

CLASS – XII

Sub.: CHEMISTRY (043)

Time Allowed: :3 hours

Maximum Marks:70

General Instructions:

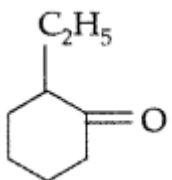
- (a) There are **33** questions in this question paper with internal choice.
- (b) SECTION A consists of 16 multiple choice questions carrying 1 mark each.
- (c) SECTION B consists of 5 very short answer questions carrying 2 marks each.
- (d) SECTION C consists of 7 short answer questions carrying 3 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.

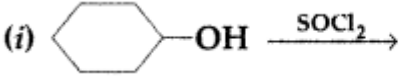
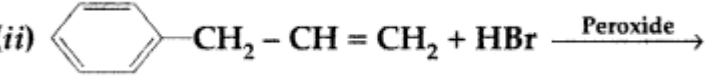
SECTION – A		
1	The formation of cyanohydrin from a ketone is an example of (a) electrophilic addition (b) nucleophilic addition (c) nucleophilic substitution (d) electrophilic substitution	1
2	Which of the following is the IUPAC name of the chemical in which an ethyl group replaces one hydrogen of ammonia? a) Ethanamine b) Aminoethane c) Ethylamine d) Ethane amine	1
3	Which of the following statements about starch is incorrect? a) Its soluble in warm water	1

	<p>b) It is a polymer of α-D-glucose</p> <p>c) It is a reducing carbohydrate</p> <p>d) It consists of branched chains</p>	
4	<p>Which of the following statements about a lead storage cell (or a lead-acid battery) is false?</p> <p>a) It is a primary cell</p> <p>b) The cathode is made up of lead(IV) oxide</p> <p>c) The anode is made up of lead</p> <p>d) The electrolyte used is an aqueous solution of sulphuric acid</p>	1
5	<p>Which reagents are required for one step conversion of chlorobenzene to toluene?</p> <p>(a) $\text{CH}_3\text{Cl} / \text{AlCl}_3$</p> <p>(b) CH_3Cl, Na, Dry ether</p> <p>(c) $\text{CH}_3\text{Cl}/\text{Fe}$ dark</p> <p>(d) $\text{NaNO}_2 / \text{HCl} / 0-50^\circ\text{C}$</p>	1
6	<p>Which of the following has magnetic moment value of 5.9?</p> <p>(a) Fe^{2+}</p> <p>(b) Fe^{3+}</p> <p>(c) Ni^{2+}</p> <p>(d) Cu^{2+}</p>	1
7	<p>Consider the given figure and mark the correct option.</p> <p>(a) Activation energy of forward reaction is $E_1 + E_2$ and product is less stable than reactant.</p> <p>(b) Activation energy of forward reaction is $E_1 + E_2$ and product is more stable than reactant.</p> <p>(c) Activation energy of both forward and backward reaction is $E_1 + E_2$ and reactant is more stable than product.</p> <p>(d) Activation energy of backward reaction is E_1 and product is more stable than reactant.</p>	1
8	<p>Acetone combines with ethylene glycol in dry HCl gas to generate</p> <p>a) hemiacetals</p> <p>b) cyclic ketals</p> <p>c) cyclic acetals</p>	1

	d) acetals	
9	The reaction of ethyl formate with an excess of CH_3MgI followed by hydrolysis gives (a) ethanol (b) n-propyl alcohol (c) propanal (d) isopropyl alcohol	1
10	The activation energy of a reaction can be determined from the slope of which of the following graph: <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>(a) $\ln k$ Vs $\frac{1}{T}$</p> <p>(c) $\ln k$ Vs T</p> </div> <div style="text-align: center;"> <p>(b) $\frac{T}{\ln k}$ Vs $\frac{1}{T}$</p> <p>(d) $\frac{\ln k}{T}$ Vs T</p> </div> </div>	1
11	Phenol can be distinguished from ethanol by the reaction with ____ Br ₂ /Water Na Glycerol All of the Above	1
12	Although Zirconium belongs 4d transition series and hafnium to 5d transition series even they show similar physical and chemical properties because Both belongs to the d- block Both have same number of electrons Both have similar atomic radius due to lanthanide contraction. Both belong to the same group of the periodic table	1
13	Assertion : In case of phenol, bromination takes place even in absence of Lewis acid whereas bromination of benzene takes place in presence of Lewis acid like FeBr_3 . Reason : – OH group attached to benzene ring is highly deactivating. Select the most appropriate answer from the options given below: Both A and R are true and R is the correct explanation of A Both A and R are true but R is not the correct explanation of A. A is true but R is false. A is false but R is true.	1
14	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A): Benzoic acid doesn't undergo Friedel-craft's reaction. Reason (R): Benzoic acid is an activating group and undergo electrophilic substitution 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 and R is not the correct explanation of A.	1

	(c) A is true but R is false. (d) A is false but R is true.	
15	Assertion (A): Sucrose is called an invert sugar. Reason: On hydrolysis, sucrose bring the change in the sign of rotation from dextro (+) to leavo(-) 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 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.	1
16	Assertion: On increasing dilution, the specific conductance keep on increasing. Reason: On increasing dilution, degree of ionisation of weak electrolyte increases and molality of ions also increases. 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 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.	1
SECTION – B		
17	The rate constant of a reaction $A \rightarrow B$ is $0.6 \times 10^3 \text{ mol S}^{-1}$. If the concentration of [A] is 5 M, then what will be concentration of [B] after 20 months?	2
18	a) Define Azeotrope with an example. b) Mention the type of deviation from ideal behavior shown by solution of phenol and aniline and why?	2
19	An aromatic compound "A" on heated with $\text{NaNO}_2 + \text{HCl}$ produces Benzene diazomium chloride, which on further treatment with Cu_2Cl_2 produces an molecule "B". While B undergoes coupling reaction to produce biphenyl with an reagent C. Mention A ,B & C and mention name of the coupling reaction occurred between B & C	2
20	Aldehyde, Ketone and Carboxylic acids Write the reactions involved in the following reactions: (i) Clemmensen reduction (ii) HVZ reaction OR Do the following conversions in not more than two steps: (i) Benzoic acid to benzaldehyde (ii) Propanone to Propene	2

21	<p>i) Write the structure of the product obtained when glucose is oxidised with nitric acid.</p> <p>ii) What are the products of hydrolysis of sucrose?</p> <p>iii) Which component of starch is a branched polymer of α-glucose and insoluble in water?</p>	2
SECTION – C		
22	<p>(a) $[\text{CrCl}_2(\text{en})_2]\text{Cl}$? Write the IUPAC Name.</p> <p>(b) On the basis of CFT, write the electronic configuration of d^5 ion if $\Delta_0 < P$.</p> <p>(c) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ is paramagnetic but $[\text{Ni}(\text{CN})_4]^{2-}$ is diamagnetic. Explain why?</p>	3
23	<p>A copper-silver cell is set up. The copper ion concentration in it is 0.10 M. The concentration of silver ion is not known. The cell potential is measured 0.422 V. Determine the concentration of silver ion in the cell.</p> <p>Given : $E^\circ_{\text{Ag}^+/\text{Ag}} = + 0.80 \text{ V}$, $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = + 0.34 \text{ V}$. (Antilog 1.14493=13.93)</p>	3
24	<p>a) How do you convert Propan-2-ol to 2-methylpropan-2-ol</p> <p>b) State Reimer-Tiemann reaction</p> <p>c) Phenol is more acidic than ethanol, explain.</p>	3
25	<p>An alkene 'A' (Mol. formula C_5H_{10}) on ozonolysis gives a mixture of two compounds, 'B' and 'C'. Compound B gives positive Fehling's test and forms iodoform on treatment with I_2 and NaOH. Compound C does not give Fehling's test but forms iodoform. Identify the compounds A, B, and C. Write the reaction for ozonolysis and formation of iodoform from B and C.</p> <p>OR</p> <p>a) Write IUPAC name of the following :</p>  <p>b) Write the equations involved in Wolff-Kishner reduction.</p> <p>(c) What is formed when Toluene undergoes treatment with chromyl chloride followed by hydrolysis?</p>	3
26	<p>Answer the following questions:</p> <p>(a) What are essential and nonessential amino acids? Write one example of each.</p> <p>(b) What is the difference between a nucleoside and a nucleotide?</p>	3
27	<p>a) Chloroform is stored in dark coloured bottles.</p>	3

	<p>b)Mention the product formed.</p> <p>(i) </p> <p>(ii) </p>	
28	<p>a) The rate of a reaction becomes four times when the temperature changes from 293 K to 313 K. Calculate the energy of activation (E_a) of the reaction assuming that it does not change with temperature. [$R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$, $\log 4 = 0.6021$]</p> <p>b) Define Pseudo first order reaction with examples.</p>	3
SECTION – D		
29	<p>Werner's theory of complex compounds says every metal atom or ion has primary valency (oxidation state) which is satisfied by -vely charged ions, ionisable where secondary valency (coordination number) is non-ionisable, satisfied by ligands (+ve, -ve, neutral) but having lone pair. Primary valency is non-directional, 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 than unidentate ligands. They are called chelating agents. EDTA is used to treat lead poisoning, cis-platin as anticancer agents. Vitamin B₁₂ is complex of cobalt. Hemoglobin, oxygen carrier is complex of Fe^{2+} and chlorophyll essential for photosynthesis is complex of Mg^{2+}.</p> <p>(a) 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. Determine the Molecular formula of complex, do the IUPAC name of the compound.</p> <p>OR</p> <p>(a) What is hybridization, shape and magnetic properties of $[\text{CoF}_6]^{3-}$ [$\text{Co} = 27$].</p> <p>(b) Out $[\text{Fe}(\text{CO})_5]$, $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$, $[\text{Fe}(\text{H}_2\text{O}_6)^{3+}]$, $[\text{Fe}(\text{CN})_6]^{3-}$, which is most stable?</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>	2+1+ 1
30	<p>Metallic conductance involves movement of electrons whereas electrolytic conductance involves movement of ions. Specific conductance increases with increase in concentration whereas A_m (molar conductivity) decreases with increase in concentration. Electrochemical cell converts chemical energy of redox reaction into electricity. Mercury cell, Dry cells are primary cells whereas Ni-Cd cell, lead storage battery are secondary cells. Electrochemical series is arrangement of elements in increasing order of their reduction potential. Electrolytic cell converts electrical energy into chemical energy which is used in electrolysis. Amount of products formed are decided with the help of Faraday's laws of Electrolysis. Kohlrausch law</p>	1+1+ 2

	<p>helps to determine limiting molar conductivity of weak electrolyte, their degree of ionisation (α) and their dissociation constants.</p> <p>(a) Out of 0.5 M, 0.01 M, 0.1 M and 1.0 M which solution of KCl will have highest value of specific conductance?</p> <p>(b) Write the product of electrolysis of aq. NaCl on cathode.</p> <p>(c) For an electrochemical cell $\text{Mg(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow 2\text{Ag(s)} + \text{Mg}^{2+}$. Give the cell representation and write Nernst equation.</p> <p>OR</p> <p>(c) State Kohlrausch's law with examples.</p>	
	SECTION – E	
31	<p>Explain the following observations : (Any five)</p> <p>(a) Generally there is an increase in density of elements from titanium ($Z = 22$) to copper ($Z = 29$) in the first series of transition elements.</p> <p>(b) Transition elements and their compounds are generally found to be good catalysts in chemical reactions.</p> <p>(c) The chemistry of actinoids is not so smooth as that of lanthanoids</p> <p>(d) The ionization enthalpies (first and second) in the first series of the transition elements are found to vary irregularly.</p> <p>(e) Represent the oxidising action of potassium dichromate and write the ionic equations for its reaction with iodine.</p> <p>(f) Zinc is not regarded as a transition element.</p> <p>(g) Transition elements generally form coloured compounds</p>	5
32	<p>a) Three molecules of a solute (A) associate in benzene to form species A_3. Calculate the freezing point of 0.25 molal solution. The degree of association of solute A is found to be 0.8. The freezing point of benzene is 5.5°C and its K_f value is 5.13 K/m.</p> <p>b) Define mole fraction.</p> <p>c) 1 Molar and 1 molal solution heated simultaneously, which one's value will remain unchanged after heating? Why?</p> <p>OR</p> <p>a) An aqueous solution containing 3.12 g of barium chloride in 250 g of water is found to be boil at 100.08°C Calculate the degree of dissociation of barium chloride. Given molar mass $\text{BaCl}_2 = 208 \text{ gmol}^{-1}$, K_b for water = 0.52 K/m</p> <p>b) Define the term 'Reverse osmosis'.</p> <p>c) Between 1 molar aqueous solution and 1 molal aqueous solution, which contains more volume of Solvent? Explain</p>	<p>3+1+ 1</p> <p>3+1+ 1</p>

33	<p>a) An aromatic compound 'A' on treatment with aqueous ammonia and heating forms compound 'B' which on heating with Br₂ and KOH forms a compound 'C' of molecular formula C₆H₇N. Write the structures and IUPAC names of compounds A, B and C.</p> <p>b) Write the structures A, B and C in the following</p> <p>(i) $\text{C}_6\text{H}_5\text{—CONH}_2 \xrightarrow{\text{Br}_2/\text{aq. KOH}} \text{A} \xrightarrow[0-5\text{ }^\circ\text{C}]{\text{NaNO}_2+\text{HCl}} \text{B} \xrightarrow{\text{KI}} \text{C}$</p> <p>(ii) $\text{CH}_3\text{—Cl} \xrightarrow{\text{KCN}} \text{A} \xrightarrow{\text{LiAlH}_4} \text{B} \xrightarrow[\Delta]{\text{CHCl}_3+\text{alc. KOH}} \text{C}$</p> <p>OR</p> <p>a) Aniline does not give Friedel-Crafts reaction.</p> <p>b) Distinguish chemically between Methylamine and Dimethylamine</p> <p>c) Arrange the following in increasing order of pK_b value: C₆H₅NH₂, C₆H₅NHCH₃, C₆H₅N(CH₃)₂</p> <p>d) Describe Carbylamine reaction</p> <p>e) Draw the structure of Phenyl acetamide</p>	5
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