

Class-XII

Max. Marks: 70

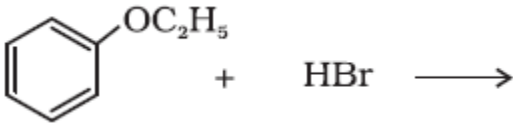
Sub: Chemistry (Theory)

Time: 3 hours

GENERAL INSTRUCTIONS:**Read the following instructions carefully.**

- (a) There are 33 questions in this question paper with internal choice.
 (b) SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
 (c) SECTION B consists of 5 short answer questions carrying 2 marks each.
 (d) SECTION C consists of 7 short answer questions carrying 3 marks each.
 (e) SECTION D consists of 2 case-based questions carrying 4 marks each.
 (f) SECTION E consists of 3 long answer questions carrying 5 marks each.
 (g) All questions are compulsory.
 (h) Use of log tables and calculators is not allowed.

SECTION A 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.	An azeotropic mixture of two liquids boils at a lower temperature than either of them when (a) it is saturated (b) it shows positive deviation from Raoult's law (c) it shows negative deviation from Raoult's law (d) it is metastable	1
2.	For which case ' λ ' values v/s $\sqrt{c}$ shows a straight line a) KCl b) HCOOH c) CH ₃ NH ₂ d) CH ₃ COOH	1
3.	The half life period for a zero order reaction is equal to : a. $2k/[A]^\circ$ b. $\frac{[A]^\circ}{2k}$ c. $\frac{0.693}{k}$ d. $\frac{0.693}{k[A]}$	1
4.	The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition element, which shows highest magnetic moment. a. $3d^7$ b. $3d^5$ c. $3d^8$ d. $3d^2$	1
5.	The name of [Co(NH ₃) ₅ NO ₂]Cl ₂ will be a) pentaamminonitrocobalt(II) chloride b) pentaamminenitrochloridecobaltate(III) c) pentaamminenitrito-N-cobalt(III) chloride	1

	d) pentanitrosoamminechlorocobaltate(III)	
6.	Halo alkanes react with AgCN to form- (a) R – CN (b) R-NC (c) R-OH (d) R-X	1
7.	 The major product(s) is/are a) Ethyl bromide + Phenol b) Bromobenzene + Ethanol c) 2-Bromo ethoxy benzene d) Benzene + Ethyl bromide	1
8.	Glucose upon refluxing with excess of HI gives a) n-Hexane b) n-Pentane c) Gluconic acid d) 2-Iodo hexane	1
9.	Which of the following reactant gives the best method of preparation of alkyl halides when reacted with alcohol? a) Zn/HCl b) PCl ₅ c) SOCl ₂ / Pyridine d) PCl ₃	1
10.	Methyl ketones are usually characterised through a) Tollen's reagent b) Iodoform test c) Schiff's test d) Benedict solution test	1
11.	Which of the following when heated with a mixture of chloroform and alcoholic potash gives ethyl isocyanide? a) 2-Amino propane b) N-Methyl ethanamine c) Ethanamine d) N,N-Dimethyl ethanamine	1
12.	Arrange the following compounds in increasing order of basicity: CH ₃ NH ₂ , (CH ₃) ₂ NH, NH ₃ , C ₆ H ₅ NH ₂ in aqueous medium a) C ₆ H ₅ NH ₂ < NH ₃ < (CH ₃) ₂ NH < CH ₃ NH ₂ b) CH ₃ NH ₂ < (CH ₃) ₂ NH < NH ₃ < C ₆ H ₅ NH ₂ c) C ₆ H ₅ NH ₂ < NH ₃ < CH ₃ NH ₂ < (CH ₃) ₂ NH d) (CH ₃) ₂ NH < NH ₃ < C ₆ H ₅ NH ₂ < CH ₃ NH ₂	1
13.	Assertion: When a non-volatile solute is added to a volatile solvent, its freezing point decreases. Reason : Upon addition of a non-volatile solute to a volatile solvent, the vapour decreases. Select the most appropriate answer from the options given below: a) Both A and R are true and R is the correct explanation of A b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	1
14.	Assertion: [Ni (CO) ₄] has square planar geometry	1

	Reason: CO is a neutral ligand which forms synergic bonding with the metal. Select the most appropriate answer from the options given below: a) Both A and R are true and R is the correct explanation of A b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	
15.	Assertion: It is difficult to replace chlorine by -OH in chlorobenzene in comparison to that in chloroethane. Reason: Chlorine-Carbon(C-Cl) bond in chlorobenzene has partial double bond character due to resonance. Select the most appropriate answer from the options given below: a) Both A and R are true and R is the correct explanation of A b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	1
16.	Assertion : Aniline does not undergo Friedel-Crafts reaction. Reason : -NH ₂ group of aniline reacts with AlCl ₃ (Lewis acid) to give acid-base reaction. Select the most appropriate answer from the options given below: a) Both A and R are true and R is the correct explanation of A b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.	1
	SECTION B 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.	Give reasons: a) Cd is not regarded as a transition element. b) Cr ²⁺ is a strong reducing agent. OR How would you account for the following: a) Cr ²⁺ is reducing in nature while with the same d-orbital configuration (d ⁴) Mn ³⁺ is an oxidising agent. b) In transition series of metals, the metal which exhibits the greatest number of oxidation states occurs in the middle of the series.	2
18.	State Raoult's law. What type of deviation will a mixture of water and nitric acid show from Raoult's law?	2
19.	Account for the following: a) Phenol is a stronger acid than alcohol. b) The boiling point of alcohol decreases with increase in branching of the alkyl chain.	1 1
20.	a) How would you distinguish between phenol and benzoic acid? b) Why F-CH ₂ COOH is a stronger acid than Cl-CH ₂ COOH?	1 1
21.	Define the following terms: a) Glycosidic linkage b) Denaturation of proteins	2
	SECTION C This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.	
22.	In a galvanic cell, the following reaction takes place:- $2\text{Cr}_{(s)} + 3\text{Cd}^{2+} \rightarrow 2\text{Cr}^{3+} + 3\text{Cd}_{(s)}$ $E^\circ \text{Cr}^{3+}/\text{Cr} = -0.74 \text{ V} ; E^\circ \text{Cd}^{2+}/\text{Cd} = -0.40 \text{ V}$. Calculate a) the standard cell potential b) the standard Gibbs Free Energy change ΔG° c) Equilibrium constant (K_c) [Antilog 0.501=3.17]	1 1 1

23.	A reaction is second order in A and first order in B. a) Write the differential rate equation. b) How is the rate affected on increasing the concentration of A three times? c) How is the rate affected when the concentration of both A and B are doubled?	1 1 1
24.	a) Calculate the freezing point of solution when 1.9 g of MgCl_2 ($M = 95 \text{ g mol}^{-1}$) is dissolved in 50 g of water, assuming MgCl_2 undergoes complete ionization. (K_f for water = $1.86 \text{ K kg mol}^{-1}$) b) What is the significance of Henry's Law constant K_H ? OR a) How does sprinkling of salt help in clearing the snow-covered roads in hilly areas? b) The freezing point of nitrobenzene is 278.8 K. When 2.8 g of an unknown substance is dissolved in 100 g of nitrobenzene, the freezing point of solution is found to be 276.8 K. If the freezing point depression constant of nitrobenzene is $8.0 \text{ K kg mol}^{-1}$, what is the molar mass of unknown substance? [$K_f = 8 \text{ K-Kg mol}^{-1}$ for nitrobenzene]	2 1 1 2
25.	The rate of a reaction quadruples, when the temperature changes from 293K to 313K. Calculate the energy of activation of the reaction assuming that it does not change with temperature. ($R = 8.314 \text{ J/K/Mol}$)	3
26.	a) Which one undergoes SN^2 reaction faster: n-Butyl bromide or t-butyl bromide? b) Racemic mixture is optically inactive. Why? c) The presence of nitro group ($-\text{NO}_2$) at o/p positions increases the reactivity of haloarenes towards nucleophilic substitution reactions. Why?	1 1 1
27.	Write the formula of reagents used in the following reactions: a) Bromination of Phenol to 2,4,6-tribromophenol. b) Propene to propan-1-ol. c) Phenol to Salicylaldehyde.	1 1 1
28.	Account for the following; a) pK_b of aniline is more than that of methyl amine. b) Gabriel phthalimide synthesis is preferred for preparing primary amines c) The presence of a base is needed in the ammonolysis of alkyl halides	1 1 1
	SECTION D The following questions are case-based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow.	
29.	Transition elements are elements that have partially filled d-orbitals. The configuration of these elements corresponds to $(n-1) d^{1-10} ns^{1-2}$. It is important to note that the elements mercury, cadmium and zinc are not considered transition elements because of their electronic configurations, which corresponds to $(n-1)d^{1-10}ns^2$. Some general properties of transition elements are : These elements can form colored compounds and ions due to d-d transition; These elements-exhibit many oxidation states; A large variety of ligands can bind themselves to these elements. The boiling and melting point of these elements are high. These elements have a large ratio of charge to radius. a) Give reason Zn is soft whereas Cr is hard. b) Explain why transition metals show higher oxidation state with oxygen as compared to fluorine. c) What is called lanthanoid contraction? Mention any one of its consequences. (OR) c).What is mischmetal? Mention its use.	1 1 2 2
30.	Proteins are an important class of biomolecules. They are the most abundant biomolecules of the living system. Chief sources of proteins are milk, cheese, pulses, peanuts, fish, meat, etc. They occur in every part of the body and form the fundamental basis of structure and functions of life. They are also required for growth and maintenance of body. All proteins are polymers of alpha-amino acids. Different proteins consist of different amino acids. They exhibit different structures namely primary, secondary, tertiary and quaternary. a) Name the linkage through which amino acids are linked in proteins	1

