

CHEMISTRY (CODE - 043)
SAMPLE QUESTION PAPER*
CLASS XII (2025-26)

Time: 3 hours

Max. Marks: 70

GENERAL INSTRUCTIONS:

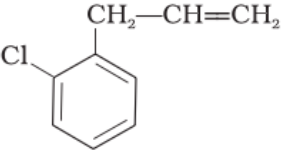
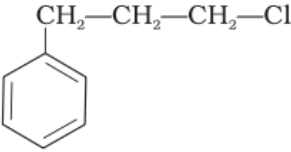
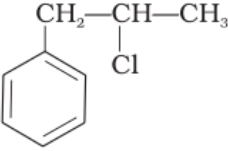
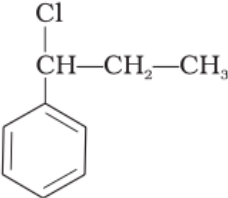
Read the following instructions carefully.

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 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.

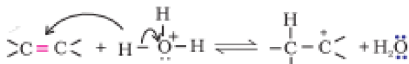

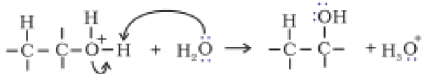
Section-A		
Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.		
1	When two perfect solutions with volume V each are combined, What is the volume of the solution as a result? a) V b) 2V c) Greater than 2V d) Less than 2V	1
2	Consider the reaction and identify B and C $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl} \xrightarrow{\text{NaOH + Ethanol}} \text{A}$ $\text{A} \xrightarrow{\text{H}_2\text{O}, \text{H}^+} \text{B} \quad \text{and} \quad \text{A} \xrightarrow{\text{(i) B}_2\text{H}_6, \text{(ii) H}_2\text{O}_2, \text{OH}^-} \text{C}$ A. B=C= Butanol B. B= Butanol, C=Butene C. B= Butan-2-ol, C= Butanol D. B= Butene, C=Butan-2-ol	1
3	What is the heat of reaction for ethyl acetate hydrolysis? a) Greater than zero b) Less than zero	1

	c) Zero d) None of the mentioned	
4	<p>The organic compounds A, B and C are amines having equivalent molecular weight. A and B on reaction with benzene sulphonyl chloride give white precipitate, however white precipitate obtained from compound B remains insoluble in NaOH.</p> <p>The variation in the boiling point of A, B and C can be seen as :</p> <p>A. $A > B > C$ B. $B > A > C$ C. $A = B > C$ D. $C > B > A$</p>	1
5	<p>Select the appropriate statement.</p> <p>a) Both actinoids and lanthanoids are less basic b) Both actinoids and lanthanoids are electropositive c) Both actinoids and lanthanoids do not exhibit magnetic and spectral properties d) Both actinoids and lanthanoids do not show same oxidation of +3</p>	1
6	<p>When converting a disaccharide to monosaccharides, which bond is hydrolyzed?</p> <p>a) Disulfide bond b) Glycosidic bond c) Phosphodiester bond d) Hydrogen bond</p>	1

7	<p>In o-cresol, the –OH group is attached to the carbon that is:</p> <p>A. sp^3 hybrid B. sp^2 hybrid C. sp hybrid D. dsp^2 hybrid</p>	1
8	<p>The Lucas test was carried out on three different compounds: A, B, and C. Compounds A and B were turbid at ambient temperature, while compound C did not become turbid until it was heated. Which one of the compounds is tertiary in structure?</p> <p>a) A b) Cannot be determined c) C d) A and B</p>	1
9	<p>Determine the proper name for $K_2[PdCl_4]$.</p> <p>a) Potassium tetrachlorinepalladium(II) b) Potassium tetrachloridopalladate(II)Potassium c) Potassium tetrachloridopalladium(II) d) tetrachlorinepalladate(II)</p>	1
10	<p>Which of the following statements about coordination compounds' bonding is incorrect?</p> <p>a) Crystal Field Theory b) VSEPR Theory c) Valence Bond Theory d) Molecular Orbital Theory</p>	1
11	<p>What happens to the atomic size of lanthanides as the atomic number increases?</p> <p>a) The radius remains unchanged b) The radius first increases and then decreases c) The radius increases d) The radius decreases</p>	1

12	<p>Identify the secondary benzylic halide and primary alkyl halide from the following:</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(i)</p>  </div> <div style="text-align: center;"> <p>(ii)</p>  </div> <div style="text-align: center;"> <p>(iii)</p>  </div> <div style="text-align: center;"> <p>(iv)</p>  </div> </div> <p>A. (i) and (iii) B. (iv) and (ii) C. (iii) and (iv) D. (i) and (ii)</p>	1
13	<p>Assertion (A): If one component of a solution obeys Raoult's law over a certain range of composition, the other component will not obey Henry's law in that range.</p> <p>Reason: Raoult's law is a special case of Henry's law.</p> <p>Select the most appropriate answer from the options given below:</p> <p>A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, and R is not the correct explanation of A. C. A is true but R is false. D. A is false but R is true</p>	1
14	<p>Assertion (A): Care should always be taken to ensure that solutions that flow in the blood stream are of the same osmotic pressure as that of the blood.</p> <p>Reason(R): Sodium ion and potassium ions are responsible for maintaining proper osmotic pressure balance inside and outside of the cells of organism.</p> <p>Select the most appropriate answer from the options given below:</p> <p>A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, and R is not the correct explanation of A. C. A is true but R is false. D. A is false but R is true</p>	1

15	<p>Assertion (A): β-glycosidic linkage is present in maltose</p> <p>Reason (R): Maltose is composed of two glucose units in which C–1 of one glucose unit is linked to C–4 of another glucose unit.</p> <p>Select the most appropriate answer from the options given below:</p> <p>A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, and R is not the correct explanation of A. C. A is true but R is false. D. A is false but R is true</p>	1
16	<p>Assertion (A): Secondary cells are used in invertors.</p> <p>Reason (R): A primary cell can be recharged by passing current through it in the opposite direction after it has been used.</p> <p>Select the most appropriate answer from the options given below:</p> <p>A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, and R is not the correct explanation of A. C. A is true but R is false. D. A is false but R is true</p>	1
<p style="text-align: center;">Section-B</p> <p>Question No. 17 to 21 are very short answer questions carrying 2 marks each.</p>		
17	<p>Classify the following as globular or fibrous proteins.</p> <p>(i) Keratin (ii) Myosin (iii) Insulin (iv) Hemoglobin.</p>	2x1
18	Write down the formula of : Tetraamineaquachloridocobalt(III) chloride.	2x1
19	<p>Carry out following conversions :</p> <p>I. Nitrobenzene to 4- bromobenzenamine II. Chlorophenylmethane to 2-phenyl-ethanamine</p>	2x1
20	<p>Give chemical tests to distinguish between the following pairs of compounds :</p> <p>(a) Benzyl chloride and Chlorobenzene (b) Chloroform and Carbon tetrachloride</p>	2x1

21	<p>The mechanism of formation of alcohols from alkenes is given below. Rectify the errors in the mechanism and rewrite the corrected steps.</p> <p>STEP 1 </p> <p>STEP 2 </p> <p>STEP 3 </p>	2x1
Section-C		
Question No. 22 to 28 are short answer questions, carrying 3 marks each.		
22	<p>Explain the following:</p> <p>I. Toluene on treatment with Cl₂ in sunlight gives benzyl chloride whereas when treated with Cl₂ in dark gives o-chlorobenzene and p-chlorobenzene.</p> <p>II. Finkelstein reaction is carried out in the presence of dry acetone.</p> <p>III. neo pentylchloride has lower boiling point than isopentylchloride.</p>	3 x1
23	<p>a) How are hormones and vitamins different in respect of their source and functions?</p> <p>b) Give one example each of:</p> <p>(i) Globular protein</p> <p>(ii) Fibrous protein</p>	2 x 1.5
24	<p>(a) What is lanthanoid contraction? Mention its main consequences.</p> <p>(b) Write the balanced ionic equation for the reaction between ferrous sulphate and acidified potassium permanganate solution.</p>	2 x 1.5
25	<p>A first order gas phase reaction : A₂B₂(g) → 2A(g) + 2B(g) at the temperature 400°C has the rate constant k = 2.0 × 10⁻⁴ sec⁻¹.</p> <p>What percentage of A₂B₂ is decomposed on heating for 900 seconds? (Antilog 0.0781 = 1.197)</p>	2 x 1.5
26	<p>What mass of NaCl (molar mass = 58.5 g mol⁻¹) must be dissolved in 65 g of water to lower the freezing point by 7.5°C? The freezing point depression constant, K_f, for water is 1.86 K kg mol⁻¹.</p> <p>Assume van't Hoff factor for NaCl is 1.87.</p>	2 x 1.5

27	Give reasons : (a) Aniline is a weaker base than cyclohexyl amine. (b) It is difficult to prepare pure amines by ammonolysis of alkyl halides.	2 x 1.5
28	Write the Nernst equation for the following: I. $\text{Ni (s)} + \text{Cu}^{2+} \text{ (aq)} \rightarrow \text{Ni}^{2+} \text{ (aq)} + \text{Cu (s)}$ II. $\text{Al (s)} + \text{FeSO}_4 \text{ (aq)} \rightarrow \text{Al}_2(\text{SO}_4)_3 \text{ (aq)} + \text{Fe (s)}$ III. $\text{Mg (s)} / \text{Mg}^{2+} \text{ (aq)} // \text{Ag}^+ \text{ (aq)} / \text{Ag (s)}$	3x1

Section-D

Question No. 29 & 30 are case-based/data -based questions carrying 4 marks each.

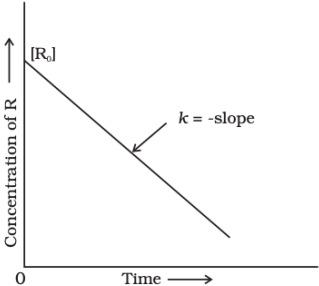
29	<p>(VI) Read the passage given below and answer the following questions: Within the 3d series, manganese exhibits oxidation states in aqueous solution from +2 to +7, ranging from $\text{Mn}^{2+} \text{ (aq)}$ to $\text{MnO}_4^- \text{ (aq)}$. Likewise, iron forms both $\text{Fe}^{2+} \text{ (aq)}$ and $\text{Fe}^{3+} \text{ (aq)}$ as well as the FeO_4^{2-} ion. Cr and Mn form oxyions CrO_2^{2-}, MnO_4^-, owing to their willingness to form multiple bonds. The pattern with the early transition metals—in the 3d series up to Mn, and for the 4d, 5d metals up to Ru and Os—is that the maximum oxidation state corresponds to the number of “outer shell” electrons. The highest oxidation states of the 3d metals may depend upon complex formation (e.g., the stabilization of Co^{3+} by ammonia) or upon the pH (thus $\text{MnO}_4^{2-} \text{ (aq)}$ is prone to disproportionation in acidic solution). Within the 3d series, there is considerable variation in relative stability of oxidation states, sometimes on moving from one metal to a neighbor; thus, for iron, Fe^{3+} is more stable than Fe^{2+}, especially in alkaline conditions, while the reverse is true for cobalt. The ability of transition metals to exhibit a wide range of oxidation states is marked with metals such as vanadium, where the standard potentials can be rather small, making a switch between states relatively easy. (Cotton, S. A. (2011). Lanthanides: Comparison to 3d metals. Encyclopedia of inorganic and Bioinorganic Chemistry.) In the following questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices on the basis of the above passage. A. Assertion and reason both are correct statements and reason is correct explanation for assertion. B. Assertion and reason both are correct statements but reason is not correct explanation for assertion. C. Assertion is correct statement but reason is wrong statement. D. Assertion is wrong statement but reason is correct statement. 1. Assertion: Highest oxidation state is exhibited by transition metal lying in the middle of the series. Reason: The highest oxidation state exhibited corresponds to number of (n-1)d electrons. 2. Assertion: Fe^{3+} is more stable than Fe^{2+} Reason: Fe^{3+} has 3d⁵ configuration while Fe^{2+} has 3d⁶ configuration. 3. Assertion: Vanadium had the ability to exhibit a wide range of oxidation states. Reason: The standard potentials Vanadium are rather small, making a switch between oxidation states relatively easy. 4. Assertion: Transition metals like Fe, Cr and Mn form oxyions Reason: Oxygen is highly electronegative and has a tendency to form multiple bonds.</p>	4
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30	<p>Complex compounds play an important role in our daily life. Werner's theory of complex compounds says every metal atom or ion has primary valency (oxidation state) which is satisfied by \pmvely charged ions, ionisable where secondary valency (coordination number) is nonionisable, satisfied by ligands (+ve, -ve, neutral) but having lone pair. Primary valency is nondirectional, secondary valency is directional. Complex compounds are name according to IUPAC system. Valence bond theory helps in determining shapes of complexes based on hybridisation, magnetic properties, outer or inner orbital complex. Complex show ionisation, linkage, solvate and coordination isomerism also called structural isomerism. Some of them also show stereoisomerism i.e. geometrical and optical isomerism. Ambidentate ligand are essential to show linkage isomerism. Polydentate ligands form more stable complexes then unidentate ligands. There are called chelating agents. EDTA is used to treat lead poisoning, cis-platin as anticancer agents. Vitamin B12 is complex of cobalt. Haemoglobin, oxygen carrier is complex of Fe^{2+} and chlorophyll essential for photosynthesis is complex of Mg^{2+}.</p> <p>(a) What is the oxidation state of Ni in $[\text{Ni}(\text{CO})_4]$?</p> <p>(b) One mole of $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ reacts with excess of AgNO_3 to yield 2 mole of AgCl. Write formula of complex. Write IUPAC name also.</p> <p>(c) Out Cis – $[\text{Pt}(\text{en})_2 \text{Cl}_2]^{2+}$ and trans $[\text{Pt}(\text{en})_2 \text{Cl}_2]^{2+}$ which one shows optical isomerism?</p> <p>(d) Name the hexadentate ligand used for treatment of lead poisoning.</p> <p>(e) What is hybridisation of $[\text{CoF}_6]^{3-}$? [Co = 27] Give its shape and magnetic properties.</p> <p>(f) What type of isomerism is shown by $[\text{Cr}(\text{H}_2\text{O})_6] \text{Cl}_3$ and $[\text{Cr}(\text{H}_2\text{O})_5 \text{Cl}] \text{Cl}_2 \cdot \text{H}_2\text{O}$?</p>	4
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Section-E

Question No. 31 to 33 are long answer type questions carrying 5 marks each.

31	<p>Attempt either A or B</p> <p>A. Answer the following questions:</p> <ol style="list-style-type: none">Write the structure of expected product of Cannizarro reaction of 2-chlorobenzaldehyde.How would the presence of $-\text{SO}_3\text{H}$ group effect the basic strength of aniline.Convert acetic acid to ethanamine.Write the steps to prepare Benzoic acid from Benzoyl chloride.Give a chemical test to distinguish between: propanal and propanone <p style="text-align: center;">OR</p> <p>B. Answer the following questions:</p> <ol style="list-style-type: none">Write the structure of expected product of Wolf-Kishner reduction of 2 –methylbutanal.How would the presence of $-\text{SO}_3\text{H}$ group effect the acidic strength of benzoic acidPrepare acetic acid from ethanamine.Convert Aniline to benzoic acid.Give a chemical test to distinguish between: propanal and ethanal.	5x1
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32	<p>Attempt either A or B</p> <p>A. Answer the following questions:</p> <ol style="list-style-type: none"> Identify and give any one point of difference between the protein present in the hair and protein present in egg albumin. Both glucose and sucrose have aldehydic group, then why does only glucose reduces Fehling's Reagent and not sucrose? Why do amino acids behave as salts? What chemical change takes place during curdling of milk? Doctor advised a 50 year old woman enough exposure to sunlight and addition of fish and egg yolk to her diet. What is the possible disease diagnosed by the doctor? <p style="text-align: center;">OR</p> <p>B. Answer the following questions:</p> <ol style="list-style-type: none"> Identify and give any one point of difference between the carbohydrate present in cane sugar and carbohydrate present in milk. Glucose is an aldohexose and a monosaccharide. Which oxidising agent should be used to bring about oxidation of only the aldehydic group present in glucose? Amino acid $\text{HOOC-CH}_2\text{CH}(\text{NH}_2)\text{CH}_2\text{COOH}$. Predict whether the pH of this amino acid will be >7, 7 or <7. Name the two major molecular shapes formed due to the folding of secondary structure of proteins. Ashish's gums bleed frequently. The doctor's prescription mentioned that Ashish is suffering from scurvy. Help him to identify two food sources to help him recover faster. 	5x1
33	<p>Attempt either A or B</p> <p>A.</p> <ol style="list-style-type: none"> The rate of a reaction triples when the temperature changes from 298 K to 318 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature. (Given $R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$, $\log 3 = 0.4771$) Identify the order of reaction and write its integrated rate equation mentioning what each term in the equation represents. <div style="text-align: center;">  </div> <p style="text-align: center;">OR</p>	3+2

	<p>B.</p> <p>I. Consider the following first order thermal decomposition of SO_2Cl_2 at a constant volume</p> $\text{SO}_2\text{Cl}_2 (\text{g}) \rightarrow \text{SO}_2(\text{g}) + \text{Cl}_2 (\text{g})$ <p>If the total pressure of the gases is found to be 200 torr after 10 seconds and 300 torr upon the complete decomposition of SO_2Cl_2. Calculate the rate constant. (Given $\log 3 = 0.4771$, $\log 2 = 0.3010$)</p> <p>II. For a bimolecular elementary reaction $\text{A} + \text{B} \rightarrow \text{Products}$. Write the expression for the rate of reaction relating temperature and activation energy for the reaction and also mention what each term represents in the equation.</p>	3+2
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