CHEMISTRY

SUBJECT SPECIFIC GUIDELINES FOR CLASS XII CHEMISTRY THEORY PAPER

1. The theory paper shall be of 70 marks and of 3 hrs duration.
2. The syllabus shall be in accordance with the core syllabus provided by COBSE.
3. The questions shall be from all the units.
4. The question paper shall have four sections A,B, C & D. Section A will have 8 questions of one mark each. Section B will have 10 questions of 2 marks each, Section C will have 9 questions of 3 marks each and Section D will have 3 questions of 5 marks each. Total number of questions will be 30.
5. All questions will be compulsory.
6. There will be no overall choice. However an internal choice will be provided in one question of section B, one question of section C and all the three questions of section D. A student has to attempt only one of the alternatives in such questions.
7. The student shall draw correct and neat diagram wherever asked.

Chemistry

Class XII

BASIC GUIDELINES FOR PRACTICALS:

1. Each student has to perform at least 15 experiments for which the list is provided.
2. Additional experiments may be done if the time permits.
3. Laboratory records should be maintained regularly. The experiments performed in a week should be recorded and submitted to the teacher for evaluation in the coming week.
4. Emphasis should be more on developing skills for different laboratory techniques and proper handling of apparatus.
5. Safety measures should be taken care of when the students are working in the laboratory [use of lab coats, safety glasses, proper handling/disposal of hazardous chemicals]
6. First aid box and charts related to safety measures should be available in the laboratory.
7. Each laboratory should have fire extinguishers and sand buckets.
8. Laboratory should have annual calendar for laboratory work.

1. Total practicals to be performed : 15
2. Maximum marks : 30
3. Duration : 03 hours

Three experiments to be performed in the examination as follows:

1. **Volumetric analysis** (8Marks)

   Determination of strength/Molarity of $KMnO_4$ solution by titrating it against a standard solution of:

   (I) Ferrous ammonium sulphate (Mohr's salt)

   (II) Oxalic acid.

   [note:-students will be required to prepare standard solution by weighing themselves]

2. **Qualitative analysis** (8Marks)

   Determination of one cation and one anion in a given salt.

   CATIONS- Pb^{2+}, Cu^{2+}, As^{3+}, Fe^{3+}, Mn^{2+}, Ni^{2+}, Zn^{2+}, Co^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Mg^{2+}, NH_4^+

   ANIONS- CO_3^{2-}, S^{2-}, SO_3^{2-}, SO_4^{2-}, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, PO_4^{3-}, $C_2O_4^{2-}$, CH_3COO^-

   (Note:- Insoluble salts excluded)

3. **One of the following experiments** (6Marks)

I. CHROMATOGRAPHY:- Separation of constituents present in an inorganic mixture containing two cations only (constituents having wide difference in R_f values to be provided).

II. PREPARATION OF ORGANIC COMPOUNDS

III. Tests for the functional groups present in organic compounds:
Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino(primary) groups.

IV. Characteristic tests of carbohydrates, fats and proteins in pure samples and their detection in given foods stuffs.

V. Preparation of one lyophilic sol and lyophobic sol.

CHEMISTRY (CLASS XII)
PRACTICALS

Evaluation Scheme for Examination	Marks
Volumetric analysis	8
Salt analysis	8
Content Based Experiments	6
Class record and Viva	4
Project work	4

SYLLABUS FOR PRACTICALS

A. SURFACE CHEMISTRY **(Periods - 6)**

(a) Preparation of one lyophilic sol and lyophobic sol.
Lyophilic sol- starch,egg albumin, and gum.
Lyophobic sol- aluminium hydroxide, ferric hydroxide,arsenious sulphide.

(b) Study of the role of emulsifying agents in stabilizing the emulsions of different oils.

B. CHEMICAL KINETICS **(Periods-4)**

(a) Effect of concentration and temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.

(b) Study of reaction rates of any one of the following:

(i) Reaction of Iodide ionwith hydrogen peroxide at room temperature using different concentrations of Iodide ions.

(ii) Reaction between potassium iodate (KIO_3) and sodium sulphite (Na_2SO_3)using starch solution as indicator(clock reaction).

C. THERMOCHEMISTRY **(Periods 4)**

Any one of the following experiments:-

(i) Enthalpy of dissolution of Copper Sulphate or potassium nitrate.

(ii) Enthalpy of neutralization of strong acid (HCl) and strong base(NaOH).

(iii) Determination of enthalpy change during interaction (Hydrogen bond formation) between acetone and chloroform.

D. ELECTROCHEMISTRY **(Periods-2)**

Variation of cell potential in Zn/Zn^{2+} II Cu^{2+}/Cu with change in concentration of electrolytes($CuSO_4$ or $ZnSO_4$) at room temperature.

E. CHROMATOGRAPHY **(Periods -2)**

(i) Separation of pigments from extracts of leaves and flowers by paper chromatography and determination of R_f values.

(ii) Separation of constituents present in an inorganic mixture containing two cations only (constituents having wide difference in R_f values to be provided).

F. PREPARATION OF INORGANIC COMPOUNDS (Periods -4)

(i) Preparation of double salt of ferrous ammonium sulphate or potash alum.

(ii) Preparation of potassium ferric oxalate

G. PREPARATION OF ORGANIC COMPOUNDS (Periods -4)

Preparation of any two of the following compounds:

(i) Acetanilide

(ii) Di-benzal acetone

(iii) p-Nitroacetanilide

(iv) Aniline yellow or 2-Napthol aniline dye

(v) Iodoform

H. **Tests for the functional groups present in organic compounds:** (Periods-6)
Unsaturation, alcoholic , phenolic, aldehydic,ketonic, carboxylic and amino(primary)groups.

I. **Characteristic tests of carbohydrates , fats and proteins in pure samples and their detection in given food stuffs.** (Periods-4)

J. **Determination of strength/Molarity of $KMnO_4$ solution by titrating it against a standard solution of** (Periods -8)

(i) Ferrous ammonium sulphate(Mohr's salt),

(ii) Oxalic acid.

(Students will be required to prepare standard solutions by weighing themselves)

K. QUALITATIVE ANALYSIS (Periods-14)

Determination of one cation and one anion in a given salt.

CATIONS- Pb^{2+}, Cu^{2+},As^{3+}, Fe^{3+}, Mn^{2+} ,Ni^{2+}, Zn^{2+}, Co^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Mg^{2+},NH_4^+

ANIONS- CO_3^{2-}, S^{2-}, SO_3^{2-}, SO_4^{2-}, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, PO_4^{3-}, $C_2O_4^{2-}$, CH_3COO^-

(NOTE: Insoluble salts excluded)

PROJECT WORK- wherever feasible, may include

i) Model Preparation

ii) Investigatory Project

iii) Science Exhibits

iv) Participation in Science fairs

v) Testing of adulteration in food items.

Any investigatory project , which involves about 10 periods of work , can be chosen with the approval of teacher.

CHEMISTRY

CLASS XII

BLUE PRINT

Marks(Numbers)

OBJECTIVE	KNOWLEDGE				UNDERSTANDING				APPLICATION + SKILL				TOTAL			
FORM OF QUESTION	E	SA1	SA2	VSA	E	SA1	SA2	VSA	E	SA1	SA2	VSA	E	SA1	SA2	VSA
Solid State								1 (1)			3 (1)				3 (1)	1 (1)
Solutions						2 (1)					3 (1)			2 (1)	3 (1)	
Electrochemistry					5 (1)								5 (1)			
Chemical kinetics										2 (1)	3 (1)			2 (1)	3 (1)	
Surface chemistry				1 (1)							3(1) (S)				3 (1)	1 (1)
General principles and process of isolation of elements			3 (1)												3 (1)	
p-block elements					5 (1) 3U+ 2S	2 (1)		1 (1)					5 (1)	2 (1)		1 (1)
d and f-block elements		2 (1)					3 (1)							2 (1)	3 (1)	
Coordination compounds							3 (1)								3 (1)	
Haloalkanes and halorenes		2 (1)				2 (1)								2 (2)		
Alchohols, phenols and ethers								1 (1)			3(1) (S)				3 (1)	1 (1)
Aldehydes, ketones and carboxylic acids	5 (1)							1 (1)					5 (1)			1 (1)
Organic compounds containing nitrogen		2 (1)								2 (1)				2 (2)		
Bio-molecules				1 (1)		2 (1)		1 (1)						2 (1)		1 (2)
Polymers		2 (1)						1 (1)						2 (1)		1 (1)
Chemistry in everyday life			3(1)												3 (1)	
SUBTOTAL	5 (1)	8 (4)	6 (2)	2 (2)	10 (2)	8 (4)	6 (2)	6 (6)		4 (2)	15 (5)		15 (3)	20 (10)	27 (9)	8 (8)
TOTAL				21 (9)				30 (14)				19 (7)				70 (30)

QUESTION PAPER DESIGN
CHEMISTRY XII

SUBJECT :- CHEMISTRY

DURATION:- 3 HOURS

MARKS:-70

1. Weightage by objectives

Objective	Marks	% of total marks
Knowledge	21	30
Understanding	28	40
Application	13	18
SKILL	8	12

2.Weightage by content

UNITS	Titles	Marks
1	Solid state	4
2	Solutions	5
3	Electrochemistry	5
4	Chemical Kinetics	5
5	Surface Chemistry	4
6	General principles and processes of isolation of elements	3
7	p-Block elements	8
8	d and f –Block elements	5
9	Coordination compounds	3
10	Haloalkanes and Haloarenes	4
11	Alcohols, Phenols and Ethers	4
12	Aldehydes , Ketones and Carboxylic acids	6
13	Organic compounds containing Nitrogen	4
14	Biomolecules	4
15	Polymers	3
16	Chemistry in everyday life	3

3.Weightage by types of questions

Type	Number of questions	Max. Marks	Total
Very short questions	8	1	8
Short answer questions –I	10	2	20
Short answer questions-II	9	3	27
Long answer questions	3	5	15
	30		70

4.Difficulty level of the question paper

LEVEL	MARKS	% of marks
Difficult	14	20
Average	35	50
Easy	21	30

SAMPLE QUESTION PAPER

SUBJECT : CHEMISTRY

Time: 3hours CLASS XII Maximum marks: 70

General instructions:

a) **All questions are compulsory.**
b) **Questions 1 to 8 carry 1 mark each.**
Questions 9 to 18 carry 2 marks each.
Questions 19 to 27 carry 3 marks each.
Questions 28 to 30 carry 5 marks each.

Q1 Which of the following is a macromolecular colloid: 1
(a) Sulphur
(b) Gold sol
(c) Protein
(d) Soap

Q2 The IUPAC name of compound $CH_3\text{-}\underset{\displaystyle OH}{\underset{|}{CH}}\text{-}CH_2\text{-}CO\text{-}CH_3$ is : 1
(a) 4-oxopentan-2-ol
(b) 2-oxopentan-4-ol
(c) 4-hydroxypentan-2-one
(d) 2-hydroxypentan-4-one

Q3 The helix structure of proteins is stabilized by : 1
(a) peptide bonds
(b) hydrogen bonds
(c) disulphide bonds
(d) van der Waals forces

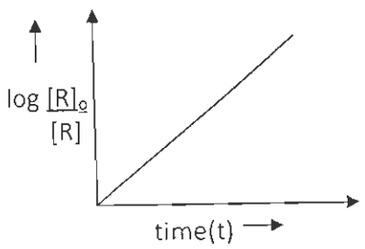
Q4 A mixed oxide has *ccp* arrangement in which the cations 'X' occupy $1/3^{rd}$ of octahedral voids and the cations 'Y' occupy $1/3^{rd}$ of tetrahedral voids .The formula of oxide is : 1
(a) $X_2Y_3O_2$
(b) XY_3O
(c) X_2YO_3
(d) XY_2O_3

Q5 How is the presence of SO_2 gas detected ? 1

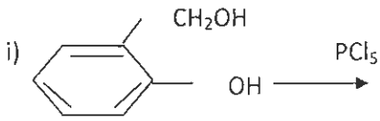
Q6 Glucose on reaction with HI gives n-hexane. What information does it give for the structure of glucose ? 1

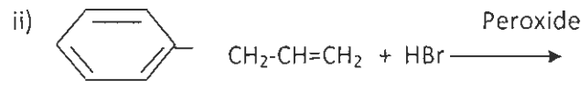
Q7 What is the role of Benzoyl peroxide in the free radical polymerization of ethene? 1

Q8 Why is 2-nitrophenol steam volatile whereas 4-nitrophenol is not? 1

Q9	What kind of deviation from Raoult's law is shown by the solution of ethanol and cyclohexane ? Give reason. **OR** i) At the same temperature Gas A is more soluble in water than gas B . Which of them will have a higher value of K_H ? Give reason . ii) Why does boiling point of water increase on dissolving salt into it?	2 2
Q10	For a reaction X ⟶ P, following plot is observed:  i) Predict the order of reaction and write the unit of rate constant(k). ii) Write the expression for slope of the line in the plot.	2
Q11	i) What is the function of Sulphur in vulcanization of rubber? ii) Arrange the following polymers in the increasing order of their intermolecular forces: Buna-N, PVC, Nylon6,6	2
Q12	Write chemical reactions involved in the preparation of : i) K_2MnO_4 from MnO_2 ii)$Na_2Cr_2O_7$ from Na_2CrO_4	2
Q13	Arrange the following in the increasing order of property indicated against each set : i) HF, HCl, HBr, HI - bond dissociation enthalpy ii)H_2O, H_2S, H_2Se , H_2Te - acidic character	2
Q14	Account for the following: i) Allyl halide is highly reactive towards S_N1 reaction. ii) C-Cl bond length in chlorobenzene is shorter as compared to C-Cl bond length in CH_3-Cl.	2

Q15 Draw structure of major product in each of the following reactions: — 2

i) 

ii) 

Q16 Write the structures of A and B in the following reactions: — 2

i) $CH_3Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B$

ii) $A \xrightarrow{Br_2+KOH} C_6H_5NH_2 \xrightarrow{CHCl_3+alc.NaOH} B$

Q17 Suggest the method for conversion of each of following in not more than two steps: — 2

i) Aniline to phenol
ii) Benzamide to N-phenylethanamide

Q18 i) Why do Amino acids behave like salts? — 2
ii) What type of linkage is responsible for the formation of polynucleotides?

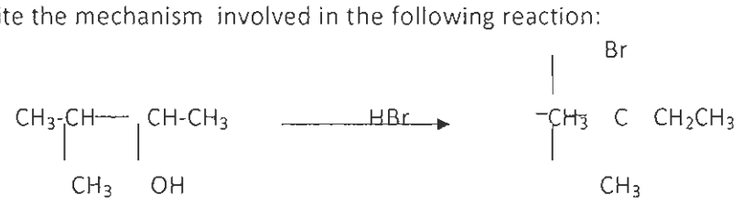
Q19 0.5 g of KCl (M= 74.5g mol^{-1}) was dissolved in 100 g of water to lower its freezing point by 0.24 K . Calculate the percentage ionization of KCl. — 3
(K_f for water= 1.86 K kg mol^{-1})

Q20 The following data were obtained during the first order thermal decomposition of PCl_5 at a constant volume: — 3

$$PCl_5(g) \longrightarrow PCl_3(g) + Cl_2(g)$$

Experiment	Time/s-1	Total pressure/atm
1	0	0.4
2	100	0.7

Q21 Calculate the rate constant. — 1x3=3
Write the role of
i) NaCN in the extraction of Gold
ii) SiO_2 in the extraction of Copper
iii) I_2 in the refining of Zirconium

Q22	i) Which of the following complexes is more stable and why? $[Co(NH_3)_6]^{3+}$ and $[Co(en)_3]^{3+}$ (where 'en' is ethane-1,2-diamine) ii) Write the formula for the following complex: Pentaamminechloridocobalt(III) sulphate iii) Write the type of hybridization and magnetic character of the complex $[Fe(CO)_5]$. [Atomic no. of Fe =26]	1x3=3 2+1=3
Q23	a) For the given Freundlich adsorption isotherm, $\frac{x}{m} = k p^{1/n}$, draw a plot between log (x/m) vs. log p. b) Write two factors which are responsible for the stability of lyophilic sols.	1x3=3
Q24	Account for the following: i) Mn^{2+} state is more stable than Fe^{2+} towards oxidation to +3 state . ii) In 3d series,the enthalpy of atomization is lowest for Zinc . iii) Actinoids show wide range of oxidation states as compare to Lanthanoids. OR Assign reasons for the following: i) Actinoids show irregularities in their electronic configuration . ii) In 3d series , $E^0(Cu^{2+}/Cu)$ has positive value . iii) Chromium metal is hard whereas Zinc metal is soft.	1x3=3
Q25	a) Write the mechanism involved in the following reaction:  b) What product is formed when 3-methylphenol undergoes dinitration?	2+1=3 3
Q26	An element with molar mass 64 $gmol^{-1}$ and density 6.6 g cm^{-3} forms a cubic unit cell. The edge length of unit cell is 4×10^{-8}cm . What is the type of cubic unit cell ? (Given: $N_A = 6.022 \times 10^{23}$ mol^{-1})	3
Q27	a) What are biodegradable detergents? Give an example. b) Why is Amoxycillin called a broad spectrum antibiotic ?	
Q28	a) Following reactions may occur at cathode during the electrolysis of aqueous sodium chloride solution: $Na^+(aq) + e^- \longrightarrow Na(s)$ $\quad E^0 = -2.71V$ $H^+(aq) + e^- \longrightarrow 1/2H_2(g)$ $\quad E^0 = 0.00V$ On the basis of their standard electrode potential (E^0) values , which reaction is feasible at the cathode and why?	2+1+2

b) Why does the cell potential of mercury cell remain constant throughout its life?

c) The resistance of a conductivity cell containing 0.001M KCl solution at 298K is 1500Ω. Calculate the cell constant if the conductivity of this cell is 0.15×10^{-3} S cm^{-1} ?

OR

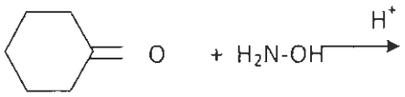
Calculate emf and $\Delta_r G$ of the following cell at 25^0C:

Fe I Fe^{2+}(0.001M) II H^+(0.01M)I H_2(g)(1 bar) I Pt(s)

$E^0(Fe^{2+}|Fe) = -0.44V$

5

Q29 a) Write products of the following reactions:

i) 

ii) $2\ C_6H_5CHO + \text{conc. NaOH} \longrightarrow$

iii) $Cl_2\text{-CH-COOH} \xrightarrow{Cl_2/P}$

3

b) Give simple chemical tests to distinguish between the following pairs of compounds:

i) Ethanal and Propanal

ii) Phenol and Benzoic acid

2

OR

a) Account for the following:

i) α- Hydrogen of ethanal is acidic in nature.

ii) Benzoic acid does not give Friedal-Crafts reaction.

2,2,1

b) Write the product formed when cyclohexanone reacts with following reagents:

i) CH_3MgBr/H_3O^+

ii) dilute NaOH

c) Distinguish between CH_2=CH-CO-CH_2-CH_3 and CH_2=CH-CH_2-CO-CH_3 .

Q30 a) Account for the following:

i) Interhalogens have higher boiling point than pure halogens.

ii) H_3PO_2 is stronger reducing agent than H_3PO_3.

iii) Reducing character decreases from SO_2 to TeO_2.

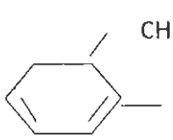
3,2

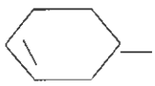
b) Draw structures of the following:

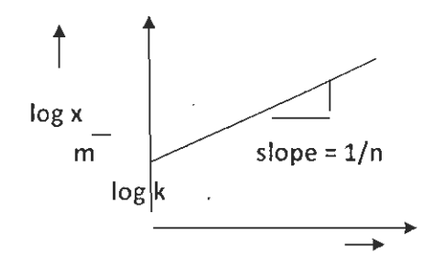
i) $H_4P_2O_7$ ii) XeF_4

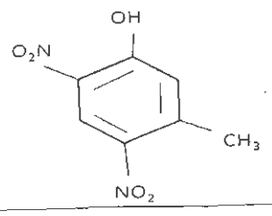
	OR a) i)Which poisonous gas is evolved when white phosphorus is heated with conc.NaOH solution? Write chemical equation involved in the reaction. ii) Among the noble gases, which one has the lowest boiling point ? iii) Why is Fluorine stronger oxidizing agent than chlorine ? b) Draw structures of the following i) $H_2S_2O_8$ ii) $(HPO_3)_3$	3,2

MARKING SCHEME (CHEMISTRY)
SAMPLE PAPER QUESTIONS

Q.no.	Answers	Marks
1	(c)	1
2	(c)	1
3	(b)	1
4	(d)	1
5	SO_2(g) on passing through $KMnO_4$ decolourises its purple colour / SO_2(g) on passing through $K_2Cr_2O_7$ changes its colour from orange to green. (Or any other suitable test)	1
6	It shows that all the six carbon atoms of glucose are in a straight chain.	1
7	It acts as an initiator.	1
8	Because of intramolecular hydrogen bonding in 2-nitrophenol whereas 4-nitrophenol is associated through intermolecular hydrogen bonding.	1
9	Positive deviation, Because of weaker interaction between ethanol and cyclohexane, the vapour pressure of solution becomes more than expected from ideal behaviour. OR i) Gas B ,Because higher the K_H value, lower the solubility of gas in water. ii) Because addition of salt decreases the vapour pressure of water and therefore in order to boil the solution vapour pressure has to be increased which raise the boiling point.	1 1 ½ ,½ 1
10	i) First order, unit of k : s^{-1} or min^{-1} ii) Slope = k / 2.303	½ ,½ 1
11	i) Sulphur produces the cross-links at the reactive sites of vulcanized rubber and thereby improves its properties like hardness,tensile strength etc. ii) Buna-N < PVC < Nylon6,6	1 1
12	i) $2MnO_2 + 4KOH + O_2 \longrightarrow 2K_2MnO_4 + 2H_2O$ ii) $2Na_2CrO_4 + 2H^+ \longrightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$	1 1
13	i) HI <HBr < HCl < HF ii) $H_2O < H_2S < H_2Se < H_2Te$	1+1
14	i) Because of the resonance stabilization of allyl carbocation. ii) Because of resonance in chlorobenzene C-Cl bond acquires partial double bond character and hence shorter than C-Cl of CH_3-Cl where there is no resonance / or C of C-Cl in chlorobenzene is sp^2 hybridized whereas of CH_3-Cl is sp^3 hybridized.	1 1
15	i) 	

	ii)  CH_2-CH_2-CH_2-Br	1+ 1
16	(i) A = CH_3CN B = CH_3-CH_2 NH_2 (ii) A = $C_6H_5CONH_2$ B = C_6H_5 NC	½ + ½ ½ + ½
17	i) $C_6H_5NH_2 \xrightarrow[273\text{-}278K]{NaNO_2 + HCl} C_6H_5N_2^+Cl^- \xrightarrow{H_2O} C_6H_5$-OH ii) $C_6H_5CONH_2 \xrightarrow{Br_2 + KOH} C_6H_5NH_2 \xrightarrow[Pyridine]{CH_3COCl} C_6H_5NHCOCH_3$ (or by any other suitable method)	1+1
18	(i) Because it contains both acidic and basic groups in the same molecule. (ii) Phosphodiester linkage	1 1
19	$\Delta T_f = iK_f m$ $0.24\ K = i \times 1.86\ K\ kg\ mol^{-1} \times \frac{0.5 \times 1000 kg^{-1}}{74.5g\ mol^{-1} 100}$ $i = 1.922$ α (percentage ionization) = $\frac{i-1}{n-1}$ $= \frac{1.922-1}{2-1}$ $\alpha = 0.922$ or 92.2%	1 ½ ½ 1
20	$k = \frac{2.303}{t} \log \frac{p_i}{2p_i - p_t}$ $= \frac{2.303}{100} \log \frac{0.4}{2 \times 0.4 - 0.7}$ $= \frac{2.303 \log 4}{100}$ $= \frac{2.303 \times 0.602}{100}$ $= 0.0138\ atm^{-1}$	1 1 1

21	(i) Role of NaCN in the extraction of gold is to do the leaching of gold ore in the presence of air from which the gold is obtained later by replacement. or $4Au(s) + 8CN^-(aq) + 2H_2O + O_2(g) \longrightarrow 4[Au(CN)_2]^- + 4OH^-$ (ii) SiO_2 is added in copper matte to convert the remaining FeS, FeO to slag. or $FeO + SiO_2 \longrightarrow FeSiO_3(slag)$ (iii) Iodine is heated with Zirconium to form a volatile compound which on further heating decompose to give pure zirconium as shown: $Zr(impure) + 2I_2 \longrightarrow ZrI_4$ $ZrI_4 \longrightarrow Zr(pure) + 2I_2$	1x3=3
22	i) $[Co(en)_3]^{3+}$, Because 'en' is a bidentate ligand and forms a chelate complex. ii) $[Co(NH_3)_5Cl]SO_4$ iii) dsp^3, Diamagnetic	½, ½ 1 ½, ½
23	i)  ii) Charge on sol and Solvent interaction	2 1
24	i)Because of stable half filled $3d^5$ configuration whereas Fe^{2+} easily oxidizes to Fe^{3+} to achieve stable $3d^5$ configuration. ii)Because of no unpaired electrons in 3d orbital of Zn which causes weak metallic bonding. iii)Because of comparable energies of 5f,6d and 7s orbitals. OR i) Because of varying stability of $5f^0$, $5f^7$ and $5f^{14}$ configurations. ii) Because of its low enthalpy of hydration and high enthalpy of atomization. iii) Because of the presence of unpaired electrons in 3d orbitals of Cr ,strong metallic bonding makes it hard whereas no unpaired electrons in 3d orbitals of Zn makes it soft.	1x3=3 1x3=3

25	a) $CH_3-\underset{\underset{CH_3}{|}}{CH}-\underset{\underset{O-H}{|}}{CH}-CH_3 \xrightarrow{H^+} CH_3-\underset{\underset{CH_3}{|}}{CH}-\underset{\underset{O-H_2}{|}}{CH}-CH_3$ (⊕ on O) $\xrightarrow{-H_2O}$ $CH_3-\overset{\overset{CH_3}{|}}{\underset{\oplus}{CH}}-CH-CH_3 \longrightarrow CH_3-\overset{\overset{CH_3}{|}}{\underset{\oplus}{C}}-CH_2-CH_3$ 2°carbocation → 3°carbocation $Br^{\cdot}$ → $CH_3-\overset{\overset{CH_3}{|}}{\overset{\overset{Br}{|}}{C}}-CH_2-CH_3$	2
	b) 	1
26	$d = \frac{z \times M}{a^3 \times N_A}$ $6.6\ g\ cm^{-3} = \frac{z \times 64\ g\ mol^{-1}}{(4 \times 10^{-8}\ cm)^3 \times 6.022 \times 10^{23}\ mol^{-1}}$ $z = \frac{6.6 \times 64 \times 10^{-24} \times 6.022 \times 10^{23}}{64}$ $z = 3.97 \approx 4$ Hence the unit cell is f.c.c.	1 ½ 1 ½
27	a)The detergents which are easily degraded by microorganisms are called biodegradable detergents. Ex. Sodium lauryl sulphate (or any other ex.) b)Because it kills both gram positive as well as gram negative bacteria.	1 1 1

28 , (a)

$$H^+(aq) + e^- \longrightarrow \tfrac{1}{2}H_2(g)$$

reaction is feasible at cathode because reduction electrode potential of H^+/H_2 is more than Na^+/Na. — 1

b). Because overall reaction of mercury cell does not contain any ions whose concentration is variable. — 1

— 1

c) $k = \frac{1}{R}\ (l/A)$

$0.15 \times 10^{-3}\ Scm^{-1} = \frac{1}{1500\ S^{-1}}\ (l/A)$ — ½

— ½

$l/A = 0.15 \times 10^{-3} \times 1500\ cm^{-1}$

$= 0.225 cm^{-1}$ — 1

OR

(ii) The cell reaction : $Fe(s) + 2H^+(aq) \rightarrow Fe^{2+}(aq) + H_2(g)$

$E^o_{cell} = E^o_c - E^o_a$ — 1

$= [0-(-0.44)]V = +0.44V$

$E_{cell} = E^0_{cell} - \frac{0.059}{2} \log \frac{[Fe^{2+}]}{[H^+]^2}$ — 1

$E_{cell} = 0.44\ V - \frac{0.059}{2} \log \frac{(0.001)}{(0.01)^2}$

$= 0.44\ V - \frac{0.059}{2} \log (10)$

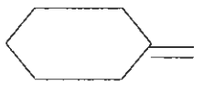
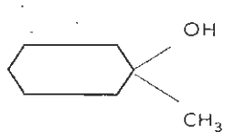
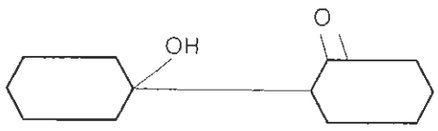
$= 0.44\ V - 0.0295\ V$ — 1

$= \mathbf{0.410\ V}$

$\Delta_r G = -nFE_{cell}$ — 1

$= -2 \times 96500\ C\ mol^{-1} \times 0.410V$

$= -79130\ Jmol^{-1}$ or $-79.130\ kJmol^{-1}$ — 1

29	(a) i)  N-OH ii)$C_6H_5COO^-Na^+$ + $C_6H_5CH_2OH$ iii)Cl_3-C-COOH (b) i) ***Ethanal andPropanal*** ***Iodoform test.*** Warm each compound with iodine and sodium hydroxide on a water bath. Propanal (CH_3CH_2CHO) No yellow ppt formed Ethanal (CH_3CHO) Yellow crystals of Iodoform are formed. ***(Other relevant test can be accepted)*** (ii)***Phenol and Benzoic acid.*** ***$FeCl_3$ test.***Add a few drops of neutral $FeCl_3$ solution. Phenol (C_6H_5OH), violet coloured ppt. is produced. Benzoic acid (H_5C_6COOH), no ppt. is produced. OR a) i) Because of resonance stabilisation of its conjugate base (enolate anion). ii)Because the carboxyl group gets bonded to the catalyst anhyd.$AlCl_3$(lewis acid). b) i)  ii)  c)***Iodoform test.*** Warm each compound with iodine and sodium hydroxide on a water bath. (CH_2=CH_2-CO-CH_2-CH_3): No yellow ppt formed (CH_2=CH_2-CH-CO-CH_3) : Yellow crystals of Iodoform are formed	1x3=3 1+1 1+1 1+1 1

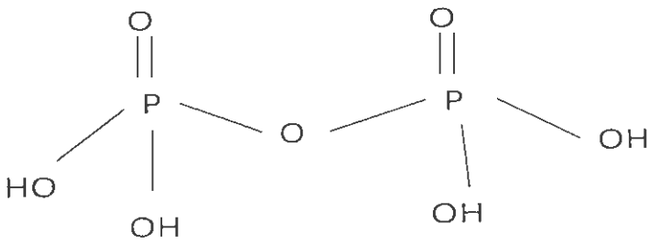
30 (a)

(i) Becuase interhalogens are polar due to electronegativity difference whereas pure halogens are non-polar.

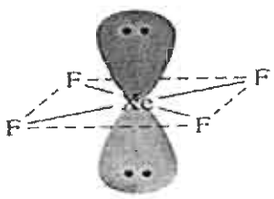
(ii) Becuase of the presence of two P-H bonds .

(iii) Becuase the stability of +4 oxidation state increases from S to Te. 1x3=3

(b) i)



ii)



1+1

OR

i) PH_3 gas

$$P_4 + 3NaOH + 3H_2O \longrightarrow PH_3 + 3NaH_2PO_2$$

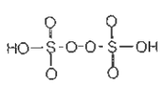
½

½

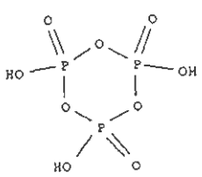
ii)Helium 1

iii)Because of low bond dissociation enthalpy and high hydration enthalpy. 1

b)i)



ii)



1+1