

**GOA BOARD OF SECONDARY AND HIGHER SECONDARY
EDUCATION**

CLASS: XII SUBJECT: CHEMISTRY

Revised Syllabus-2024-2025

Solutions	10 Periods
Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, vapour pressure of liquid solutions, Raoult's law, Ideal solutions & Non ideal solutions, colligative properties – relative lowering of vapour pressure, elevation of B.P., depression of freezing point, osmosis, reverse osmosis & osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Vant Hoff factor(excluding numericals using vant Hoff factor).	
Electrochemistry	12 Periods
Electrochemical cell, Galvanic cell, Measurement of electrode potential, Nernst equation and its application to chemical cells Equilibrium constant from Nernst equation, Relation between Gibbs energy change and EMF of a cell, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis and law of electrolysis (elementary idea), dry cell- electrolytic cells and Galvanic cells, lead accumulator, fuel cells, corrosion	
Chemical Kinetics	10 Periods
Rate of a reaction (Average and instantaneous), factors affecting rate of reaction: concentration, temperature, catalyst; elementary and complex reactions, order and molecularity of a reaction, rate law and specific rate constant, integrated rate equations and half-life (only for zero and first order reactions), concept of collision theory (elementary idea, no mathematical treatment), Effect of temperature on the rate of reaction, Arrhenius equation, activation energy and its calculations. Effect of catalyst on the rate of reaction	
d and f Block Elements	12 Periods
General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, complex formation, alloy formation, preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$ and structures of chromate ion, dichromate ion, manganate ion and permanganate ion.	
Lanthanoids - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.	
Actinoids - Electronic configuration, oxidation states, ionic sizes and comparison with lanthanoids.	
Coordination Compounds	12 Periods
Coordination compounds - Introduction, definition of important terms pertaining to coordination compounds, IUPAC nomenclature of mononuclear coordination compounds. Bonding, Werner's theory, VBT, magnetic properties, limitations of VBT Basic Ideas of CFT(excluding diagrams) colour, limitations of CFT, structural and stereoisomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological system).	
Haloalkanes and Haloarenes.	10 Periods
Haloalkanes: Nomenclature, classification, methods of preparation, nature of C–X bond,	

<p>physical and chemical properties, optical rotation, mechanism of substitution reactions ,Stereochemical aspects of nucleophilic substitution .</p> <p>Haloarenes: Nomenclature, Nature of C–X bond, methods of preparation, substitution reactions (Directive influence of halogen in monosubstituted compounds only) ,electrophilic substitution reactions, reactions with metals.</p> <p>Polyhalogen compounds - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.</p>	
Alcohols, Phenols and Ethers	10 Periods
<p>Alcohols: Classification, Nomenclature, methods of preparation, physical and chemical properties identification of primary, secondary and tertiary alcohols(Oxidation ,dehydrogenation reactions and Lucas test), mechanism of dehydration,</p> <p>Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, Reactions of Phenol.</p> <p>Ethers: Nomenclature, methods of preparation, physical and chemical properties.</p>	
Aldehydes, Ketones and Carboxylic Acids	10 Periods
<p>Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes, uses.</p> <p>Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.</p>	
Amines	10 Periods
<p>Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines.</p> <p>Diazonium salts: Preparation, chemical reactions.</p>	
Biomolecules	12 Periods
<p>Carbohydrates :Classification (aldoses and ketoses), monosaccharides (glucose and fructose), D-L configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides starch, cellulose, glycogen (excluding structures)</p> <p>Proteins - Elementary idea of alpha - amino acids(only structure of Glycine and Alanine) classification, peptide bond, polypeptides, proteins, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins :enzymes. Hormones - Elementary idea excluding structure.</p> <p>Vitamins – Classification and functions.</p> <p>Nucleic Acids: DNA and RNA(excluding structures).</p>	

Exam		Mid Term	First Term	Board Exam
Month		Aug	Oct	March
Sr No	Unit			
1	SOLUTIONS	5±1	8+1	7±1
2	ELECTROCHEMISTRY		9+1	9±1
3	CHEMICAL KINETICS	5±1	8+1	7±1
4	THE d-& f-BLOCK ELEMENTS	5±1	8+1	7±1
5	COORDINATION COMPOUNDS			7±1
6	HALOALKANES & HALOARENES	5±1	7+1	6±1
7	ALCOHOLS, PHENOLS AND ETHERS		7±1	6±1
8	ALDEHYDES, KETONES AND CARBOXYLIC ACIDS			8±1
9	AMINES		6+1	6±1
10	BIOMOLECULES		7±1	7±1
Sr No	Question Details			
1	MAXIMUM MARKS	20	60	70
2	DURATION IN MINUTES	60	150	180
3	NUMBER OF QUESTIONS	10	31	35
4	MULTIPLE CHOICE QUESTION (1MARK)	2	8	8
5	VERY SHORT ANSWER (VSA) (1 MARK)	2	4	5
6	SHORT ANSWER I (SA I)—2 MARKS	3	12	12
7	SHORT ANSWER (SA II)—3 MARKS	2	4	7
8	LONG ANSWER (LA) —4 MARKS	1	3	3
9	KNOWLEDGE %	30 ±5	30 ±5	30 ±5
10	UNDERSTANDING %	40±5	40±5	40±5
11	SKILL(Diag/Structure/Graph) %	10±5	10±5	10±5
12	APPLICATION %	20 ±5	20 ±5	20 ±5
Difficulty Level				
1	EASY	30±5	30±5	30±5
2	AVERAGE	50±5	50±5	50±5
3	DIFFICULT	20±5	20±5	20±5

Internal assessment : $20/2=10$ MARKS

FIRST TERM PRACTICAL EXAMINATION

VOLUMETRIC ANALYSIS	16 Marks
JOURNAL + VIVA	04 Marks (2+2)
TOTAL	20 Marks
DURATION	120 Minutes

GOA BOARD PRACTICAL EXAMINATION

VOLUMETRIC ANALYSIS	08 Marks
JOURNAL + VIVA	02 Marks (01+01)
ANALYSIS OF SALT	10 Marks
TOTAL	20 Marks
DURATION	180 Minutes (Three Hours)

MODEL BLUEPRINT OF MID TERM TEST (2024 – 2025)

XII SCIENCE

SUBJECT : CHEMISTRY

MARKS : 20

DURATION : 60min

	OBJECTIVES				DIFFICULTY LEVEL		
	K	U	S	A	Easy(E)	Average (Av)	Difficult(D)
Percentage	30%	40%	10%	20%	30%	50%	20%
Marks	6	8	2	4	6	10	4

Variation of $\pm 5\%$ is permitted in the above Objectives and Difficulty Level

Type of question	Marks per Question	No. of Questions	Total marks
MCQ	1	2	2
VSA	1	2	2
SA- I	2	3	6
SA- II	3	2	6
LA	4	1	4
Total	10	20

MCQ = Multiple choice Question

VSA = Very Short Answer

SA – I = Short answer type -I

SA – II = Short answer type – II

LA = Long Answer

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BLUEPRINT OF MIDTERM TEST 2024-2025 (CHEMISTRY – XII SCIENCE)

Q. No.	Type	Unit Name	Objectives	Difficulty Level	Duration (min)	Marks
1	MCQ	Solutions	K	E	2	1
2	MCQ	The 'd' and 'f' block elements	U	Av	2	1
3	VSA	Haloalkanes and Haloarenes	K	E	2	1
4	VSA	The 'd' and 'f' block elements	S	E	2	1
5	SA-I	Chemical Kinetics	A	D	5	2
6*	SA-I	Solutions	K + S	Av	4	1+1=2
6*	SA-I	OR Solutions				
7	SA-I	Solutions	A	D	5	2
8	SA-II	The 'd' and 'f' block elements	K	E	8	3
9	SA-II	Chemical kinetics	U	Av	8	3
10*	LA	Haloalkanes and Haloarenes	U	Av	12	4
10*	LA	OR Haloalkanes and Haloarenes				
TOTAL DURATION IN MINUTES AND MARKS					50 min	20mks

*Internal Choice

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MODEL BLUEPRINT OF THE QUESTION PAPER FOR FIRST TERM EXAM (2024 – 2025)

STD: XII SCIENCE

SUBJECT: CHEMISTRY

MAXIMUM MARKS : 60

DURATION: 150 min.

	OBJECTIVES				DIFFICULTY LEVEL		
	K	U	S	A	Easy (E)	Average (Av)	Difficult (D)
Percentage	30%	40%	10%	20%	30%	50%	20%
Marks	18	24	6	12	18	30	12

Variation of $\pm 5\%$ is permitted in the above objectives and Difficulty level.

Type of Questions	Marks	Number of questions	Total marks
MCQ	1	8	8
VSA	1	4	4
SA - I	2	12	24
SA - II	3	4	12
LA	4	3	12
TOTAL	-----	31	60

MCQ=Multiple Choice question

VSA = Very Short Answer

SA I = Short Answer type I

SA II= Short Answer type II

LA = Long Answer

Choice to be provided for one question of 2 mks, one question of 3 mks and one question of 4 mks.

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MODEL BLUEPRINT OF THE QUESTION PAPER FOR FIRST TERM EXAM (2024 – 2025)

STD : XII SCIENCE SUBJECT : CHEMISTRY DURATION : 150 min. MARKS: 60

Q. No.	NAME OF THE UNIT	OBJECTIVE	DIFFICULTY LEVEL	TYPE	DURATION IN MINUTES	MARKS
1	BIOMOLECULES	U	Av	MCQ	2	1
2	ELECTROCHEMISTRY	U	Av	MCQ	2	1
3	THE d-& f-BLOCK ELEMENTS	U	Av	MCQ	2	1
4	AMINES	A	D	MCQ	2	1
5	ALCOHOLS, PHENOLS AND ETHERS	U	Av	MCQ	2	1
6	CHEMICAL KINETICS	U	Av	MCQ	2	1
7	HALOALKANES AND HALOARENES	U	Av	MCQ	1	1
8	SOLUTIONS	A	D	MCQ	2	1
9	AMINES	K	E	VSA	2	1
10	BIOMOLECULES	U	Av	VSA	2	1
11	THE d-& f-BLOCK ELEMENTS	S	Av	VSA	1	1
12	HALOALKANES AND HALOARENES	U	Av	VSA	2	1
13	CHEMICAL KINETICS	U	Av	SA-I	5	2
14	BIOMOLECULES	K	E	SA-I	4	2
15	SOLUTIONS	S+K	Av	SA-I	5	1+1
16	ELECTROCHEMISTRY	K	E	SA-I	5	2
17	AMINES	U	Av	SA-I	7	2
18*	HALOALKANES AND HALOARENES	K	E	SA-I	6	2
18*	HALOALKANES AND HALOARENES	K	E	SA-I	6	2

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Q. No	NAME OF TOPIC	OBJECTIVE	DIFFICULTY LEVEL	TYPE	DURATION IN MINUTES	MARKS
19	THE d-& f-BLOCK ELEMENTS	K	E	SA-I	5	2
20	ELECTROCHEMISTRY	S	E	SA-I	4	2
21	ALCOHOLS, PHENOLS AND ETHERS	K	Av	SA-I	6	2
22	CHEMICAL KINETICS	K	E	SA-I	6	2
23	SOLUTIONS	U	Av	SA-I	6	2
24	AMINES	K	E	SA-I	5	2
25	HALOALKANES AND HALOARENES	A	D	SA-II	8	3
26	CHEMICAL KINETICS	S+K	E	SA-II	7	1+2
27	BIOMOLECULES	U	Av	SA-II	7	3
28*	SOLUTIONS	A	D	SA-II	7	3
28*	SOLUTIONS	A	D	SA-II	7	3
29	ELECTROCHEMISTRY	S+U	Av	LA	10	1+3
30	THE d-& f-BLOCK ELEMENTS	U	Av	LA	7	4
31*	ALCOHOLS, PHENOLS AND ETHERS	A	D	LA	8	4
31*	ALCOHOLS, PHENOLS AND ETHERS	A	D	LA	8	4
TOTAL DURATION IN MINUTES AND MARKS					140 min	60 mks

*Internal choice

Blue Print of Model paper of HSSC Final Examination Feb/March-2025

Q. No.	Unit Name	Objective	Difficulty Level	Q-Type	Duration (min)	Marks
1	BIOMOLECULES	K	E	MCQ	1	1
2	SOLUTIONS	U	A	MCQ	2	1
3	CHEMICAL KINETICS	U	A	MCQ	2	1
4	THE d- & f-BLOCK ELEMENTS	K	E	MCQ	1	1
5	ELECTROCHEMISTRY	A	D	MCQ	3	1
6	HALOALKANES AND HALOARENES	U	A	MCQ	3	1
7	ALCOHOLS, PHENOLS AND ETHERS	U	A	MCQ	3	1
8	ALDEHYDES, KETONES AND CARBOXYLIC ACIDS	A	D	MCQ	3	1
9	THE d- & f-BLOCK ELEMENTS	S	A	VSA	3	1
10	BIOMOLECULES	K	E	VSA	2	1
11	ALCOHOLS, PHENOLS AND ETHERS	U	A	VSA	3	1
12	AMINES	A	D	VSA	4	1
13	CHEMICAL KINETICS	K	E	VSA	3	1
14	ELECTROCHEMISTRY	S	A	SA-I	4	2
15	ELECTROCHEMISTRY	A	D	SA-I	5	2
16	COORDINATION COMPOUNDS	K	E	SA-I	4	2
17	*COORDINATION COMPOUNDS OR	U	A	SA-I	5	2
17	COORDINATION COMPOUNDS	U	A	SA-I	5	2
18	BIOMOLECULES	U	A	SA-I	4	2
19	HALOALKANES AND HALOARENES	U	A	SA-I	6	2
20	CHEMICAL KINETICS	K	E	SA-I	4	2
21	ALCOHOLS, PHENOLS AND ETHERS	A	D	SA-I	7	2
22	ALCOHOLS, PHENOLS AND ETHERS	U	A	SA-I	5	2
23	SOLUTIONS	K	E	SA-I	5	2
24	THE d- & f-BLOCK ELEMENTS	K	E	SA-I	5	2
25	AMINES	U	A	SA-I	6	2
26	CHEMICAL KINETICS	A	D	SA-II	8	3
27	COORDINATION COMPOUNDS	S + U	A	SA-II	7	2 + 1
28	HALOALKANES AND HALOARENES	K	E	SA-II	8	3
29	*THE d- & f-BLOCK ELEMENTS OR	U	A	SA-II	7	3
29	THE d- & f-BLOCK ELEMENTS	U	A	SA-II	7	3
30	AMINES	K	E	SA-II	7	3
31	BIOMOLECULES	K	E	SA-II	6	3
32	ALDEHYDES, KETONES AND CARBOXYLIC ACIDS	U	A	SA-II	7	3
33	*SOLUTIONS OR	S + U	A	LA	9	2 + 2
33	SOLUTIONS	S + U	A	LA	9	2 + 2

34	*ELECTROCHEMISTRY OR	U	A	LA	9	4
34	ELECTROCHEMISTRY	U	A	LA	9	4
35	*ALDEHYDES, KETONES AND CARBOXYLIC ACIDS OR	A	D	LA	9	4
35	ALDEHYDES, KETONES AND CARBOXYLIC ACIDS	A	D	LA	9	4
	TOTAL DURATION (MIN) & MARKS				170	70

**GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION
ALTO - PORVORIM GOA.
MODEL QUESTION PAPER FOR HSSC FINAL EXAMINATION IN CHEMISTRY
FEBRUARY/MARCH 2025**

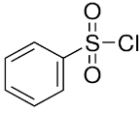
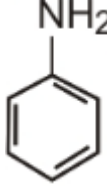
MAXIMUM MARKS : 70 DURATION :180 mins TOTAL NUMBER OF QUESTIONS : 35

- INSTRUCTIONS** : (i) There are 35 Questions to answer. However Q. Nos. 17, 29, 33, 34 and 35 have internal choice.
(ii) Answer each question only once.
(iii) Use of calculator is not permitted. Logarithm tables shall be supplied on request.
(iv) For Question Nos. 1 to 8, select and write the correct alternative from the options given below the statement.
(v) Question Nos. 1 to 13 carry *one* mark each.
(vi) Question Nos. 14 to 25 carry *two* marks each.
(vii) Question Nos. 26 to 32 carry *three* marks each.
(viii) Question Nos. 33 to 35 carry *four* marks each.

Q.1	Which among the following is an example of Globular protein? <ul style="list-style-type: none"> ● Keratin ● Enzymes ● Myosin ● Fibroin 	1
Q.2	The value of Henry's constant K_H is _____. <ul style="list-style-type: none"> ● greater for gases with lower solubility. ● greater for gases with higher solubility. ● constant for all gases. ● not related to the solubility of the gas. 	1
Q.3	For a first order reaction the ratio of the time required for completion of $3/4^{\text{th}}$ to the time required for completion of $1/2$ is ____ <ul style="list-style-type: none"> ● 1.5 ● 2.0 ● 2.5 ● 3.0 	1
Q.4	Which transition element among the following has +8 oxidation state? <ul style="list-style-type: none"> ● Osmium ● Manganese 	1

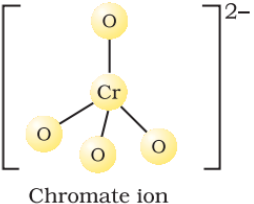
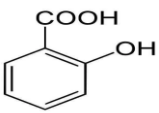
	<ul style="list-style-type: none"> ● Molybdenum ● Niobium 	
Q.5	<p>When hydrogen gas electrode is dipped in HCl solution it shows a potential of -0.177v at standard temperature and pressure, the pH of solution is found to be ____</p> <ul style="list-style-type: none"> ●2.07 ●0.73 ●1.00 ●3.00 	1
Q.6	<p>Which of the following represents a geminal dihalide ?</p> <ul style="list-style-type: none"> ● Ethylene dichloride ● 1,2-dichloropropane ● 1,3-dichloropropane ● 2,2-dichloropropane. 	1
Q.7	<p>Which among the following alcohols undergo dehydration easily?</p> <ul style="list-style-type: none"> ● Ethanol ● Propan- 1-ol ● 2- Methylpropan-1-ol ● 2-Methylpropan -2-ol 	1
Q.8	<p>The reagent used to convert p- Fluorotoluene to p- Fluorobenzaldehyde is.....</p> <ul style="list-style-type: none"> ●PCC ●O₃/H₂O-Zn dust ●CO,HCl/Anhyd. AlCl₃ ●i) CrO₂Cl₂,CS₂, ii) H₃O⁺ 	1
Q.9	Draw the structure of Chromate ion.	1
Q.10	Write the chemical name of Vitamin C.	1
Q.11	Write the structure of the major product formed when sodium salt of phenol is heated with CO ₂ followed by acidification.	1
Q.12	An organic compound with molecular formula C ₃ H ₉ N on heating with chloroform and alcoholic KOH gives a product having extremely unpleasant smell. Write the structure of this product.	1
Q.13	Define Rate of reaction.	1
Q.14	Draw a neat labelled diagram of H ₂ -O ₂ Fuel cell.	2
Q.15	<p>The cell in which the following reaction occurs</p> $2\text{Fe}^{3+}(\text{aq}) + 2\text{I}^- \longrightarrow 2\text{Fe}^{2+}(\text{aq}) + \text{I}_2$ <p>has $E^\circ_{\text{cell}} = 0.236\text{v}$ at 298k. Calculate the standard Gibbs free energy and Equilibrium constant for the reaction. (Given $F = 96500\text{ C}$)</p>	2
Q.16	<p>Write IUPAC name of each of the following Complexes.</p> <p>(i) $\text{K}_3 [\text{Cr} (\text{C}_2\text{O}_4)_3]$ (ii) $[\text{Pt Br}_2(\text{CO})_2]$</p>	2
Q.17	On the basis of VBT deduce the type of hybridisation and predict the magnetic property of the high spin complex $[\text{Fe} (\text{H}_2\text{O})_6]^{+3}$	2
	OR	
Q.17	On the basis of VBT deduce the type of hybridisation and the number of unpaired electrons in the tetrahedral complex $[\text{NiCl}_4]^{-2}$	2
Q.18	Differentiate between DNA and RNA with respect to its secondary structure and the nitrogenous	2

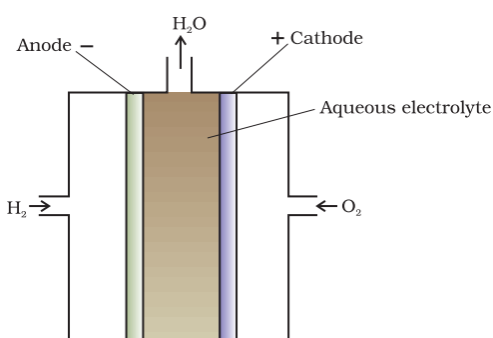
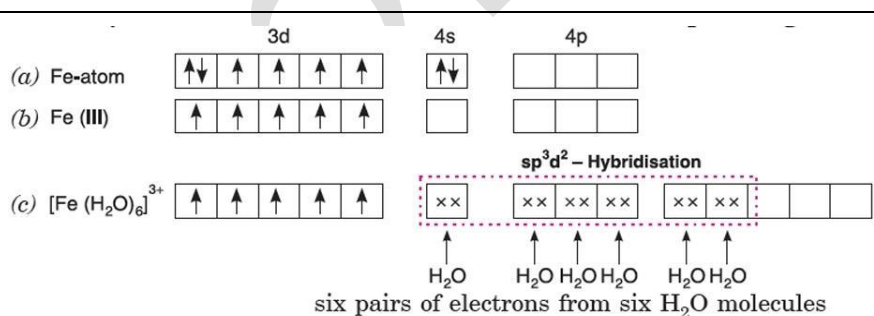
	bases present in them.	
Q.19	Explain giving reasons for each of the following : (i) Chloroform is stored in dark coloured bottles filled up to the brim. (ii) Cyclohexylchloromethane undergoes SN-2 reaction faster than cyclohexylchloride	2
Q.20	A reaction is second order with respect to a reactant R, write the rate law expression and unit of rate constant k.	2
Q.21	An organic compound A having molecular formula C ₂ H ₄ O on treatment with Methylmagnesium Iodide followed by acid hydrolysis gives compound B. When Vapours of compound B are passed over heated copper at 573K, acetone is formed. Write the sequence of reactions involved and name the compounds A and B.	2
Q.22	Write chemical equations for the conversion of (i) Anisole to Phenol, (ii) Ethyl bromide to Diethyl ether.	2
Q.23	Define: (i) Molality (ii) Azeotropes	2
Q.24	State two consequences of Lanthanoid contraction. Write the electronic configuration of Gadolinium. (Z= 64)	2
Q.25	An amide on treatment with Bromine and alkali gets converted to aniline which has one carbon atom less than the amide. Write the structure of the amide. Arrange the following amines in the increasing order of their pK _b values CH ₃ NH ₂ , C ₆ H ₅ NHCH ₃ , C ₆ H ₅ NH ₂ , (CH ₃) ₂ NH	2
Q.26	Radium decays into Helium and Radon. Write rate law expression and order for the decay reaction. The rate constants of a reaction at 500K and 700K are 0.08s ⁻¹ and 0.04s ⁻¹ respectively. Calculate activation energy of the reaction. (Given R= 8.314 J/K/mol)	3
Q.27	Draw the geometrical isomers of [Pt(en) ₂ Cl ₂] ⁺² Why is a solution of [Ni (H ₂ O) ₆] ⁺² green in colour while that of [Ni(CN) ₄] ⁻² colourless ?	3
Q.28	Identify the structure or IUPAC name of the Compounds A, B and C in the following. (i) But-1-ene + HBr in presence of peroxides → Compound A (major product) (ii) Chlorobenzene + nitrating mixture → Compound B (major product) (iii) Compound C + Na metal / ether → 2,3 -dimethylbutane	3
Q.29	Write the ionic equation to show the disproportionation of K ₂ MnO ₄ in acidic medium. Among the given transition metal ions of 3d series Zn ²⁺ , Cu ²⁺ , Cr ³⁺ , Sc ²⁺ Select the ion which is most paramagnetic giving the reason.	3
	OR	
Q.29	Write the chemical equation for oxidation of Fe ²⁺ by Cr ₂ O ₇ ²⁻ in acidic medium. Among the given transition metals of 4d & 5d series Zr, Mo, Hf, Cd Select the softest metal, giving reason.	3
Q.30	Name the major products L, M and N in the following reactions	3

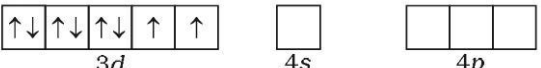

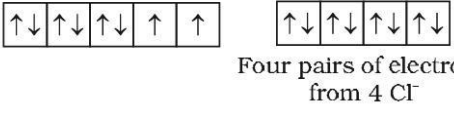
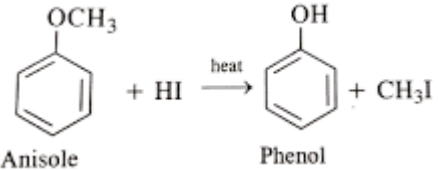
	<p>$\text{Ar N}_2\text{Cl} + \text{KI} \longrightarrow \text{L}$</p> <p>  $+ \text{C}_2\text{H}_5\text{NH}_2 \longrightarrow \text{M}$ </p> <p>  $\xrightarrow{\text{Br}_2/\text{H}_2\text{O}} \text{N}$ </p>	
Q.31	<p>State the effect of denaturation on the structure of protein? Name the two components of starch. Write the products obtained during hydrolysis of Lactose.</p>	3
Q.32	<p>Write chemical equations for each of the following and name the reaction . i) Benzoyl chloride is hydrogenated in the presence of Palladium and Barium sulphate. ii) Benzene is treated with acetyl chloride in presence of anhydrous aluminium chloride. iii) Acetone is treated with Zinc amalgam and concentrated Hydrochloric acid.</p>	3
Q.33	<p>Draw a neat labelled graph to illustrate the type of deviation from Raoult's Law by a mixture of ethanol and acetone. Ethylene glycol($\text{C}_2\text{H}_6\text{O}_2$) is an antifreeze agent. Calculate the mole fraction of ethylene glycol in an aqueous solution containing 20 percent of ethylene glycol by mass. (Given : at.mass C=12, H=1, O =16)</p>	4
	OR	
Q.33	<p>Draw a neat labelled graph to illustrate the effect on the boiling point of water upon the addition of common salt in it. An aqueous solution containing 21.6 milligram of a hormone in 100 ml of solution has an Osmotic Pressure of 0.00487 bars at 25 °C . Calculate the molar mass of the hormone. (Given : R = 0.0821 lit bar /K/ mole.)</p>	4
Q.34	<p>With respect to Leclanche cell answer the following: (i) Leclanche cell is also called primary battery. Explain. (ii) Which part of the cell acts as anode? (iii) Write the cathodic reaction taking place in this cell. (iv) Write the chemical composition of the paste used in between the two electrodes?</p>	4
	OR	
Q.34	<p>With respect to corrosion, answer the following. (i) Corrosion acts essentially as an Electrochemical cell. Explain (ii) Write the formula of the Rust. (iii) Write the cathodic reaction involved. (iv) Write the name of any one method for prevention of Corrosion.</p>	4
Q.35	<p>Complete the following chemical equations & label the compounds P, Q, R and S. 1. $\text{P} + \text{Cl}_2/h\nu, \text{H}_3\text{O}^+ \longrightarrow \text{benzaldehyde}$</p>	4

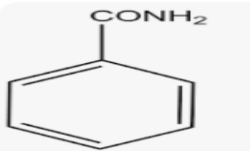
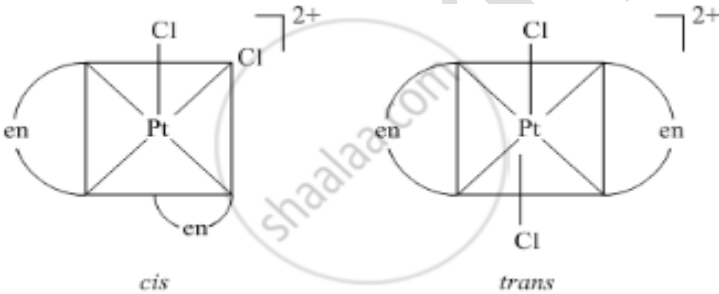
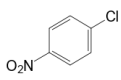
	2. 4-Oxocyclohexanecarbaldehyde + Tollen's reagent \longrightarrow Q 3. 2 mol of R + conc.kOH \longrightarrow Methanol + Potassium formate 4. S + NaOH + I ₂ \longrightarrow Sodium benzoate + Iodoform	
	OR	
Q.35	Complete the following chemical equations & label the compounds W,X,Y and Z 1. W + H ₂ O, H ⁺ \longrightarrow 2- Methyl propanamide 2. X + CO ₂ , DDE, H ₃ O ⁺ \longrightarrow n- Valeric Acid 3. Y + H ₂ O \longrightarrow Benzoic Acid + Ethanoic acid 4. Z + Alkaline KMnO ₄ , H ₃ O ⁺ \longrightarrow Benzoic Acid	4

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION
ALTO - PORVORIM GOA.
ANSWERKEY TO MODEL QUESTION PAPER OF FINAL BOARD EXAM IN CHEMISTRY
FEBRUARY / MARCH 2025

1	<ul style="list-style-type: none"> ● Enzymes 	1mk
2	<ul style="list-style-type: none"> ● Greater for gases with lower solubility 	1mk
3	<ul style="list-style-type: none"> ● 2 	1mk
4	<ul style="list-style-type: none"> ● Osmium 	1mk
5	<ul style="list-style-type: none"> ● 3 	1mk
6	<ul style="list-style-type: none"> ● 2,2-dichloropropane 	1mk
7	<ul style="list-style-type: none"> ● 2-Methylpropan-2-ol 	1mk
8	<ul style="list-style-type: none"> ● i)CrO₂Cl₂, CS₂ ,ii) H₃O⁺ 	1mk
9	 <p style="text-align: center;">Chromate ion</p>	1mk
10	Ascorbic acid	1mk
11		1mk

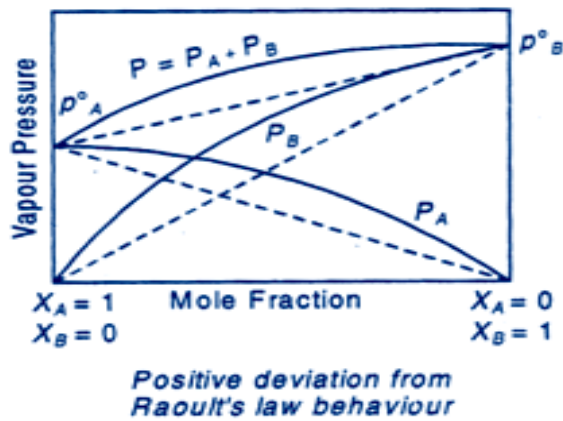
12	$\text{CH}_3\text{CH}_2\text{CH}_2\text{NC}$	1mk
13	Change in concentration of a reactant or product in unit time .	1mk
14	 <p style="text-align: center;">Diagram 1mk Any 2 labels 1mk</p>	2mk
15	$\Delta G = -nFE^\circ_{\text{cell}} \text{-----}>1/2$ $= -2 \times 96500 \times 0.236$ $= -45,548 \text{ J/mol} \text{-----}>1/2$ $\text{Log } kc = n E^\circ_{\text{cell}} / 0.059 \text{-----}>1/2$ $= 2 \times 0.236 / 0.059$ $= 8.00$ $Kc = 1.00 \times 10^8 \text{-----}>1/2$	2mk
16	(i) Potassium trioxalatochromate(III) (ii) Dibromidodicarbonylplatinum(II)	1mk + 1mk
17	 <p>Fe(III) config = 1/2 mk Fe(H₂O)₆]⁺³ config = 1/2 mk Type of hybridisation = sp³ d² = 1/2 mk Magnetic property = paramagnetic = 1/2 mk</p>	2mk
OR		

<p>17</p>	<p>Orbitals of Ni³⁺ ion </p> <p>sp³ hybridised orbitals of Ni²⁺ </p> <p>[NiCl₄]²⁻ (high spin complex) </p> <p>Ni(II) config = 1/2 mk [NiCl₄]²⁻ config = 1/2 mk Hybridisation = sp³ = 1/2 mk Number of unpaired electrons = 2 = 1/2 mk</p>	<p>2mk</p>
<p>18</p>	<p>DNA is double-stranded, forming a double helix, while RNA is usually single-stranded. Bases present in DNA are adenine, thymine, cytosine, and guanine, while Bases present in RNA are adenine, uracil, cytosine, and guanine.</p>	<p>1mk + 1mk</p>
<p>19</p>	<p>(i) In presence of light and air chloroform undergoes oxidation to produce phosgene - a highly poisonous substance. So it is stored in dark coloured bottles filled upto the brim to keep out light and air.</p> <p>(ii) Because cyclohexylchloromethane is a primary halide, it undergoes SN-2 reaction faster.</p>	<p>1 mk + 1mk</p>
<p>20</p>	<p>Rate = k[A]² 1mk Lmol⁻¹s⁻¹ 1mk</p>	<p>2mk</p>
<p>21</p>	<p>Dry ether, H⁺/H₂O <chem>CH3CHO + CH3MgI >> (CH3)2CH-OH</chem> 1/2 mk Cu, 573K <chem>(CH3)2CH-OH >> CH3COCH3</chem> 1/2 mk A- Ethanal/Acetaldehyde 1/2 mk B- Propan-2-ol/isopropyl alcohol 1/2 mk</p>	<p>2mk</p>
<p>22</p>	<p></p> <p>Anisole Phenol 1mk</p> <p><chem>CH3CH2Br + CH3CH2ONa >> CH3CH2OCH2CH3 + NaBr</chem> 1mk</p>	<p>2mk</p>
<p>23</p>	<p>Molality - it is defined as the number of moles of solute present in per kilogram of solvent OR number of gram moles of solute dissolved in 1000 grams of solvent. Azeotropes - are liquid mixtures which boil at same temperatures without undergoing any change in composition OR are binary mixtures having the same composition in liquid and vapour phase and boil at a constant temperature</p>	<p>1mk + 1mk</p>

24	<p>The consequences are as follows: The atomic radii of Zr and Hf are almost the same hence difficult to separate them. Covalent character of cations increases. Electronegativity of trivalent ions increases slightly. (Any two, ½ mark each)</p> <p>[Xe] 4 f⁷ 5 d¹ 6 s²</p>	1mk + 1mk
25	 <p style="text-align: center;">1mk</p> <p>(CH₃)₂NH < CH₃NH₂ < C₆H₅NHCH₃ < C₆H₅NH₂ 1mk</p>	2mk
26	<p>All radioactive decay follows 1st order 1/2mk Rate = K [Ra] 1/2mk</p> <p>Log K₂/k₁ = Ea / 2.303 R x T₂ - T₁ / T₁ x T₂ 1/2mk Log 0.08/0.04 = Ea / 2.303 x 8.314 x 200 / 500 x 700 1/2mk Log 2 x 2.303 x 8.314 x 500 x 700 / 200 = Ea Ea = 10,085J/mol 1mk</p>	3mk
27	 <p>Each isomer = 1mk q</p> <p>Hexaaquanickel(II) has two unpaired electrons (H₂O is a weak field ligand). So d-d transition is possible and it is hence coloured...1/2 mk Tetracyanonickelate(II) has no unpaired electrons(CN is a strong field ligand).So d-d transition is not possible and hence it is colourless..½ mk</p>	3mk
28	<p>Compound A = 1-bromobutane CH₃ CH₂ CH₂ CH₂ Br</p>  <p>Compound B = 1-chloro-4-nitrobenzene</p> <p>Compound C = 2-chloropropane or 2-bromopropane or 2-iodopropane CH₃ CH(Cl)CH₃ CH₃ CH(Br) CH₃ CH₃CH(I) CH₃</p> <p>Formula or IUPAC name of each = 1 mk</p>	3mk
29	$3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O}$	3mk

	<p>($\frac{1}{2}$ mk for equation+ $\frac{1}{2}$ mk for balancing) Cr^{3+}, (1mk) It has maximum no of unpaired electrons, i.e it has 3 unpaired electrons (1mk)</p>	
	OR	
29	<p>$\text{Cr}_2\text{O}_7^{2-} + 14 \text{H}^+ + 6 \text{Fe}^{2+} \rightarrow 2 \text{Cr}^{3+} + 6 \text{Fe}^{3+} + 7 \text{H}_2\text{O}$ ($\frac{1}{2}$ mk for equation+ $\frac{1}{2}$ mk for balancing) Cd (1mk) Weak interatomic metallic bonding &/fully filled 3d orbitals (1mk)</p>	3mk
30	<p>L = Iodobenzene 1 mk M = N-Ethylbenzenesulphonamide 1 mk N = 2,4,6-Tribromoaniline 1mk</p>	3mk
31	<p>Globules get unfolded and helixes get uncoiled. Secondary and tertiary structures of protein are destroyed, but the primary structures remain unaltered. (any one point 1mk) Amylose & Amylopectin ($\frac{1}{2}$ + $\frac{1}{2}$ mk) Glucose & Galactose ($\frac{1}{2}$ + $\frac{1}{2}$ mk)</p>	3mk
32	<p style="text-align: center;"> Rosenmund Reduction Friedel Craft Acylation Clemmensen reduction </p> <p>Reaction !/2mk Name 1/2mk</p>	3mk

33



Graph = 1mk
Labelling = 1mk

Molar mass of ethylene glycol = 62

Molar mass of water = 18

Mass of ethylene glycol = 20g

Mass of water = 80g

Number of moles of ethylene glycol = $20 / 62 = 0.322$

Number of moles of water = $80 / 18 = 4.44$

Mole fraction of ethylene glycol = $\frac{\text{moles of ethylene glycol}}{\text{Moles of ethylene glycol} + \text{moles of water}}$

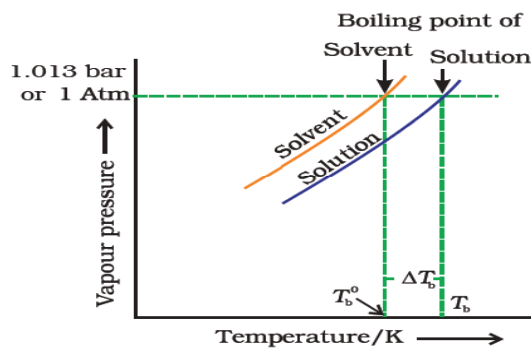
$$= \frac{0.322}{0.322 + 4.44}$$

$$= 0.0676$$

Formula = 1/2 mark, Substitution = 1 mark, Ans = 1/2 mark

OR

33



Graph = 1mk
Labelling = 1mk

Mass of hormone = 21.6×10^{-3} gms

Volume of solution = $100 / 1000 = 0.1$ lit

Osmotic pressure = 0.00487 bar

Temperature = $25 + 273 = 298$ K

R = 0.0821 lit bar / k / mol

$\Pi V = w_2 RT / M_2$

Or $M_2 = w_2 R T / \Pi V$

$$= \frac{21.6 \times 10^{-3} \times 0.0821 \times 298}{0.00487 \times 0.1} = 1085 \text{ g/mol}$$

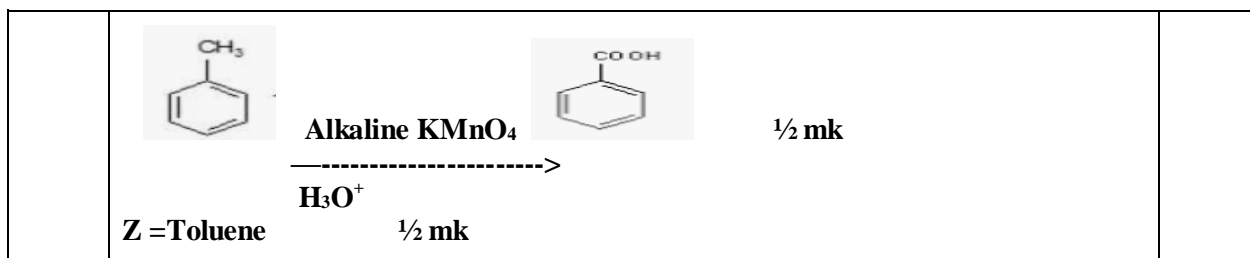
Formula = 1/2 mk, Substitution = 1 mk, Answer = 1/2 mk

34

(i) Leclanche cell is also called primary cell because the reaction occurs only once and after use after a period of time the battery becomes dead and cannot be reused.

4mk

	<p>(ii) Anode - zinc (iii) Cathodic reaction $\text{MnO}_2 + \text{NH}_4^+ + 1\text{e}^- \longrightarrow \text{MnO}(\text{OH}) + \text{NH}_3$ (iv) Mixture of NH_4Cl & ZnCl_2 1mk each x 4 = 4mks</p>	
	OR	
34	<p>(i) At one part of iron rod oxidation takes place and this spot acts as anode. Electrons released at anode move through metal and go to another spot and reduce oxygen and this spot act as cathode (ii) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ (iii) $\text{O}_2(\text{g}) + 4\text{H}^+(\text{g}) + 4\text{e}^- \longrightarrow 2\text{H}_2\text{O}$ (iv) Use of paint or use of sacrificial anode like Mg, Zn or Sn 1mk each x 4 = 4mks</p>	4mk
35	<div style="text-align: center;"> <p style="text-align: right;">1/2 mk</p> </div> <p>P = Toluene 1/2mk</p> <div style="text-align: center;"> <p style="text-align: right;">1/2mk</p> </div> <p>Q = 4-Oxocyclohexane carboxylate 1/2mk</p> <p>$2\text{HCHO} + \text{KOH}(\text{conc}) \longrightarrow \text{CH}_3\text{OH} + \text{HCOOK}$ 1/2mk</p> <p>R = Methanal/Formaldehyde 1/2 mk</p> <p>$\text{C}_6\text{H}_5\text{COCH}_3 + \text{NaOH} + \text{I}_2 \longrightarrow \text{C}_6\text{H}_5\text{COONa} + \text{CHI}_3$ 1/2mk</p> <p>S = Acetophenone 1/2 mk</p>	4mk
	OR	
35	<p>$(\text{CH}_3)_2\text{CH}-\text{CN} + \text{H}_2\text{O}/\text{H}^+ \longrightarrow (\text{CH}_3)_2\text{CHCONH}_2$ 1/2 mk W = 2-Methylpropanamide. 1/2 mk</p> <p style="text-align: center;">i) Dry ether</p> <p>$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{MgBr} + \text{CO}_2 \longrightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$ 1/2 mk ii) H_3O^+ X = n-Butylmagnesium bromide 1/2 mk</p> <div style="text-align: center;"> <p style="text-align: right;">1/2 mk</p> </div> <p>Y = Benzoic ethanoic anhydride 1/2 mk</p>	4mk



FIRST TERM PRACTICAL EXAMINATION

VOLUMETRIC ANALYSIS	16 Marks
JOURNAL + VIVA	04 Marks
TOTAL	20 Marks
DURATION	120 Minutes

GOA BOARD FINAL PRACTICAL EXAMINATION

VOLUMETRIC ANALYSIS	08 Marks
JOURNAL + VIVA	02 Marks (01+01)
ANALYSIS OF SALT	10 Marks
TOTAL	20 Marks
DURATION	180 Minutes (Three Hours)

COMPUTATION OF INTERNAL MARKS : (Max 10)

- 1) For performing five activities in the school lab (may be carried out in a group of five to six students) and recording the same in the journal=10 Marks.
- 2) For Completing any one of the innovative methods=10 Marks.

COMPUTATION OF CHEMISTRY MARKS FOR FINAL HSSC EXAMINATION		
HSSC Theory examination	70 Marks	180 Minutes
HSSC Practical examination	20 Marks	180 Minutes
HSSC Internal Marks	10 Marks	
Total	100 Marks	

Note: *HSSC Internal Marks = Total 20 marks allotted for internal assessment to be divided by two to convert it to 10 marks

**Goa Board of Secondary & Higher Secondary Education
Alto, Betim-Goa**

**Model Paper for First term Practical Examination-2024
CHEMISTRY**

Date:
Session:

Duration: **120** Minutes
Max. Marks: **20**

N. B.

- 1) On your answer books write your Examination Seat number and your Laboratory table number.
- 2) Get the burette reading and confirmatory tests initialed by the Examiner.
- 3) Check if the number on (i) your table (ii) answer script and (iii) the containers A, B, and C are the same. If not, report immediately to the Examiner.
- 4) Use of non - programmable calculator is allowed.

Atomic Masses:- H=1, C=12, N=14, O=16, S=32, K=39, Mn=55, Fe= 56.

Q .1 You are provided with two solutions as follows:-

Container A: _____N/M stock solution of hydrated Oxalic acid / Mohr's salt.

Container B: KMnO₄ Solution

Using the stock solution from Container A, prepare 100 mL of _____N/M hydrated Oxalic acid /Mohr's salt in the given Standard Measuring flask C.

Using the solution prepared in flask C, determine N/M of the solution in container B.

Also calculate.

- The strength of the solution in container B in terms of grams per _____mL.
- The percentage purity of the solution in container B, _____ g of which have been dissolved per _____mL.

(16 Marks)

Q.2. Journal + Viva

(2+2 Marks)

Marking Scheme

Scheme for allotment of marks for First term practical examination

1. Volumetric analysis.....16 marks
- a. Correct observations (burette solution, solution in the flask, indicator and colour change) (2 marks)
 - b. Calculation of correct volume2 mark
 - c. Titre reading08 marks

Error in titre reading Marks

$\pm 0.2\text{mL}$	8
$\pm 0.3\text{mL}$	6
$\pm 0.4\text{mL}$	4
$\pm 0.5\text{mL}$	2
$\pm 0.6\text{mL}$	1

- d. Calculations 2 + 2 mark (4Marks)

2. Journal + Viva 2 + 2 mark

SEAT NO:-

TABLE NO:-

**Goa Board of Secondary & Higher Secondary Education
Alto, Betim-Goa**

HSSC Practical Examination –FEB/MARCH 2025

CHEMISTRY

Date:
Session:

Duration: 3 Hours
Max. Marks: 20

N. B.1) Write your Examination Seat number and your Laboratory table number on your answer book.

- 2) Get the burette reading and confirmatory tests initialed by one of the Examiner.
- 3) Check if the number on (i) your table (ii) answer book and (iii) the containers A, B, C and D are the same. If not, report immediately to the Examiners.
- 4) Use of non - programmable calculator is allowed.

Atomic Masses:- H=1, C=12, N=14, O=16, S=32, K=39, Mn=55, Fe= 56.

SECTION – I

Q.1 You are provided with two solutions as follows:-

Container A: _____ N/M stock solution of hydrated Oxalic acid / Mohr's salt.

Container B: KMnO_4 Solution

Using the stock solution from Container A, prepare 100 mL of _____ N/M hydrated Oxalic acid /Mohr's salt in the given Standard Measuring flask C.

Using the solution prepared in flask C, determine N/M of the solution in container B.

Also calculate.(any one)

- The strength of the solution in container B in terms of grams per _____ mL.
- The percentage purity of the solution in container B, _____ g of which have been dissolved per _____ mL. (08 Marks)

Q.2 Journal + Viva

(1+1 Marks)

SECTION – II

Q.3 Analyse the inorganic salt given in container **D** bearing your table number qualitatively and detect the cation and anion present. Give a complete report of all the tests performed.

Write the formula of the compound detected.

(10

Marks)

**GOA BOARD OF SECONDARY & HIGHER SECONDARY
EDUCATION Alto, Betim – Goa
HIGHER SECONDARY SCHOOL CERTIFICATE EXAMINATION
GUIDELINES FOR CONDUCT OF THE H.S.S.C. PRACTICALS IN CHEMISTRY -2024-25**

- 1 Student should report in journal:
- Minimum of 4 volumetric exercises.
 - Minimum 10 inorganic qualitative analysis.
 - Minimum **Five Activities** .

2 List of the compounds.

<u>COMPOUND</u>	<u>COMPOUND</u>
<u>NH₄Cl</u>	<u>Zn(NO₃)₂</u>
<u>NH₄Br</u>	<u>ZnCl₂</u>
<u>(NH₄)₃PO₄</u>	<u>CoCl₂</u>
<u>(NH₄)₂CO₃</u>	<u>CoSO₄</u>
<u>Pb(NO₃)₂</u>	<u>Co(NO₃)₂</u>
<u>Pb(CH₃COO)₂</u>	<u>CaCl₂</u>
<u>CuSO₄</u>	<u>Ca(NO₃)₂</u>
<u>CuCl₂</u>	<u>Sr(NO₃)₂</u>
<u>Cu(NO₃)₂</u>	<u>SrCl₂</u>
<u>AlCl₃</u>	<u>BaCl₂</u>
<u>Al₂(SO₄)₃</u>	<u>Ba(NO₃)₂</u>
<u>Al(NO₃)₃</u>	<u>MgSO₄</u>
<u>FeCl₃</u>	<u>MgCl₂</u>
<u>Fe(NO₃)₃</u>	<u>KCl</u>
<u>MnCl₂</u>	<u>KI</u>
<u>MnSO₄</u>	<u>KBr</u>
<u>NiSO₄</u>	<u>K₂SO₄</u>
<u>NiCl₂</u>	<u>K₂CO₃</u>
<u>Ni(NO₃)₂</u>	<u>K₃PO₄</u>
<u>ZnSO₄</u>	<u>K₂C₂O₄</u>

1. Scheme for allotment of marks.

Q1. In organic Volumetric Analysis (Redox titration) (8 marks)

- (a) Correct observations (burette solution, solution in the flask, indicator and colour change) (1 mark)
- (b) Calculation of correct volume(1 mark)
- (c) Range of titre reading for allotment of marks is as follows: (Maximum 4 marks)

Error in titre reading Marks

$\pm 0.2\text{mL}$	4
$\pm 0.3\text{mL}$	3
$\pm 0.4\text{mL}$	2
$\pm 0.5\text{mL}$	1

Pilot reading and a set of three concordant reading shall be recorded in the observation table and thus the concordant reading should be taken as the correct reading for assigning the marks for accuracy in the reading.

- (d) Calculations:- (2 marks)

(1) Calculation of N/M of solution in container B, by using

(1) $N_1V_1=N_2V_2$ (2) $N=aM$

$a_1M_1V_1=a_2M_2V_2$ formula/e, (a= number of electrons lost or gained per molecule).....

(1 mark)

(2) Calculate the following.....

(1 mark)

Strength of the solution in container B in terms of _____ g/ _____ mL

Or % purity of solution in container B

N.B. In case the titre reading is not within the range of error then for calculations (correct formula) ½ mark to be allotted out of the 1 mark allotted for each calculation.

Q 2. JOURNAL+Viva (2 Mark)

The marks are to be allotted as follows:

- a. For the experiments performed and recorded during the year. (1 mark)
- b. Viva on volumetric analysis (Two questions ½ marks each) (1 mark)

Q 3. Qualitative analysis of Inorganic Compound (10 marks)

<p>Dry/Preliminary Tests.....(4 marks)</p> <p>Colour..... (½ mark)</p> <p>Heating in a dry test tube.....(½ mark)</p> <p>Flame test(½ mark)</p> <p>Test for NH_4^+(½ mark)</p> <p>Dil HCl test..... (½ mark)</p> <p>Conc H_2SO_4.....(½ mark)</p> <p>Phosphate test(½ mark)</p> <p>KMnO_4 test.....(½ mark)</p> <p>If no anion is detected and if it is SO_4^{2-}, it need not be reported as given in the chart.</p>	<p>WET TESTS FOR CATION.....(3 marks)</p> <p>1) Group separation.....(1 mark)</p> <p>2) Identification of cation(1 mark)</p> <p>3) C.T. for cation.....(1 mark)</p> <p>WET TESTS FOR ANION AND RESULT..... (2 marks)</p> <p>(1) Identification of anion.....(1 mark)</p> <p>(2) C.T. for anion..... (1 mark)</p> <p>(3) CORRECT FORMULA OF SALT</p> <p>..... (1 mark)</p>
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Assessment criteria for internal assessment of 20 marks

1. Five different activities to be performed out of the 10 activities listed below.

Two marks each for reporting 5 activities in the journal. Total of 10 marks to be allotted for the same.

- **Preparation of dyes.**
- **Preparation of coordination compounds.**
- **Effect of concentration on the rate of reaction.**
- **Effect of temperature on the rate of reaction.**
- **Enthalpy of neutralisation.**
- **Setting up of Daniel cell.**
- **Setting up of electrolytic cell.**
- **Chalk chromatography.**
- **Preparation of Tollen's reagent and Iodoform.**
- **Detection of functional group (tests to distinguish between Alcoholic and Phenolic group, Phenolic and Amino group, Ketonic and aldehydic group)**

2. Innovative methods (any one topic 10 marks).

Suggestive topics for innovative methods.

- **Investigatory project.**
- **Working/static model.**
- **Visit to industrial units.**
- **Survey.**
- **Poster based assignment.**
- **Power point presentation.**

NOTE: Student should submit a hand written report and the same to be evaluated as per the marking scheme given below.

- **Submission of report** – 5 marks.
- **Method adopted** - 3 marks.
- **Viva** - 2 marks
