

**Sample Paper**  
**(2023-24)**  
**Subject- Chemistry**  
**Class-12**

**Time: 3hrs 15min**

**Total: 70**

Note: First 15 minutes are allotted for the candidates to read the question paper.

1. All questions are compulsory. Marks allotted to each question are given in the margin.
2. Mention all the steps in numericals.
3. Give relevant answers to the questions.
4. Write chemical equations wherever necessary.

Question1. Four alternatives are given in each part of this question. Select the correct alternative and write it in your answer book.

a)  $200\text{cm}^3$  of an aqueous solution of a protein contains 1.26gm of the protein. The osmotic pressure of solution at 300K is found to be  $2.57 \times 10^3$  bar. Calculate the molar mass of the protein. 1

- i)  $61.022 \text{ gmol}^{-1}$
- ii)  $6.1022 \text{ gmol}^{-1}$
- iii)  $610.22 \text{ gmol}^{-1}$
- iv)  $61.22 \text{ gmol}^{-1}$

b) Which oxidation state of following d electronic configuration will be stable in ground state of transition elements? 1

- i)  $3d^3$
- ii)  $3d^5$
- iii)  $3d^8$
- iv)  $3d^4$

c) How many ions will be produced by a complex  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_2$ ? 1

- i) 6
- ii) 4
- iii) 3
- iv) 2

d) Increasing order of boiling points of following compounds are- 1

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$ ,  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ ,  $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$ ,  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

- i)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO} < \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} < \text{C}_2\text{H}_5\text{OC}_2\text{H}_5 < \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- ii)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO} < \text{C}_2\text{H}_5\text{OC}_2\text{H}_5 < \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} < \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- iii)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3 < \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} < \text{C}_2\text{H}_5\text{OC}_2\text{H}_5 < \text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$
- iv)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3 < \text{C}_2\text{H}_5\text{OC}_2\text{H}_5 < \text{CH}_3\text{CH}_2\text{CH}_2\text{CHO} < \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$

- e) From Gabriel Pthalimide synthesis \_\_\_\_\_ is formed. 1
- i) primary aromatic amine
  - ii) primary aliphatic amine
  - iii) secondary amine
  - iv) tertiary amine
- f) Maltose is formed by- 1
- i) two molecules of glucose
  - ii) two molecules of fructose
  - iii) from glucose and fructose
  - iv) None

- Question 2. (a) Explain Van't Hoff coefficient? How it is related to colligative properties? 1+1=2
- (b) What are interstitial compounds? Why are such compounds well known for transition metals? 1+1=2
- (c) What is electrochemical series? 2
- (d) How will you convert the following- 1+1=2
- (i) Butane from chloroethane, (ii) chlorobenzene from aniline

- Question 3. (a) 45g of ethylene glycol is mixed with 600gm of water. Calculate its- 1+1=2
- (i) freezing point depression.
  - (ii) freezing point of solution.
- (b) Write the name of reagent used in the following reactions- 1+1=2
- (i) oxidation of primary alcohol into carboxylic acid.
  - (ii) dehydration of propene-2-ol into propene.
- (c) Differentiate between- 1+1=2
- (i) Acetaldehyde and Acetone.
  - (ii) Acetophenone and Benzophenone.
- (d) Draw the structure of four bases present in DNA. 2

- Question 4. (a) Why it is not possible to obtain pure ethanol by distillation? What is the term used for those binary mixtures which show deviation from Rault's law and their components cannot be separated by steam distillation? How many types of these mixtures are? 1+1+1=3
- (b) Define the conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration. 2+1=3
- (c) A reaction is of first order with respect to A and second order with respect to B- 1+1+1=3

- (i) Write its differential rate equation.
- (ii) What will be the effect on velocity when concentration of B is changed to three times of its original concentration?
- (iii) What will be the effect on velocity when concentration of A and B is changed to two times of its original concentration?
- (d) Give reason of following- 3
- (i) Mn(III) is a strong oxidizing agent whereas  $\text{Cr}^{+2}$  is a strong reducing agent.
- (ii) Ions having  $d^1$  configuration is unstable.

Question 5. (a) What are the advantages of fuel cell in comparison to primary and secondary batteries? Write the reactions involved in lead storage battery. How the density of an electrolyte is affected when battery is discharged. 2+1+1=4

(b) (i) The rate constant of a first order reaction is  $60\text{s}^{-1}$ . How much time will it take to reduce to  $1/16^{\text{th}}$  of its original concentration? 2

(ii) A first order reaction takes 40 minutes for its 30% decomposition. Calculate  $t_{1/2}$  for this reaction. 2

(c) (i) Write two common chemical reactions of glucose and fructose. 2

(ii) Why are Vitamin A and Vitamin C are essential for us. Give their important sources. 2

(d) (i) What do you understand by bidentate and ambidentate ligands? 2

(ii) What do you understand by chelate effect? 2

Question 6. (a) What happens when- 1+1+1+1+1=5

- (i) Methyl Chloride is treated with KCN.
- (ii) Ethyl Chloride is treated with aq. KOH.
- (iii) Bromobenzene is treated with magnesium in presence of dry ether.
- (iv) n-butyl chloride is treated with alcoholic KOH
- (v) Hydrolysis of chlorobenzene

OR

Write the structure of final product of the following reactions- 1+1+1+1+1=5

- (i)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl} + \text{NaI} \longrightarrow$
- (ii)  $\text{C}_6\text{H}_5\text{ONa} + \text{C}_2\text{H}_5\text{Cl} \longrightarrow$
- (iii)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{SOCl}_2 \longrightarrow$
- (iv)  $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 + \text{HBr} \longrightarrow$
- (v)  $\text{CH}_3\text{CH}=\text{C}(\text{CH}_3)_2 + \text{HBr} \longrightarrow$

- (b) Explain the following with examples- 2+2+1=5
- (i) Kolbe reaction
  - (ii) Reimer Tiemann reaction
  - (iii) Williamsons Synthesis

OR

- Give the chemical reactions for following- 2+2+1=5
- (i) Reaction of Phenol with dil.  $\text{HNO}_3$
  - (ii) Reaction of Bromine with Phenol in  $\text{CS}_2$
  - (iii) Oxidation of Propane-1-ol with basic  $\text{KMnO}_4$

Question 7. (a) Complete the following conversions in two steps only- 1+1+1+1+1=5

- (i) 1-Phenylethanol from Bromobenzene
- (ii) 3-Phenylpropane-1-ol from Benzaldehyde
- (iii) 3-Hydroxybutanal from Ethanol
- (iv) Benzaldehyde from Benzoic acid
- (v) Propene from Propanone

OR

Write the structure of following compounds- 1+1+1+1+1=5

- (i) 4-chloropentane-2-one
- (ii) p,p'- dihydroxy benzophenone
- (iii) hex-2-en-4-ynoic acid
- (iv) 3-methylbutanal
- (v) p-methylbenzaldehyde

(b) Explain the following- 2+2+1=5

- (i) Ethylamine is soluble in water whereas aniline does not.
- (ii) Aniline does not undergo Friedel Craft reaction.
- (iii) Diazonium salt of aromatic amines are more stable than the salt obtain from the aliphatic amines.

OR

- (i) Write structures of different isomeric amines corresponding to the molecular formula  $\text{C}_4\text{H}_{11}\text{N}$ . What type isomerism is exhibited by different pairs of amines? 3+2
- (ii) Write the chemical equation of ethanolic  $\text{NH}_3$  with  $\text{C}_2\text{H}_5\text{Cl}$ .