

Chemistry
CLASS XII

Time allowed: 3 Hours

Maximum Marks: 70

General Instructions:

- (i) All questions are compulsory.
- (ii) Marks by each question are indicated against it.
- (iii) Question numbers 1 to 5 are very short answer questions, each of 1 mark. Answer them in about one sentence each.
- (iv) Question number 6 to 12 is short answer questions of 2 marks each. Answer them in about 30 words each.
- (v) Question numbers 13 to 24 are also short answer questions of 3 marks each. Answer them in about 40 words each.
- (vi) Question numbers 25 to 27 are long answer questions of 5 marks each. Answer them in about 70 words each.
- (vii) Use log tables, if necessary. Calculators are not permitted.

1. Why does the molality of a solution remain unchanged with temperature? 1
2. Classify the following as being either n type or p type semi conductor. 1
a) Si doped with Sb b) Ge is doped with In
3. The reaction $R_1 + R_2 \rightarrow P$ is Zero order with respect to R_1 and 2nd order with respect to R_2 . Write the unit for rate constant for this reaction. 1
4. Write the IUPAC name of $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{C}(\text{CH}_3)_2\text{CONH}(\text{CH}_3)$ 1
5. Why is aniline weaker base than N,N dimethyl aniline and stronger base than m-nitro aniline? 1
6. What type(s) of intermolecular forces exist between the following pairs? 2
a) HCl and PH_3 b) Br_2 and CCl_4 c) I_2 and CO_3^{2-} d) H_2O and CO_2
7. Define entropy and free energy. For a reaction which has positive enthalpy change and positive entropy change, state the conditions under which the reaction is spontaneous. 2
8. Draw Wedge and dash and Fischer projections of 2
a) 2 hydroxy butanoic acid (ii) 3-chloro-pentan-2-ol

OR

- Distinguish between
- a) Diastereomers and enantiomers b) Meso form and Racemic mixture 2
 9. How will you bring about the following conversions in not more than two steps? 2
a) Ethanoic acid to Ethanal b) Benzene amine to Benzene
 10. Explain the mechanism of anionic polymerization taking suitable example. 2
 11. One mole of naturally occurring fat on hydrolysis of with NaOH gave one mole of glycerol together with sodium stearate and sodium palmitate in 1: 2 molar ratio. The molecule of the fat is symmetric. Write down the structure of the fat with the chemical equation of the reaction involved. 2
 12. a) SiF_6^{2-} is known but SiCl_6^{2-} . Why is it so? 2
b) Lithium Aluminium Hydride is a versatile reducing agent used in organic synthesis. Write the chemical equation for the preparation of it.
 13. A proton is accelerated to a velocity of $3 \times 10^7 \text{ms}^{-1}$. If the velocity can be with a precision of 0.4% , calculate the uncertainty in the position of proton. 3
($h = 6.6 \times 10^{-34} \text{Js}$; mass of proton = $1.66 \times 10^{-27} \text{Kg}$)

14. a) Define azeotropic mixture
 b) What are two types of solid solutions? Give an example for each of it.
 c) How can a Raoult's law be used for determining the molecular mass of a dissolved substance. 3

OR

What is Van't Hoff factor? How is it related to degree of dissociation of the electrolyte in the solutions? What is its value when the solute undergoes association? The freezing point of a solution containing 0.3g of ethanoic acid in 30g benzene is lowered by 0.45K. Calculate Van't Hoff factor. (K_f for benzene = $5.12 \text{ K kg mol}^{-1}$)

15. a) What are F centres? Illustrate with an example. 3

b) If the radius of Li^+ ion is 60 pm and that of F^- is 136 pm, what are the coordination number of Li^+ and F^- ?

16. a) Using valence bond theory, explain the shape and magnetic behaviour of $[\text{Ni}(\text{CO})_4]$

b) Write the formula and IUPAC name of Wilkinson's catalyst.

17. Explain what happens

a) methanal is treated with Gold(III)chloride solution.

b) When FeCl_3 solution is added with Arsenic sulphide sol.

c) direct current is passed through a colloidal sol. 3

18. a) How many alpha and Beta particles are emitted when ${}_{90}\text{Th}^{232}$ undergoes successive decay to ${}_{82}\text{Pb}^{208}$?

b) Complete: ${}_{92}\text{U}^{238}(\alpha, \beta^-)$ -----

c) What are thermo nuclear reactions? 3

19. Describe the following with suitable examples.

a) Antioxidants b) Antihistamines c) Super conductors 3

20. In general, it is observed that rate of a chemical reaction doubles with every 10° rise in temperature. If this generalization holds for a reaction in the temperature range 295K to 305K, What would be the value of activation energy for the reaction?

$[\text{R} = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}]$ 3

21. a) If ΔG° for a reversible reaction is found to be zero, what is the value of its equilibrium constant?

b) For the equilibrium, $\text{PCl}_5(\text{g}) \leftrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ at 298K, $K = 1.8 \times 10^{-7}$. Calculate ΔG° for the reaction ($\text{R} = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$) 3

22. Describe the following:

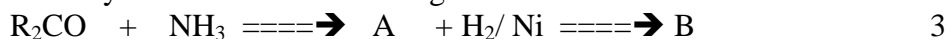
a) Codon b) Genetic code c) Mutation 3

23. a) Write chemical tests to distinguish the following pairs of compounds.

i) Pentane-2-one and pentane-3-one

ii) N,N Diethyl ethanamine and ethanamine

b) Identify A and B in the following:



24. a) Write a note on HVZ reaction.

b) Explain the mechanism of esterification.

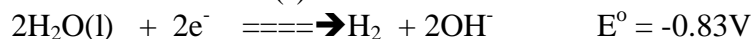
c) Describe how isonitrile reacts with an electrophile and a nucleophile at the same isonitrile carbon. 3

25. a) The conductivity of 0.00241M ethanoic is $7.896 \times 10^{-5} \text{Scm}^{-1}$. Calculate its molar conductivity if its limiting molar conductivity is $390.5 \text{Scm}^2\text{mol}^{-1}$ also calculate its dissociation constant.

b) Explain the mechanism of corrosion taking rusting of iron as example giving details of cathodic and anodic reactions. 5

OR

a) Following two reactions occur at cathode in the electrolysis of aqueous solution of sodium chloride.



Which reaction take place preferentially and why?

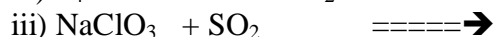
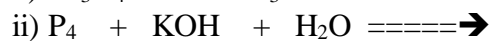
b) Silver is electro deposited on a metallic vessel by passing a current of 0.2 amperes for 3 hours. Calculate the mass of silver deposited. (Silver atomic mass = 108amu and $1\text{F} = 96500\text{C}$) 3

26. Explain the following giving reason:

- i) HF is a weaker acid than all other halogen acids
- ii) Phosphorous penta chloride is molecular in the gas and liquid phases but in the solid state exists as $[\text{PCl}_4]^+ [\text{PCl}_6]^-$
- iii) Anhydrous AlCl_3 is used as a catalyst in many organic reactions.
- iv) SF_6 is used as a gaseous insulator in high voltage generators.
- v) Xenon is found to form compounds only with oxygen and fluorine. 5

OR

a) Complete the following:



b) How will you prepare XeO_3 ? How does it react with a base? Draw the shape of XeO_3 using VSEPR theory?

27. Give reasons for the following:

- i) Transition metals form interstitial compounds.
- ii) Mn^{2+} compounds are more stable than Fe^{2+} towards oxidation to their +3 state.
- iii) The highest oxidation state is exhibited in oxoanions of a metal
- iv) Zr and Hf show similar properties.
- v) Many trivalent lanthanide ions exhibit colour both in solid state and in aqueous solutions. 5

OR

- i) How will you prepare potassium dichromate from chromite ore? Write the ionic equation for its oxidizing action with H_2S in acid medium.
- ii) What is the action of aqueous ammonia with calomel?
- iii) What is known as mischmetal? What is its use?