, C and  $B_{12}$  which vitamin cannot be stored in our body and why?
- Name a vitamin which helps in blood clotting and name source of this vitamin.

**or**

- Name a vitamin which is fat soluble and anti-oxidant. What are sources of this vitamin and its deficiency disease?

- 30.** Electrolytes dissociate into ions. In case of electrolytes if we determine their molar mass using colligative property, the value of molar mass is found to be abnormal because colligative property depends on number of ions. Greater the number of ions, more will be colligative property. van't Hoff factor ( $i$ ) is ratio of normal molar mass to the abnormal molar mass. It is also equal to ratio of observed colligative property to the calculated colligative property.

A student determined value of  $i$  at various concentration of NaCl, KCl,  $MgSO_4$  and  $K_2SO_4$ . The values are given in the following table.

**Table:** Values of van't Hoff factor,  $i$ , at Various Concentrations for NaCl, KCl,  $MgSO_4$  and  $K_2SO_4$ .

Salt	Values of $i$			van't Hoff Factor $i$ for complete dissociation of solute
	0.1 m	0.01 m	0.001 m	
NaCl	1.87	1.94	1.97	2.00
KCl	1.85	1.94	1.98	2.00
$MgSO_4$	1.21	1.82	1.82	2.00
$K_2SO_4$	2.32	2.84	2.84	3.00

\* represent  $i$  values for incomplete dissociation. Answer the following questions based on above table.

- (a) How is van't Hoff factor related to molality and why?  
 (b) What is value of  $i$  in case of (i) electrolyte (ii) non-electrolyte?  
 (c) Determine the amount of  $\text{CaCl}_2$  ( $i = 2.47$ ) dissolved in 2.5 L of water such that its osmotic pressure is 0.75 atm at  $27^\circ\text{C}$ . [ $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$ ] [Ca 40u, Cl = 35.5u]  
**or**  
 (d) Determine the osmotic pressure of a solution prepared by dissolving 25 mg of  $\text{K}_2\text{SO}_4$  in 2 L solution at  $25^\circ\text{C}$   
 Assuming it is completely ionised.  
 [ $R = 0.082 \text{ L atm K}^{-1}$ ,  $K = 39\text{u}$ ,  $s = 32\text{u}$ ,  $O = 16\text{u}$ ]

## 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.** How would you determine the standard electrode potential of  $\text{Mg}^{2+} | \text{Mg}$  ?

**or**

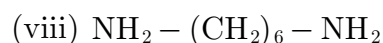
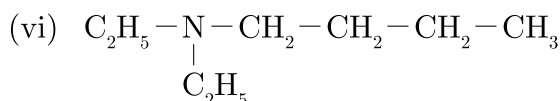
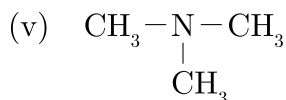
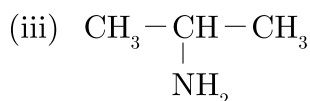
Explain Nernst equation.

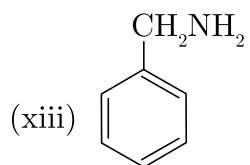
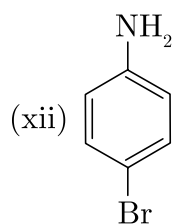
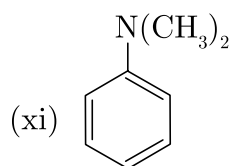
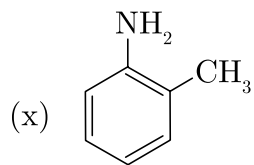
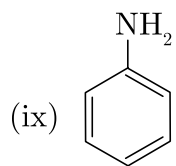
- 32.** (a) State Werner's coordination theory.  
 (b) What are ligands? Classify them with examples.

**or**

List various types of isomerism possible for coordination compounds give one example of each.

- 33.** Write common name and IUPAC name of following amines.





**Important MCQ Question For  
Class 12 Chemistry**