

# Sample Paper 7

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. Adenosine is an example of  
(a) Nucleotide  
(b) Pyrimidine base  
(c) Nucleoside  
(d) Purine base
2. If 2 gm of NaOH is present in 200 ml of its solution, its molarity will be :  
(a) 0.25  
(b) 0.5  
(c) 5  
(d) 10
3. The hybridisation of Fe in  $K_4[Fe(CN)_6]$  is :  
(a)  $dsp^2$   
(b)  $sp^3$   
(c)  $d^2 sp^3$   
(d)  $sp^3 d^2$
4. If 96500 coulomb of electricity is passed through  $CuSO_4$  solution, it will liberate  
(a) 63.5 g Cu  
(b) 31.76 g Cu  
(c) 96500 g Cu  
(d) 100 g Cu
5. Which of the following alcohols gives 2-butene on dehydration by concentration  $H_2SO_4$  ?  
(a) 2-Methyl propene-2-ol  
(b) 2-Methyl 1-propanol  
(c) Butane-2-ol  
(d) Butane-1-ol

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6. The rate constant of a reaction depends on
- (a) temperature (b) initial concentration of the reactants  
(c) time of reaction (d) extent of reaction
7. Methylamine can be prepared by :
- (a) Wurtz reaction (b) Hofmann's bromamide reaction  
(c) Friedel-Crafts reaction (d) Kolbe reaction
8. The most common oxidation state shown by 1st row of transition elements is :
- (a) (+II) (b) (+III)  
(c) (+IV) (d) all of these
9. Avogadro's number ( $N$ ) is equal to :
- (a)  $6.023 \times 10^{24}$  (b)  $6.023 \times 10^{23}$   
(c)  $6.023 \times 10^{-23}$  (d) 11.2
10. What is the coordination number of Cr in  $[K_3Cr(OX)_3]$
- (a) 6 (b) 5  
(c) 4 (d) 3
11. The reaction is called :
- $$RCOCl + H_2 \xrightarrow{Pd/BaSO_4} RCHO + HCl$$
- (a) Cannizzaro Reaction (b) Rosenmund's Reaction  
(c) Haloform Reaction (d) Clemensen's Reaction
12. Alkyl halide is converted into an alcohol by :
- (a) Addition reaction (b) Substitution reaction  
(c) Elimination reaction (d) Dehydrogenation reaction

**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 :** Carboxypeptidase is an exopeptidase.  
**Reason :** It cleaves the N-terminal bond.
- (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 :** Reimer-Tiemann reaction of phenol with  $\text{CCl}_4$  in NaOH at 340 K gives salicylic acid as the major product.  
**Reason :** The reaction occurs through intermediate formation of di-chlorocarbene.
- (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 order of a reaction can have fractional value.  
**Reason :** The order of a reaction cannot be written from balanced equation of a 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 :** Proteins on hydrolysis produce amino acids.  
**Reason :** Amino acids contain- $\text{NH}_2$  and  $-\text{COOH}$  group.
- (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

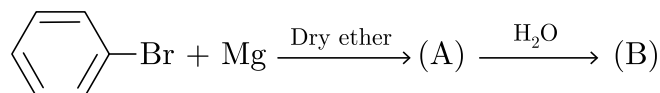
**Directions (Q. Nos. 17-21) :** This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.

17. Explain why aquatic species are more comfortable in cold water rather than in warm water.
18. Why is  $\text{Cr}^{2+}$  reducing and  $\text{Mn}^{3+}$  oxidising when both have  $d^4$  configuration?

**Ans :**

$\text{Cr}^{2+}$  is reducing because after the loss of one electron its configuration changes from  $d^4$  to  $d^3$ , the latter having a half filled  $t_{2g}$  level (see next unit).  $\text{Mn}^{3+}$  is oxidising because after taking one electron its configuration changes from  $d^4$  to  $d^5$  ( $\text{Mn}^{3+}$  to  $\text{Mn}^{2+}$ ) configuration which has extra stability transition elements.

19. Identify A and B in the following:



20. What are phenols?

or

What are ethers?

21. Write the general form of reactions:

- (i) Wurtz reaction
- (ii) Swarts reaction

## 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. Differentiate between average and instantaneous rate of reaction.

23. Why Zinc, Cadmium and Mercury are not regarded as transition elements?

24. Why does vapour pressure of a liquid decrease with addition of a non volatile solid solute?

25. What are the products obtained at the cathode and anode during the electrolysis of the following when platinum electrodes are used in the electrolysis

- (a) Molten KCl
- (b) Aq.  $\text{CuSO}_4$  solution
- (c) Aq.  $\text{K}_2\text{SO}_4$  solution

26. Transition elements form coloured compound. Explain.

27. What happens when :

1. ethanol is oxidised with acidified  $\text{KMnO}_3$  solution?
2. ethanol is treated with  $\text{PCl}_5$ ?

28. Explain two important uses of formalin.

or

Give reasons for the following :

1. Ethyne is more acidic than ethane.
2. Lower members of aldehyde are more soluble in water.

## 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.** In the 1880s, French chemist François-Marie Raoult discovered that when a substance is dissolved in a solution, the vapor pressure of the solution will generally decrease. This observation depends on two variables:

- the mole fraction of the amount of dissolved solute present and
- the original vapor pressure (pure solvent).

At any given temperature for a particular solid or liquid, there is a pressure at which the vapor formed above the substance is in dynamic equilibrium with its liquid or solid form. This is the vapor pressure of the substance at that temperature. At equilibrium, the rate at which the solid or liquid evaporates is equal to the rate that the gas is condensing back to its original form. All solids and liquids have a vapor pressure, and this pressure is constant regardless of how much of the substance is present.

Answer the following questions :

- What is the value of  $\Delta H_{\text{mixing}}$  and  $\Delta V_{\text{mixing}}$  for an ideal solution?
- Do the intermolecular forces between  $A$  and  $B$  are weaker or stronger than that between  $A - A$  and  $B - B$  in a non-ideal solution with positive deviation ?
- Give an example of non-ideal solution with negative deviation. Give an example of ideal solution.

**or**

- Write the expression for the pressure of non ideal solution with positive and negative deviations.

**30.** The sequence of bases along the DNA and RNA chain establishes its primary structure which controls the specific properties of the nucleic acid. An RNA molecule is usually a single chain of ribose-containing nucleotide. On the basis of X-ray analysis of DNA, J.D., Watson and F.H.C. Crick (shared noble prize in 1962) proposed a three dimensional secondary structure for DNA. DNA molecule is a long and highly complex, spirally twisted, double helix, ladder like structure. The two polynucleotide chains or strands are linked up by hydrogen bonding between the nitrogenous base molecules of their nucleotide monomers. Adenine (purine) always links with thymine (pyrimidine) with the help of two hydrogen bonds and guanine (purine) with cytosine (pyrimidine) with the help of three hydrogen bonds. Hence, the two strands extend in opposite directions, i.e., are antiparallel and complimentary.

Answer the following questions :

- What information is given by primary structure of DNA?
- Name the types of nitrogenous bases present in nucleic acids.
- Write the structural and functional difference between DNA and RNA.

**or**

- Name the bases present in RNA. Which one of these is not present in DNA?

## 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.** Write following methods of preparation of amines:

- (i) Reduction of nitro compounds.
- (ii) Ammonolysis
- (iii) Reduction of nitriles
- (iv) Reduction of amides
- (v) Gabriel phthalimide synthesis
- (vi) Hoffmann bromamide degradation reaction.
- (vii) Schmidt reaction

**32.** Define the following :

1. Resistance
2. Conductance
3. Conductivity
4. Equivalent conductivity
5. Molar conductivity

**or**

1. How Molar conductivity of strong and weak electrolyte vary with concentration?
2. How conductivity of solution vary with concentration.

**33.** (i) Draw all the possible isomers having the formula  $\text{Cr}[(\text{NH}_3)_4\text{Cl}_2]^+$ .

(ii) Illustrate the following with an example:

- (a) Linkage isomerism
- (b) Coordination isomerism.

(iii) Why is  $[\text{NiCl}_4]^{2-}$  is paramagnetic ( $\text{Ni} = 28$ )?

**or**

Explain bonding in coordination compounds with the help of crystal field theory.

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