Sample Question Paper- I
CHEMISTRY
BLUE PRINT
CLASS - XII

Time Allowed : 3 Hrs **Maximum Marks : 70**

S.No.	UNIT	VSA (1)	SAI(2)	SA II(3)	LA (5)	TOTAL
1	Solid State		4(2)			4 (2)
2	Solutions				5 (1)	5 (1)
3	Electrochemistry		2(1)	3(1)		5 (2)
4	Chemical Kinetics	1(1)	4(2)			5 (3)
5	Surface Chemistry	1(1)		3(1)		4 (2)
6	General Principles and Processes of Isolation of Elements			3(1)		3 (1)
7	p-block Elements	1(1)	4 (2)	3 (1)		8 (4)
8	d & f- Block Elements				5 (1)	5 (1)
9	Co-ordination Compounds	1 (1)	2 (1)			3 (2)
10	Haloalkanes and Haloarenes	1 (1)		3 (1)		4(2)
11	Alcohols, Phenols & Ethers	1 (1)		3 (1)		4(2)
12	Aldehydes, Ketones & Carboxylic Acids	1 (1)			5 (1)	6 (2)
13	Organic Compounds Containing Nitrogen		4 (2)			4 (2)
14	Biomolecules	1 (1)		3 (1)		4 (2)
15	Polymers			3 (1)		3 (1)
16	Chemistry in Everyday Life			3 (1)		3 (1)
	TOTAL:	**8 (8)**	**20(10)**	**27(9)**	**15(3)**	**70(30)**

DESIGN

S No.	Type of Question	Marks for each Question	No. of Questions	Total Marks
1.	Long Answers (LA)	5	3	15
2.	Short Answers-II (SA II)	3	9	27
3.	Short Answers-I (SA-I)	2	10	20
4.	Very Short Answer (VSA)	1	08	08
	Total		**30**	**70**

Sample Question Paper - I
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General Instructions:

1. All questions are compulsory
2. Question no. 1-8 are very short answer questions and carry 1 mark each.
3. Question no. 9-18 are short answer questions and carry 2 marks each.
4. Question no. 19-27 are also short answer questions and carry 3 marks each.
5. Question no. 28-30 are long answer questions and carry 5 marks each
6. Use log tables if necessary, use of calculators is not allowed.

1. Arrange the following compounds in order of increasing boiling points.

   Chloropropane, Isopropyl chloride, I-Chlorobutane

2. Give the IUPAC name of the following compound $(CH_3)_2C= CHCOOH$

3. For the reaction

   $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

   If $\Delta [NH_3] / \Delta t = 4 \times 10^{-8}$ mol L^{-1} s^{-1}, what is the value of $-\Delta [H_2] / \Delta t$.?

4. Which of the following is most effective electrolyte in the coagulation of $Fe_2O_3.H_2O/Fe^{3+}$ sol?

   $KC\ell$, $A\ell C\ell_3$, $MgC\ell_2$, $K_4[Fe(CN)_6]$

5. Which nucleic acid is responsible for protein synthesis in the cell.

6. Which Xenon compound is isostructural with $IC\ell_4^-$?

7. What happens to the colour of coordination compound $[Ti(H_2O)_6] Cl_3$ when heated gradually?

8. Write the structure of phenyl isopentylether.

9. (i) For a weak electrolyte molar conductance in dilute solution increases sharply as its concentration in solution is decreased. Give reason.

   (ii) Write overall cell reaction for lead storage battery when the battery is being charged.

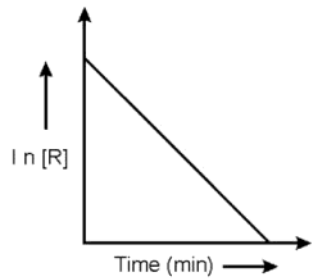
10. Sucrose decomposes in acid solution into glucose and fructose according to the first order rate law with $t_{1/2}$ = 3hrs. Calculate the fraction of sucrose which remains after 8hrs.

OR

The rate constants of a reaction at 500K and 700K are 0.02 s^{-1} and 0.07 s^{-1} respectively. Calculate value of activation energy for the reaction [Given R=8.314$JK^{-1}mol^{-1}$].

11. For a chemical reaction variation in concentration,

ln[R] Vs time (min) plot is shown below:



(i) What is the order of the reaction?

(ii) What are units of rate constant, k for the reaction?

(iii) If initial concentration of the reactant is half of the original concentration how will $t_{1/2}$ change?

(iv) Draw the plot of log $[R]_0$ / [R] Vs time(s).

12. (i) Draw the structure of phosphinic acid (H_3PO_2)

(ii) Write a chemical reaction for its use as reducing agent.

13. (a) Suggest a quantitative method for estimation of the gas which protects us from U.V. rays of the sun.

(b) Nitrogen oxides emitted from the exhaust system of supersonic jet aeroplanes slowly deplete the concentration of ozone layer in upper atmosphere. Comment.

14. (a) Give the electronic configuration of the d-orbitals of Ti in $[Ti(H_2O)_6]^{3+}$ ion and explain why this complex is coloured? [At.No. of Ti = 22]

(b) Write IUPAC name of $[Cr(NH_3)_3(H_2O)_3]\ C\ell_3$

15. Show the mechanism of acylation of ethanamine and write the IUPAC name of the product formed.

16. Write a chemical equation each to represent

(a) Gatterman reaction

(b) Carbylamine reaction

17. Sodium crystallizes in a bcc unit cell. Calculate the approximate number of unit cells in 9.2g of sodium? (Atomic Mass of Na =23u)

18. What is a semiconductor? Describe the two main types of semiconductors.

19. a) Calculate the charge in coloumbs required for oxidation of 2 moles of water to oxygen? [Given IF = 96, 500 C mol^{-1}]

b) Zinc/silver oxide cell is used in hearing aids and electric watches. The following reactions occur:

$Zn(s) \rightarrow Zn^{2+}(aq) + 2e^-$ $\quad E^0(Zn^{2+}/Zn) = -0.76V$

$Ag_2O + H_2O + 2e^- \rightarrow 2Ag + 2OH^-$ $\quad E^0(Ag^+/Ag) = 0.344V$

Calculate (i) Standard potential of the cell

(ii) Standard Gibbs energy

20. Give reason for the following observations:

(a) Colloids stabilize due to Brownian movement.

(b) Cottrell's smoke precipitator is fitted at the mouth of chimney used in factories.

(c) Colloidal gold is used for intramuscular injection.

21. (a) Extraction of Au by leaching with NaCN involves both oxidation and reduction. Justify by giving equations for the reactions involved.

(b) Why is the froth flotation method selected for the concentration of sulphide ores?

OR

Outline the principle of the method used for refining of

(a) Nickel

(b) Zirconium

(c) Tin

22. Write balanced chemical equations for the following reactions:

(a) Dimeric selenium chloride undergoes disproportionation reaction.

(b) Reaction of gold with aqua regia.

(c) When phosphine is passed through mercuric chloride solution.

23. Account for following:

(a) Chloromethane reacts with KCN to form ethanenitrile as main product and with AgCN to form methyl isocyanide as chief product.

(b) Chloroform should be stored in dark coloured bottles and these bottles should be completely filled.

(c) Benzylic halides show high reactivity towards S_N1 reaction.

24. (a) Give one reaction of D-glucose which can not be explained by its open chain structure.

(b) Give one example each for essential and non-essential amino acids.

(c) Differentiate between keratin and insulin.

25. (a) Identify aliphatic biodegradable polyester which is used in packaging and orthopedic devices.

(i) Write its full form (name).

(ii) Give the structures of monomers from which it is formed.

(iii) Show the formation of polymer.

b) Write the name and structure of the monomer of nylon-6

26. (a) Justify the following:

(i) Sleeping pills are recommended to patients suffering from sleeplessness but it is not advisable to take them without consulting the doctor.

(ii) Why do we require artificial sweetening agents?

(b) Write the composition of Dettol.

27. (a) Give chemical tests to distinguish between:

(i) Isopropyl alcohol and n-propylalcohol

(ii) Phenol and alcohol

(iii) Methyl ethanoate and Ethyl ethanoate

28. (a) Menthol is a crystalline substance with peppermint taste. A 6.2% solution of menthol in cyclohexane freezes at -1.95°C. Determine the formula mass of menthol. The freezing point and molal depression constant of cyclohexane are 6.5 °C and 20.2 K m^{-1}, respectively.

(b) State Henry's Law and mention its two important applications.

(c) Which of the following has higher boiling point and why?

0.1 M NaCl or 0.1 M Glucose

OR

(a) Define Azeotropes and explain briefly minimum boiling azeotrope by taking suitable example.

(b) The vapour pressures of pure liquids A and B are 450 mm and 700 mm of Hg respectively at 350K. Calculate the composition of liquid mixture if total vapor pressure is 600 mm of Hg. Also find the composition of the mixture in vapour phase.

Q.29: (a) (i) Which is stronger reducing agent Cr^{2+} or Fe^{2+} and why?

(ii) Explain why Cu^{+} ion is not stable in aqueous solutions.

(iii) Explain why Ce^{4+} is a strong oxidizing agent.

(b) Describe the oxidizing property of $KMnO_4$ in neutral or faintly alkaline medium for its reaction with iodide ions and thiosulphate ions.

OR

(a) Account for the following:

(i) Oxidizing power in the series $VO^{+}_{2} < Cr_2O_7^{2-} < MnO_4^{-}$

(ii) In the first transition series only copper has positive electrode potential.

(iii) Oxoanions of a metal show higher oxidation state.

(b) Which is the last element in the series of actinoides? Write the electronic configuration of this element. Comment on the possible oxidation states of this element.

30. (a) An organic compound (A) which has characteristic odour, on treatment with conc. NaOH forms two compounds (B) and (C). Compound (B) has molecular formula C_7H_8O which on oxidation gives back (A). The compound (C) is a sodium salt of an acid. When (C) is treated with soda lime it yields an aromatic hydrocarbon (D). Deduce the structures of (A), (B), (C) and (D). Write the sequence of reactions involved.

(b) Arrange the following in the increasing order of the property: indicated:

(i) Benzoic acid, 4-Nitro benzoic acid, 3,5-Dinitrobenzoic acid, 4-Methoxybenzoic acid **(acid strength)**

(ii) Acetaldehyde, Acetone, Di-tertbutylketone, Methyltert-butyl ketone **(Reactivity towards HCN).**

OR

(a) Complete each synthesis by filling the missing starting materials, reagents or products.(X,Y and Z)

(i) $C_6H_5CHO + CH_3CH_2CHO \xrightarrow{NaOH} X$

(ii) $CH_3CH_2CH_2CH_2OH \xrightarrow{Y} CH_3CH_2CH_2COOH$

(iii) $CH_3(CH_2)_9COOC_2H_5 \xrightarrow{Z} CH_3(CH_2)_9CHO$

(b) How will you bring about the following conversions in not more than two steps?

(i) Toulene to Benzaldehyde

(ii) Ethylcyanide to 1-Phenylpropanone.

Sample Question Paper - I
MARKING SCHEME
CHEMISTRY

Time Allowed : 3 Hrs **Maximum Marks : 70**

1. Isopropyl Chloride < I-Chloropropane < I-Chlorobutane 1

2. 3-Methyl but-2-en-1-oic acid 1

3. $6 \times 10^{-8}\ mol L^{-1} s^{-1}$ 1

4. $K_4[Fe(CN)_6]$ 1

5. RNA 1

6. XeF_4 1

7. Its colour becomes lighter on heating. 1

8. $C_6H_5 - O - CH_2 - CH_2 - \underset{\underset{CH_3}{|}}{CH} - CH_3$ 1

9. (i) Because with dilution, there is increase in degree of dissociation and consequently the number of ions in total volume of solution increases and hence molar conductivity increases sharply.

   (ii) $2PbSO_4(s) + 2H_2O(\ell) \rightarrow Pb(s) + PbO_2(s) + 4H^+(aq) + 2SO_4^{2-}(aq)$ 1

10. $k = \dfrac{0.693}{t_{1/2}}$ 1

$$k = \frac{0.693}{3\ hr} = 0.231\ hr^{-1}$$

$$0.231\ hr^{-1} = \frac{2.303}{8\ hr} \log \frac{[A]_0}{[A]}$$

$$\frac{[A]}{[A]_0} = 0.158$$ 1

OR

(b) $\log \frac{k_2}{k_1} = \frac{Ea}{2.303\,R}\left[\frac{T_2 - T_1}{T_1\,T_2}\right]$ ½

$\log \frac{0.07}{0.02} = \frac{Ea}{2.303 \times 8.314} JK^{-1}\,mol^{-1}\left[\frac{700 - 500}{700 \times 500}\ K^{-1}\right]$

$0.5441 = \frac{Ea}{2.303 \times 8.314} JK^{-1}\,mol^{-1}\left[\frac{200}{700 \times 500}\ K^{-1}\right]$ ½

$Ea = 18231\ J\,mol^{-1}$

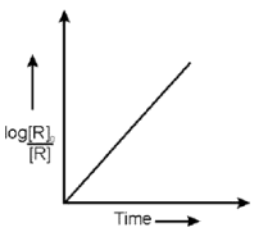
$= 18.231\ KJ\,mol^{-1}$ 1

11. (i) Ist order

(ii) min^{-1}

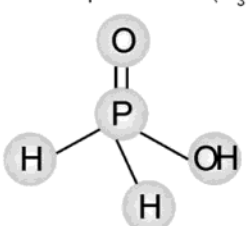
(iii) $t_{½}$ remain same as it is independent of $[R]_0$

(iv)



½ x4=2

12. (i) Phosphinic acid (H_3PO_2)



1

(ii) $H_3PO_2 + 4\,AgNO_3 + 2H_2O \rightarrow 4Ag + 4HNO_3 + H_3PO_4$ 1

H_3PO_2 reduces Ag^+ to Ag which shows its reducing nature.

13. (a) $O_3 + 2I^- + H_2O \rightarrow O_2 + I_2 + 2OH^-$ 1

I_2 liberated is then titrated against sodium thiosulphate solution and amount of O_3 can be estimated.

(b) $NO(g) + O_3(g) \rightarrow NO_2(g) + O_2(g)$ 1

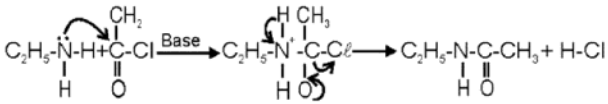
'NO' combines rapidly with O_3 forming oxygen and thus is slowly depleting the concentration of the ozone.

14. (a) $Ti^{3+} = T_{2g}{}^1e_g{}^0$

Due to d-d transition, complex is coloured. 1

(b) Triamminetriaquachromium (III) chloride 1

15. Mechanism



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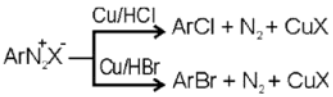
IUPAC name N-Ethylethanamide 1

16. (a) Gatterman Reaction for introduction of chlorine or bromine in the benzene ring. 1



(b) Carbylamine Reaction to test for presence of primary amines. 1

$$Ar/R\text{-}NH_2 + CHCl_3 + 3\,KOH\ (alc) \rightarrow Ar/R\text{-}NC + 3KCl + 3H_2O$$

Isocyanide (Foul Smelling)

17. (a) no. of atoms per unit cell for bcc(Z) = 2

no. of atoms in 9.2 g of Na

$$= \frac{9.2\ g}{23\ gmol^{-1}} \times 6.022 \times 10^{23}\ atoms\ mol^{-1}$$ ½

No. of Na atoms = $2.408\ 8 \times 10^{23}$ 1

No. of unit cells $\frac{2.4088 \times 10^{23} atoms}{2\,atoms\ unit\ cell^{-1}} = 1.2044 \times 10^{23}$ ½

18. Semiconductor is a solid with conductivity in the intermediate range form 10^{-6} to 10^4 $Ohm^{-1}\,m^{-1}$. 1

(i) n-type Semiconductor: They have excess of electrons e.g Ge doped with As. ½

(ii) p- type Semiconductor: They have electron vacancies or holes e.g. Si doped with B. ½

19. (a) $2H_2O \rightarrow 4H^+ + O_2 + 4e^-$ ½

Therefore Q = 4F

$= 4 \times 96500\ C\ mol^{-1}$

$= 386000\ C\ mol^{-1}$ ½

(b) Zn is oxidized and Ag_2O is reduced to Ag

$E^0cell = E^0Cathode - E^0anode = [\ 0.344 - (\ -0.76)\ ]\ V$

$= 1.104\ V$ 1

$\Delta G^\circ = -n\ F\ E^0cell$

$= -2 \times 96500\ C\ mol^{-1} \times 1.104\ V$

$= -2.13 \times 10^5\ J\ mol^{-1}$ 1

20. (a) Brownian movement is the random motion of the colloidal particles in a colloidal solution. It counters the force of gravity acting on colloidal particles and hence helps in providing stability to colloidal solutions by not allowing them to settle down.

(b) The precipitator contains plates having a charge opposite to that carried by smoke particles which lose their charge and get precipitated and smoke is thus, free form carbon and dust particles after passing through chimney.

(c) Because of larger surface area of colloidal gold and easy assimilation with the blood which is colloidal. 1x3 =3

21. (a) Oxidation of Au to Au^+

$4Au(s) + 8CN^-(aq) + 2H_2O + O_2(g) \rightarrow 4[Au(CN)_2]^- + 4OH^-$ 1

Reduction of Au^+ to Au 1

$2[Au(CN)_2]^- + Zn \rightarrow [Zn(CN)_4]2^- + 2Au$

(b) Because sulphide ores are preferentially wetted by oil and impurities by water. 1

OR

(a) Nickel : Mond's Process : Impure nickel on reaction with carbon monoxide forms tetracarbonyl nickel which decomposes to form pure nickel and carbon monoxide.

(b) Zircornium : Van-Arkel Method : Impure metal Z_r is heated with I_2 to get $Z_r\ I_4$ which is heated strongly at 2075K to get pure Z_r.

(c) Tin : Liquation: Impure metal is heated at the top of sloping furnace so that tin melts but impurity does not. Molten tin flows down and pure tin so formed is collected. 1 X 3=3

22. (a) $2Se_2Cl_2 \rightarrow SeCl_4 + 3Se$

(b) $Au + 4H^+ + NO_3^- + 4Cl^- \rightarrow AuCl_4^- + NO + 2H_2O$

(c) $3HgCl_2 + 2PH_3 \rightarrow Hg_3P_2 + 6HCl$ 1x3 = 3

23. (a) Because with KCN, C act as a nucleophile due to ionic nature of K-C bond whereas with AgCN, N act as a nucleophile due to covalent nature of Ag-C bond.

(b) Chloroform is oxidized by air in the presence of light thereby producing an extremely poisonous gas i.e. carbonyl chloride. Therefore it should be stored in dark coloured bottles which should be completely filled so that light cannot enter and air is also kept out. 1

(c) Due to high stability of benzyl carbocation through Resonance. 1x3=3

24. (a) Despite having the presence of aldehyde group, glucose does not give 2,4 DNP test/schiff's test/ does not form the hydrogen sulphite additon product with $NaHSO_3$

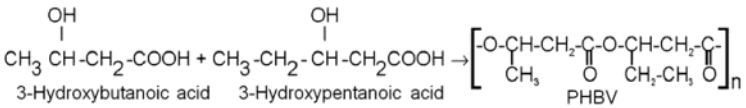
(b) Essential aminoacid-valine; non-essential amino acid = glycine

(c) keratin is a fibrous protein whereas insulin is a globular protein. 1x3=3

25. (a) PHBV

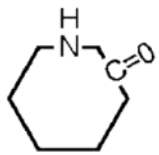
(i) Poly β - Hydroxybutyrate-co - β -Hydroxyvalerate

(ii) CH_3- CH(OH)CH_2COOH and CH_3-CH_2-CH(OH)CH_2COOH

(iii) 

½ X4=2

(b) (iii) Nylon-6:Caprolactam



1

26. (a)

(i) Because most of the drugs act as poison in higher doses and may lead to death.

(ii) To control calorie intake and as a substitute of sugar for diabetics.

(b) Chloroxylenol and terpineol 1x3=3

27. (a)

(i) Isopropyl alcohol and n-propyl alcohol

On adding NaOH/I_2 or NaOI and heating, Isopropyl alcohol forms yellow ppt of iodoform(CHI_3) whereas n-propyl alcohol does not. (or any other suitable test)

(ii) Phenol and alcohol

On adding neutral $FeCl_3$ solution, Phenol forms red-violet complex whereas alcohol does not.

(or any other suitable test)

(iii) Methyl ethanoate and ethyl ethanoate-Iodoform test:- On hydrolysis, ethylethanoate gives ethanol which on heating with NaOI gives yellow ppt. of CHI_3 whereas Methyl Ethanoate on hydrolysis gives Methanol which does not form Iodoform with NaOI.

1x3=3

28. (a) $\Delta T_f = K_f m = \frac{W_B}{M_B} X \frac{1000g}{W_A}$ ½

$$8.45\,K = 20.2\,K\,kg\,Mol^{-1} \times \frac{6.2g}{M_B} X \frac{1000g/kg}{93.8\,g}$$ ½

M_B = 158 g mol-1 1

(b) **Henry's Law :** The Solubility of gas in a liquid is directly proportional to the pressure of the gas. 1

Applications : 1. Solubility of CO_2 is increased at high pressure. ½

2. Mixture of He and O_2 are used by deep sea divers because He is less soluble than nitrogen ½

(c) 0.1 M NaCl, Because it dissociates in solution and furnishes greater number of particles per unit volume while glucose does not dissociate. 1

OR

(a) Azeotropes : is a liquid mixture which boils at constant temperature without undergoing change in composition .

Ex- A mixture of 95% ethanol and 5% H_2O by mass forms minimum boiling Azeotropes i.e it boils at a temperature lower than expected from ideal behavior, as it shows positive deviation from ideal behaviour. 1+1

(b) p_A° = 450 mm Hg p_B° = 700 mm Hg

$p = p_A^\circ x_A + P_B^\circ x_B$ 1

$600 = 450\,(x_A) + 700\,(1 - x_A)$

On solving

$x_A = 0.4$ ½ + ½

$x_B = 0.6$

In vapour phase

p_A = 0.4 X 450 mm =180 mm Hg : p_B = 0.6 X 700 mm = 420 mm Hg

$$y_A = \frac{180mm}{600mm} = 0.3$$

$$: \quad y_B = \frac{420mm}{600mm} = 0.7$$ 1

29. (a)

(i) Cr^{2+} is stronger reducing agent than Fe^{2+} due to its change from d^4 to stable d^3 configuration in case of Cr^{2+} to Cr^{3+} than d^6 to d^5 change in Fe^{2+} to Fe^{3+}.

(ii) Because C_u^+ in aqueous solution undergoes disproportionation to more stable Cu^{2+} and Cu.

(iii) Because Ce is more stable in +3 oxidation state. 1x3=3

(b) $2MnO_4^- + I^- + H_2O \rightarrow 2MnO_2 + IO_3^- + 2OH^-$

$8MnO_4^- + 3S_2O_3^{2-} + H_2O \rightarrow 8MnO_2 + 6SO_4^{2-} + 2OH^-$ 1+1

OR

(a) (i) This is due to the increasing stability of the lower species to which they are reduced.

(ii) Cu has high ionization enthalpy for transforming Cu(s) to $Cu^{2+}(aq)$ and this is not balanced by its hydration enthalpy. 1

(iii) Due to high electronegativity and multiple bond formation with metal by oxygen. 1x3=3

(b) Lawrencium (Lr) (Z=103) ½

Electronic Cofiguration = $[Rn]^{86}\ 5f^{14}\ 6d^1\ 7s^2$ 1

Possible oxidation state = +3 ½

30. $C_6H_5CHO \xrightarrow{NaOH} C_6H_5CH_2OH + C_6H_5COONa$
(A) (B) (C)
(C) $\xrightarrow{NaOH/CaO}$ C_6H_6 (D) 1

(A) C_6H_5CHO

(B) $C_6H_5CH_2OH$

(C) C_6H_5COONa

(D) C_6H_6 ½x4=2

(b) (i) 4- Methoxybenzoic acid < Benzoic acid < 4-Nitrobenzoic acid < 3,5- Dinitrobenzoic acid.

(ii) Di-Tertbutylketone < Methyl t-butylketone < Acetone < Acetaldehyde 1+1

OR

(a) (i) $C_6H_5CHO + CH_3CH_2CHO \xrightarrow{NaOH} C_6H_5CH(OH)CH(CH_3)CHO$

(ii) $CH_3CH_2CH_2CH_2OH \xrightarrow{KMnO_4} CH_3CH_2CH_2COOH$

(iii) $CH_3(CH_2)_9\ COOC_2H_5 \xrightarrow{DIBAL\text{-}H\ /H_2O} CH_3(CH_2)_9\ CHO$ 1X3=3

(b) Toluene to Benzaldehyde

$C_6H_5\text{-}CH_3 \xrightarrow{Cl_2/hv} C_6H_5\text{-}CHCl_2 \xrightarrow[373K]{H_2O} C_6H_5\text{-}CHO$

(ii) Ethylcyanide to 1- Phenylpropanone

CH_3CH_2CN PhMgBr $PhC{=}(N\ MgBr)CH_2CH_3$ $H_2O > PhCOCH_2CH_3$ 1+1

Sample Question Paper-II
CHEMISTRY
BLUE PRINT
CLASS - XII

Time Allowed : 3 Hrs **Maximum Marks : 70**

S.R.	UNIT	VSA (1)	S.A. I (2)	S.A. II (3)	L.A. (5)	TOTAL
1	Solid State		4(2)		-	4(2)
2	Solutions	-	2(1)	3(1)	-	5(2)
3	Electrochemistry		2(1)	3(1)	-	5(2)
4	Chemical Kinetics	-	-	-	5(1)	5(1)
5	Surface Chemistry	1(1)		3(1)	-	4(2)
6	General Principles and Processes of Extraction of Elements	1(1)	2(1)	-	-	3(2)
7	p- Block Elements	1(1)	2(1)	-	5(1)	8(3)
8	d- and f- Block Elements	-	2(1)	3(1)	-	5(2)
9	Coordination Compounds	-	-	3(1)	-	3(1)
10	Haloalkanes and Haloarenes	2 (2)	2(1)	-	-	4(3)
11	Alcohols ,Phenols & Ethers	1(1)	-	3(1)	-	4(2)
12	Aldehydes,ketones and Carboxylic Acids	1(1)	-	-	5(1)	6(2)
13	Organic Compounds Containing Nitrogen		4 (2)	-	-	4(2)
14	Biomolecules	1(1)	-	3(1)	-	4(2)
15	Polymers			3(1)	-	3(1)
16	Chemistry in everyday Life	-	-	3(1)	-	3(1)
	Total	**8 (8)**	**20(10)**	**27(9)**	**15(3)**	**70(30)**

DESIGN

S No.	Type of Question	Marks for each Question	No. of Questions	Total Marks
1.	Long Answers (LA)	5	3	15
2.	Short Answers-II (SA II)	3	9	27
3.	Short Answers-I (SA-I)	2	10	20
4.	Very Short Answer (VSA)	1	08	08
	Total		**30**	**70**

Sample Question Paper - II
CHEMISTRY
CLASS - XII

Time Allowed : 3 Hrs **Maximum Marks : 70**

General Instructions:

1. *All questions are compulsory.*
2. *Question No. 1 to 8 are very short questions carrying one mark each.*
3. *Question No. 9 to 18 are short answer questions carrying 2 marks each.*
4. *Question No. 19 to 27 are also short answer questions carrying 3 marks each.*
5. *Question No. 28 to 30 are long answer questions carrying 5 marks each.*
6. *Use log table if necessary. Log tables will be provided on demand. Calculator is not allowed in exam hall.*

Q.1 Write the products obtained when benzyl phenylether is heated with HI.

Q.2 Gases with high critical temperature are readily adsorbed. Why?

Q.3 Write the IUPAC name of the compound

$CH_2(C\ell)COCH(CH_3)CONH_2$

Q.4 Which of the following compounds has a lone pair of electrons at the central atom?

$H_2S_2O_8$, $H_2S_2O_7$, H_2SO_3, H_2SO_4

Q.5 What type of linkage holds together the monomers of DNA?

Q.6 Complete the following reaction :

$$CH_3 - CH = CH_2 \xrightarrow[\text{peroxide}]{HBr} X \xrightarrow[\text{Acetone}]{NaI} Y$$

Q.7 Write a non-exothermic reaction taking place in the blast furnace during extraction of iron.

Q.8 Iodoform has antiseptic properties. Give one reason to support this.

Q.9 Write the names associated with the following reactions

(a) $RCONH_2 + Br_2 + 4NaOH \rightarrow RNH_2 + Na_2CO_3 + 2\,NaBr + 2H_2O$

(b) $ArN_2^+X^- \xrightarrow{CuCN/KCN} ArCN + N_2$

(c) $R\text{-}NH_2 + CHCl_3 + 3KOH \xrightarrow{Heat} R\text{-}NC + 3KCl + 3H_2O$

(d) $ArN_2^+X^- \xrightarrow{Cu/HCl} ArCl + N_2 + CuX$

10. KF has ccp structure. Calculate the ionic radius of F^- ion if the side of the cube or edge length is 400pm. How many F^- ions and octahedral voids are there in the unit cell.

11. Give reason

    (a) Why is Frenkel defect found in AgCl?

    (b) What is the difference between Phosphorus doped and Gallium doped Silicon semi conductors?

12. Describe the construction of a H_2-O_2 fuel cell and the reactions taking place in it.

OR

Define the terms given below:

(a) Conductivity (b) Molar Conductivity

What are their units?

13. State Raoult's law for a solution containing volatile liquids. Explain with suitable example the concept of maximum boiling azeotropes.

14. Give chemical reactions in support of the following observations.

    (a) Sulphuric acid has low volatility

    (b) Iodide ions can be oxidized by oxygen in acidic medium.

15. Propose mechanism of the reaction taking place when

    (a) (-) - 2-Bromooctane reacts with sodium hydroxide to form (+)-octane-2-ol.

    (b) 2-Bromo pentane is heated with (alc.) KOH to form alkenes.

16. What is a flux? What is the role of flux in the metallurgy of Iron and Copper?

17. The sum of first and second ionization enthalpies and third and fourth ionization enthalpies of nickel and platinum are:

	IE_1+IE_2 ($KJmol^{-1}$)	IE_3+IE_4 ($KJmol^{-1}$)
Ni	2.49	8.80
Pt	2.66	6.70

Based on the above information, answer the following:

(a) Which is the most common oxidation state for Ni and Pt? why?

(b) Out of the two, name the metal which can easily form compounds in +4 oxidation state and why?

18. Describe a chemical test in each case to distinguish between the following pairs of compounds

    (a) Aniline and N-ethylaniline.

    (b) N-Methyl propan-2-amine and N-Ethyl-N-methylethanamine.

19. Give reason

(a) Nature of electrodes can also affect the products of electrolysis.

(b) Why does a dry cell become dead after a long time even if it has not been used?

(c) Conductivity decreases with decrease in concentration of electrolyte in a solution.

20. Write :

(a) Reaction involved in the preparation of a biodegradable polyester.

(b) Monomer unit of synthetic rubber (neoprene).

(c) One use of Nylon-6,6

21. (a) Write the Zwitter ion structure of glycine.

(b) What is meant by inversion of sugar?

(c) Name the Vitamin in each case whose deficiency causes

(i) Night Blindness

(ii) Poor coagulation of blood.

22. Write chemical equations for the following reactions :

(a) Oxidation of nitrite ion by MnO_4^- in acidic medium.

(b) Acidification of potassium Chromate solution.

(c) Disproportionation of Manganese(VI) in acidic solution.

OR

Account for the following

(a) Europium (II) is more stable than cerium(II).

(b) Transition metals have high enthalpies of atomization.

(c) Actinoides show irregularities in the electronic configuration.

23. Give plausible explanation for each of the following:

(a) Ortho-nitrophenol is more acidic than ortho-methoxyphenol.

(b) Alcohols are easily protonated in comparison to phenols.

(c) The relative ease of dehydration of alcohols is tertiary > secondary > primary.

24. On dissolving 19.5 g of CH_2FCOOH in 500 g of water, a depression of 1°C in freezing point of water is observed. Calculate the Van't Hoff factor and dissociation constant of fluoro acetic acid. Given, $K_f = 1.86\ K\ kg\ mol^{-1}$

25. (a) Name one substance which can act as both:-

(i) Analgesic and antipyretic.

(ii) Antiseptic and disinfectant.

(b) Explain the following terms with suitable example of each :

(i) Broad spectrum antibiotics.

(ii) Anionic detergents.

26. (a) Heat of adsorption is greater for chemisorption than for physisorption. Why?

(b) Mention two common properties of sol and emulsions.

(c) Differentiate between electrophoresis and electro-osmosis.

27. (a) State the hybridization & magnetic behaviour of $[C_r(CO)_6]$.

(b) What are the various factors affecting crystal field splitting energy?

(c) Which of the two is more stable and why?

$K_4[Fe(CN)_6]$ OR $K_3[Fe(CN)_6]$.

28. (a) A white solid A on treating with caustic soda gives a pungent smelling gas B. B on catalytic oxidation forms gas C. C gives brown fumes of gas D, on further oxidation which on dissolving in water forms HNO_3 . Identify A,B,C,D and give the sequence of reactions involved.

(b) Arrange the following in order of property indicated for each set:

(i) HCl, HI, HBr,HF – Decreasing thermal stabilty.

(ii) Xe,He, Kr, Rn, Ne – Decreasing order of electron gain enthalpy.

OR

(a) Give Reasons:

(i) Solid PCl_5 is an ionic compound.

(ii) Most of the reactions of fluorine are exothermic.

(iii) Ozone is thermodynamically unstable.

(b) Draw the structures of the following

(i) $XeOF_4$ (ii) $H_4P_2O_7$

29. (a) A compound A on oxidation gives $B(C_2H_4O_2)$.A reacts with dil. NaOH and on subsquent heating forms C.C on catalytic hydrogenation gives D. Identify A,B,C,D and write down the reactions involved.

(b) Write chemical equations to carry out the following conversions :-

(i) Benzene to Benzylalcohol.

(ii) Propane nitrile to 1-phenylpropanone.

OR

(a) An organic compound X undergoes acid hydrolysis to form two compounds Y and Z. Y reacts with Sodium carbonate to form A.A is heated with Soda lime to form B

(CH_4) . Y on reduction with $LiAlH_4$ forms Z.Identify X,Y,Z,A,B and write the reactions involved.

(b) Account for the following:-

(i) Benzoic acid does not undergo Friedel-Craft reaction.

(ii) pKa value of chloro acetic acid is lower than pKa value of acetic acid.

30. (a) For the reaction

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{H^+} C_6H_{12}O_6 + C_6H_{12}O_6$$

write:

(i) Rate of reaction expression,

(ii) rate law equation,

(ii) molecularity,

(iii) order of reaction

(b) The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at constant volume.

$SO_2Cl_2\ (g) \rightarrow SO_2\ (g) + Cl_2\ (g)$

Experiment	Time/s	Total pressure/atm
1	0	0.5
2	100	0.6

Calculate the rate of reaction when total pressure is 0.65 atm.

OR

(a) Illustrate graphically the effect of catalyst on activation energy.

(b) Catalysts have no effect on the equilibrium constant. Why?

(c) The decomposition of A into product has value of k as $4.5 \times 10^3\ s^{-1}$ at 10°C and activation energy is 60 kJ mol^{-1}. Calculate the temperature at which the value of k will be $1.5 \times 10^4\ s^{-1}$

MARKING SCHEME OF
CHEMISTRY
SAMPLE PAPER-II

A.1 Phenol and benzyl iodide. 1

A.2 Gases with high critical temperature have strong van der Waals forces. 1

A.3 4-Chloro-2-methyl-3-oxo butanamide. 1

A.4 H_2SO_3 1

A.5 Phosphodiester linkage 1

A.6 $X = CH_3\text{-}CH_2\text{-}CH_2\text{-}Br$ ½ +½

$Y = CH_3\text{-}CH_2\text{-}CH_2\text{-}I$

A.7 $CaCO_3 \rightarrow CaO + CO_2$ 1

A.8 Iodoform has antiseptic properties due to free liberated iodine. 1

A.9 (a) Hoffmann Bromamide Degradation
(b) Sandmeyer's reaction
(c) Carbylamine reaction
(d) Gattermann Reaction (½ x 4=2)

A.10 For ccp lattice

$$r = \frac{\sqrt{2}\,a}{4}$$ ½

$$r = \frac{1.414 \times 400\ pm}{4}$$

r = 141.4 pm 1

There are four F^- ions and four octahedral voids in one unit cell. ½

A.11 (a) Due to smaller size of Ag^+ cation.
(b) Silicon doped with Phosphorus gives n-type whereas Silicon doped with Gallium are p-type semi conductors. 1+1

A.12 Fuel cell consists of porous carbon electrodes containing catalysts (finely divided platinum or palladium metal) incorporated in them. Conc. Aqueous KOH/ NaOH solution is placed between the electrodes act as electrolyte. H_2 and oxygen are bubbled through porous electrodes into the electrolytic solution. (1)

At Anode : $2H_2(g) + 4OH^-(aq) \rightarrow 4H_2O(l) + 4e^-$ (½)

At Cathode : $O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$ (½)

(a) Inverse of resistivity is called conductivity/conductance of one centimeter cube of the solution of the electrolyte.

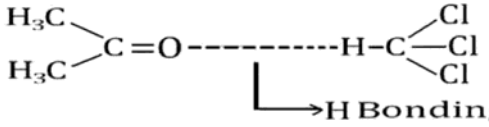
S I.Unit is Sm^{-1} (1)

(b) Molar conductivity : The conductance of the solution of an electrolyte containing one mole of electrolyte kept between two electrodes of a conductivity cell at unit distance. (1)

S I Unit Sm^2mol^{-1}

A.13 Roult's Law : For a solution of volatile liquids, the partial pressure of each component in a solution is directly proportional to its mole fraction. (½)

The solution showing large negative deviation from Raoult's law form maximum boiling azeotrops. e.g. mixture of chloroform and acetone.



(½)

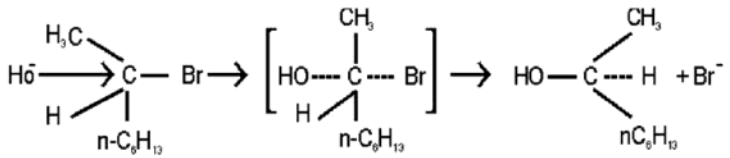
Hydrogen bonding formation decreases escaping tendency of a molecule i.e. exerts low V.P which leads to high B.P. (1)

A.14 (a) $2MX + H_2SO_4 \rightarrow 2HX + M_2SO_4$ (1)

$(X = F, Cl^-, NO_3)$

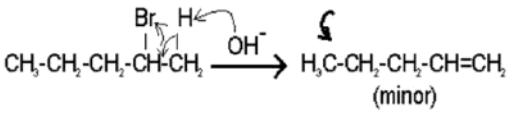
(b) $4I^- + 4H^+ + O_2 \rightarrow 2I_2 + 2H_2O$ (1)

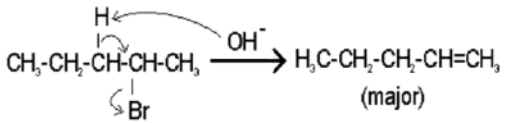
A.15 (a)



(1)

(b)





(1)

A16. Flux is a substance that combines with gangue (which may still be present in roasted or the calcined ore) to form slag. (1)

Metallurgy of Cu :

$FeO + SiO_2 \longrightarrow FeSiO_3$ (½)

(flux) (slag)

In the blast furnace CaO(flux) removes silica present in the Ore. (½)

$CaO + SiO_2 + CaSiO_3$

(flux) (slag)

A.17 (a) Ni = + 2 Pt = + 4 because these have lower ionization enthalpy. (1)

(b) Pt, The sum of first four Ionization enthalpies for Pt is lower than that of Ni. (1)

A.18 (a) Aniline is a primary amine. Therefore it gives carbyamine test, i.e., when heated with an alcoholic solution of KOH and $CHCl_3$, it gives offensive smell of phenyl isocyanide.

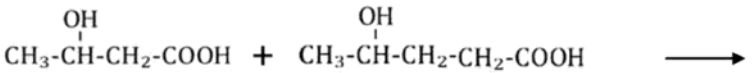
But N-ethyl aniline is a secondary amine and hence does not give carbylamine test. (1)

(b) N-methylpropan-2 amine is a secondary amine. On adding Hinsberg's reagent compound formed is soluble in aqueous NaOH.But N-ethyl-N-methylethamine does not react with Hinsberg's reagent.(or any other suitable test) (1)

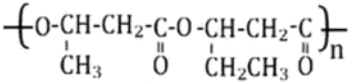
A.19 (a) If the electrode is inert, it only acts as a sink for electrons. If it participates in the electrode reactions, it affects the products of electrolysis. (1)

(b) This is because the acidic $NH_4C\ell$ corrodes the Zinc container. (1)

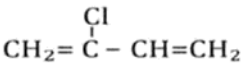
(c) On dilution number of ions per unit volume of the solution decreases and hence the conductivity decreases. (1)

A.20 (a) 

3- Hydroxybutanoic acid **3- Hydroxypentanoic acid**

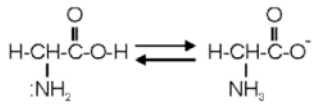


PHVB

(b) 

2-chloro- 1, 3- butadiene

(c) For making sheets/ bristles for brushes/In Textile industry. (1x3=3)

A.21 (a) 

(Zwitter Ion) (1)

(b) The change of specific rotation of sugar from dextrorotation to laevorotation is called

inversion of sugar. (1)

(c) (i) Vitamin A (ii) Vitamin K (½ + ½)

A.22 (a) $5NO_2^- + 2MnO_4^- + 6H^+ \longrightarrow 2Mn^{2+} + 3H_2O + 5NO_3^-$

(b) $2K_2CrO_4 + 2H^+ \longrightarrow K_2Cr_2O_7 + 2K^+ + H_2O$

(c) $3MnO_4^{2-} + 4H^+ \longrightarrow 2MnO_4 + MnO_2 + 2H_2O$ (1X3=3)

OR

(a) Europium(II) has stable electronic configuration i.e $[Xe]4f^7 5d^0 6s^\circ$. (1)

(b) Due to large number of unpaired electrons in their atoms, stronger interatomic interaction & hence stronger bonding between their atoms is found. (1)

(c) This irregularity is due to the extra -stability of f^7 and f^{14} configurations of 5f orbitals.(1)

A.23 (a) Due to strong -R and -I effect of $-NO_2$ group, electron density in the OH bond decreases

(b) In alcohols lone pair of electrons on oxygen is available for proton due to absence of resonance.

OR

Lone pair of electrons at oxygen are not available for donation due to resonance in phenols.

(c) Due to order of stability of carbocations, $3^o > 2^o > 1^o$

OR

Tertiary alcohols form more substituted alkenes.

A.24 Given $W_A = 19.5g$, $W_B = 500g$, $K_f = 1.86 K Kg\ mol^{-1}$

$\Delta T_f(obs) = 1^oC$

$$\Delta T_f = \frac{K_f \times \omega_B \times 1000}{M_B \times M_A} \quad (½)$$

$$M_B = \frac{Kf . \omega_B \times 1000}{\Delta T_f \times M_A}$$

$$= \frac{1.86\ K\ kg\ mol^{-1} \times 19.5\ g \times 1000\ g}{1.0\ K \times 500\ kg} = 72.54\ g mol^{-1} \quad (½)$$

Molecular mass of $CH_2FCOOH = 12+2+19+32+1 = 78\ g\ mol^{-1}$

i = normal molecular mass/observed molecular mass = 78/72.54 (½)

= 1.0753

$CH_2FCOOH \rightleftharpoons CH_2FCOO^- + H^+$

C mol L^{-1} 0 0

$C(1-\alpha)$ $C\alpha$ $C\alpha$

$\alpha = i - 1 = 1.0753 - 1 = 0.0753$ (½)

$$K_a = \frac{[CH_2FCOO^-][H^+]}{[CH_2FCOOH]} = \frac{C\alpha}{C(1-\alpha)} = \frac{C\alpha^2}{1-\alpha}$$

$$C = \frac{19.5 \times 1000}{78 \times 500} = 0.5M$$

$K_a = C\alpha^2$

$K_a = 0.5X(0.0753)^2$

$K_a = 3.07 \times 10^{-3}$ (1)

A.25 (a) (i) Aspirin (½)

(ii) Phenol (½)

(b) Antibiotics which kill or inhibit the growth of wide range of gram positive and gram negative bacteria. e.g., Chloramphenicol . (1)

(c) Sodium salts of sulphonated long chain alcohols or hydrocarbons are anionic detergents. e.g., Sodium lauryl sulphate. (1)

A.26 (a) Due to the formation of chemical bonds between adsorbate and adsorbent in case of chemisorption. (1)

(b) Brownian movement and Tyndall effect. (½+ ½)

(c) The movement of colloidal particles under an applied electrical potential is electrophoresis. When electrophoresis of dispersed particle in a colloidal system is prevented by some suitable means, it is observed that dispersion medium itself begins to move in an electric field. This phenomenon is known as electro osmosis. (1)

A.27 (a) d^2sp^3 , diamagnetic (1)

(b) Factors : (i) Field produced by the ligand. (½)

(ii) Charge on the metal ions. (½)

(c) $K_4[Fe(CN)_6]$ is more stable due to higher charge and smaller size of metal ion. (1)

A.28 (a) $(NH_4)_2SO_4 + 2NaOH \rightarrow 2NH_3 + 2H_2O + Na_2SO_4$ (1)

A B

$$4NH_3(g) + 5O_2(g) \xrightarrow[500K,\ 9bar]{\text{Catalyst}} 4NO + 6H_2O(g)$$ (1)

C

$$2NO + O_2(g) \rightleftharpoons 2NO_2(g)$$

D

$4NO_2(g) + 2H_2O + O_2(g) \rightarrow 4HNO_3(aq)$ (1)

(b) (i) $HF > HCl > HBr > HI$ (1)

(ii) $Ne > Kr > Xe > Rn > He$ (1)

OR

(a) (i) It exists as $[PCl_4]^+ [PCl_6]^-$ (1)

(ii) Due to low bond dissociation enthalpy of fluorine and strong bond formation with other elements. (1)

(iii) Decomposition of Ozone $[2O_3 \longrightarrow 3O_2]$

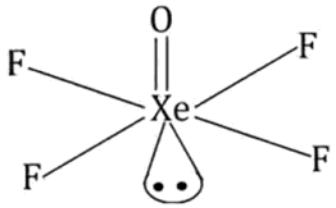
results in

ΔH =negative

ΔS =positive

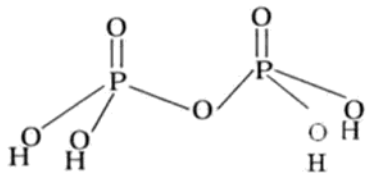
According to Gibb's equation $\Delta G = \Delta H - T\Delta S$, reactions with negative ΔG value are spontaneous (1)

(b) (i)



(1)

(ii)



(1)

A.29 (a) $CH_3-\overset{\underset{(A)}{O}}{\overset{\|}{C}}-H \xrightarrow{\text{oxidation}} CH_2-\overset{\underset{(B)}{O}}{\overset{\|}{C}}-OH$ (1)

(1)

$CH_3OHO + CH_3CHO \xrightarrow{NaOH(aq)} CH_3-\underset{OH}{CH}-CH_2-CHO$

(A)

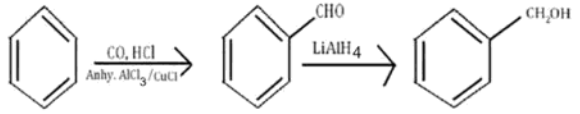
$CH_3\underset{OH}{CH}-CH_2CHO \xrightarrow{Heat} CH_3CH=CH.CHO$

(C)

$CH_3-CH=CH-CHO \xrightarrow{H_2/N_i} CH_3CH_2-CH_2-CHO$

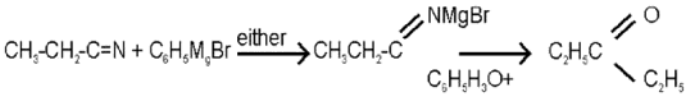
(C) (D)

(1)

(b) (i) 

(1)

Benzene Benzylalcohol

(ii) 

(1)

Propane nitrile **OR** 1-Phenylpropanone

a) $CH_3COOC_2H_5 \xrightarrow{H_3O^+} CH_3COOH + C_2H_5OH$ (1)

(X) (Y) (Z)

$CH_3COOH + Na_2CO_3 \longrightarrow CH_3COON_a$ (A)

Heat | NaOH & CaO

CH_4 (B)

$CH_3COOH \xrightarrow{LiAlH_4} CH_3CH_2OH_{(Z)}$ (1)

(b) (i) – COOH group is deactivating and combines with Aluminium chloride(catalyst) during the reaction. (1)

(ii) Due to - I effect of chlorine atom in chloroacetic acid larger number of H^+Ions are released in its aqueous solution. Therefore It has lower pKa value. (1)

A.30 (a) (i). Rate equation

$$\text{Rate} = \frac{-d[C_{12}H_{22}O_{11}]}{dt} = -\frac{d[H_2O]}{dt} = \frac{d[C_6H_{12}O_6]}{dt} = \frac{d[C_6H_{12}O_6]}{dt}$$ (½)

(ii) Rate law equation:

$$\text{Rate} = K\,[C_{12}H_{22}O_{11}]$$ (½)

(iii) Molecularity ⟶ 2 (½)

(iv) Order ⟶ first order (½)

(b) As the reaction is of first order therefore

$$k = \frac{2.303}{t} \log \frac{P_o}{2P_o - P_t}$$ (½)

When t = 100s

$$k = \frac{(2.303)}{100} \log \frac{(0.5)}{2 \times 0.5 - 0.6}$$

$k = (2.303)/100 \log 1.25$

$= (2.303)/100\ (.0969)$

$= 2.2316 \times 10^{-3}\ sec^{-1}$ (½)

When

$P_o = 0.65$ atm i.e $P_o + P = .65$ atm

$P = 0.65 - P_o = 0.65 - 0.50 = .15$ atm (½)

Therefore the pressure of SO_2Cl_2 at time t ($P_{so_2c/_2}$)

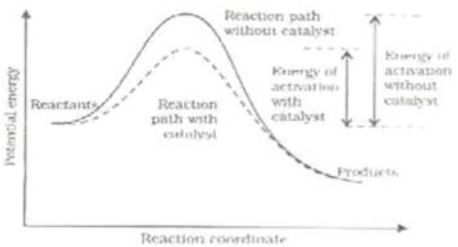
$= P_o - P = (0.50 - .15)$ atm $= 0.35$ atm (½)

Rate at that time = $K \times (P_{so_2c/_2}) = 2.2316 \times 10^{-3} \times 0.35$

$= 7.8 \times 10^{-4}$ atm sec^{-1} (1)

OR

(a)



Effect of catalyst on activation energy (2)

(b) Because catalyst catalyses the forward as well as backward reaction to the same extent. (1)

(c) Given

$K_1 = 4.5 \times 10^3\ s^{-1}$, $T_1 = 283$ K

$K_2 = 1.5 \times 10^4\ s^{-1}$, $T_2 = ?$, $Ea = 60$ KJ mol^{-1}

$$\log \frac{K_2}{K_1} = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1 . T_2}\right]$$ (½)

$$\text{Log}\ (1.5 \times 10^4)\ (4.5 \times 10^3) = 60000/(2.303 \times 8.314)\left[\frac{T_2 - T_1}{T_1 T_2}\right]$$ (½)

$\text{Log}\ 3.333 = 3133.63\ [(T_2 - 283)/(283 T_2)]$

$T_2 = 283/0.9528$

$= 297K = (297 - 273)^oC$

$= 24^oC$ (1)

Sample Question Paper - III
CHEMISTRY
BLUE PRINT
CLASS - XII

Time Allowed : 3 Hrs **Maximum Marks : 70**

S.R.	UNIT	VSA(1)	SA I (2)	SA II(3)	LA(5)	TOTAL
1	Solid State		4(2)			4(2)
2	Solutions	1(1)	4(2)			5(3)
3	Electrochemistry				5(1)	5(1)
4	Chemical Kinetics		2(1)	3(1)		5(2)
5	Surface Chemistry	1(1)		3(1)		4(2)
6	General Principles and Processes of Extraction of Elements	1(1)	2(1)			3(2)
7	p- Block Elements		2(1)	6(2)		8(3)
8	d- and f- Block Elements				5(1)	5(1)
9	Coordination Compounds	1(1)	2(1)			3(2)
10	Haloalkanes and Haloarenes		4(2)			4(2)
11	Alcohols,Phenols & Ethers	1(1)		3(1)		4(2)
12	Aldehydes,ketones and Carboxylic Acids	1(1)			5(1)	6(2)
13	Organic Compounds Containing Nitrogen	1(1)		3(1)		4(2)
14	Biomolecules	1(1)		3(1)		4(2)
15	Polymers			3(1)		3(1)
16	Chemistry in Everyday Life			3(1)		3(1)
	Total	**8(8))**	**20(10)**	**27(9)**	**15(3)**	**70(30)**

DESIGN

S No.	Type of Question	Marks for each Question	No. of Questions	Total Marks
1.	Long Answers (LA)	5	3	15
2.	Short Answers-II (SA II)	3	9	27
3.	Short Answers-I (SA-I)	2	10	20
4.	Very Short Answer (VSA)	1	08	08
	Total		**30**	**70**

Sample Question Paper - III
CHEMISTRY
CLASS - XII

Time Allowed : 3 Hrs **Maximum Marks : 70**

General Instructions:

1. All questions are compulsory.
2. Question No. 1 to 8 are very short questions carrying one mark each.
3. Question No. 9 to 18 are short answer questions carrying 2 marks each.
4. Question No. 19 to 27 are also short answer questions carrying 3 marks each.
5. Question No. 28 to 30 are long answer questions carrying 5 marks each.
6. Use of calculators is not allowed. Use the log tables wherever necessary.

Q.1 A and B liquids on mixing produce a warm solution. Which type of deviation from Raoult's law is there?

Q.2 Why is Ferric Chloride preferred over Potassium Chloride in case of a cut leading to bleeding?

Q.3 Among octahedral and tetrahedral crystal fields, in which case the magnitude of crystal field splitting is larger?

Q.4 Why is ortho-nitrophenol more acidic than ortho-methoxyphenol?

Q.5 Write two important uses of Formalin.

Q.6 Why do amines act as nucleophiles?

Q.7 Why can't aluminium be reduced by carbon?

Q.8 What are the ultimate products of digesion of proteins?

Q.9 Gold (atomic mass =197u, atomic radius = 0.144nm) crystallizes in a face centered unit cell. Determine the density of gold, [$N_A = 6.022 \times 10^{23}\ mol^{-1}$]

Q.10 Classify each of the following as being either a p-type or an n-type semi-conductor. Give reason.

(a) Si doped with In

(b) Si doped with P.

Q.11 Determine the molarity of an antifreeze solution containing 250g water mixed with 222g ethylene glycol ($C_2H_6O_2$). The density of this solution is 1.07g/ml.

Q.12 An aqueous solution containing urea was found to have boiling point more than the normal

boiling point of water (373.13 K).When the same solution was cooled it was found that its freezing point is less than the normal freezing point of water (273.13K).Explain these observations.

Q.13 Consider the decomposition of hydrogen peroxide in alkaline medium which is catalysed by iodide ions.

$$2H_2O_2 \xrightarrow{OH^-/I^-} 2H_2O+O_2$$

This reaction takes place in two steps as given below

Step - I $H_2O_2 + I^- \rightarrow H_2O + IO^-$ (slow)

Step -II $H_2O_2 + IO^- \longrightarrow H_2O + I^- + O_2$ (fast)

(a) Write the rate law expression and determine the order of reaction w.r.t. H_2O_2.

(b) What is the molecularity of each individual step?

Q.14 (a) What is the role of depressant in froth floatation process?

(b) Out of C and CO which is a better reducing agent for FeO

(i) In the lower part of blast furnace (Higher temperature)

(ii) In the upper part of blast furnace (Lower temperature)

Q.15 Complete the following reactions :-

a) $P_4 + 8\ SOCl_2 \longrightarrow$

(b) $I^- + O_3 + H_2O \longrightarrow$

Q.16 Using valence bond theory , predict the geometry and magnetic character of $[NiCl_4]^{2-}$. (Atomic number of Ni is 28).

Q.17 (a) Write the structure of following compound

1-Bromo-4 -sec-butyl- 2- methylbenzene

(b) How will you bring about the conversion:

Methyl bromide to methyl iodide

Q.18 Explain-

(a) Grignard reagents should be prepared under anhydrous conditions.

(b) $C_6H_5CHClCH_3$ is hydrolysed more easily with KOH than $C_6H_5CH_2Cl$

OR

Arrange the following compounds in the decreasing order of reactivity towards S_N2 displacement reaction and give reasons in support of your answer.

a) C_2H_5Br, C_2H_5I, C_2H_5Cl

b) $(CH_3)_3CBr$, $CH_3CH_2CHBrCH_3$, $CH_3CH_2CH_2CH_2Br$

Q.19 Draw the structures of the following:

(a) $H_2S_2O_8$

(b) XeO_3

(c) $HOClO_2$

Q.20 In a hydrolysis reaction, 5g ethyl acetate is hydrolyzed in presence of dilute HCl in 300 minutes. If the reaction is of first order and the initial concentration of ethyl acetate is 22g/L, calculate the rate constant of the reaction.

Q.21 (a) Give reasons for the following:

(i) Glucose does not give 2, 4- DNP test and Schiff's test.

(ii) Amino acids have high melting points and are soluble in water.

(c) What is meant by the secondary structure of proteins ?

Q.22 (a) Give an example of a synthetic rubber and mention its main advantage.

(b) Write the structures of the monomers of Dacron.

(c) Arrange the following polymers in the increasing order of tensile strength.

Nylon-6, Buna-S, Polythene

Q.23 Give one example for each of the following:

(a) An artificial sweetner whose use is limited to cold drinks.

(b) A non ionic detergent.

(c) A pain reliever used for relief from severe pains like post-operative pain or pain due to terminal cancer.

Q.24 (a) Give chemical tests to distinguish between the following compounds (One test in each case).

(i) Aniline and ethylamine

(ii) Methylamine and dimethylamine

(b) How will you convert aniline to sulphanilic acid?

OR

An aromatic compound (A) on treatment with ammonia followed by heating forms compound (B), which on heating with Br_2 and KOH forms a compound (C) having molecular formula C_6H_7N. Give the structures of A, B and C and write the reactions involved.

Q.25 (a) Give the mechanism of the following reaction:

$$2CH_3CH_2OH \xrightarrow[413K]{dil H_2SO_4} CH_3CH_2OCH_2CH_3$$

Does this reaction follow S_N1 or S_N2 pathway?

(b) Describe hydroboration oxidation reaction with the help of an example.

Q.26 Give reasons:-

(a) Interhalogen compounds are more reactive than halogens.

(b) PCl_5 is known but NCl_5 is not known.

(c) Amongst all noble gases only xenon is known to form compounds with oxygen and fluorine.

Q.27 (a) Give one main difference between lyophillic and lyophobic colloids.

(b) What is observed when:-

(i) A beam of light is passed through a colloidal solution.

(ii) Electric current is passed through a colloidal solution.

Q.28 (a) Two electrolytic cells containing silver nitrate solution and dilute sulphuric acid solution were connected in series. A steady current of 2.5 amp was passed through them till 1.078g of silver was deposited. [Ag = 107.8g mol^{-1}, IF = 96, 500 C]

(i) How much electricity was consumed?

(ii) What was the weight of oxygen gas liberated?

(b) Give reason:-

(i) The equilibrium constant K is related to E^0_{cell} and not E_{cell}.

(ii) Conductivity of an electrolytic solution decreases with the decrease in concentration.

OR

(a) What is a fuel cell? What is its main advantage?

(b) What are the reactions occurring at the cathode and anode of a Leclanche cell?

(c) In the button cell widely used for watches and other devices, the following reaction takes place:

$$Zn(s) + Ag_2O(s) + H_2O(l) \longrightarrow Zn^{2+}(aq) + 2Ag(s) + 2OH^-(aq)$$

Give the cell representation and determine the value of K_c for the above reaction using the following data:

$$Ag_2O(s) + H_2O(l) + 2e^- \longrightarrow 2Ag(s) + 2\,OH^-(aq) \qquad (E^0 = 0.344V)$$

$$Zn^{2+}(aq) + 2e^- \longrightarrow Zn(s) \qquad (E^0 = -0.76V)$$

Q.29 Explain the following:

(a) Actinoids show large number of oxidation states.

(b) The transition metals form a large number of complex compounds.

(c) Chromium is a typical hard metal while mercury is a liquid.

(d) MnO is basic while Mn_2O_7 is acidic in nature.

(e) Silver is a transition metal but zinc is not.

OR

(a) Give two consequences of lanthanoid contraction.

(b) Complete the following reactions:

(i) $MnO_4^- + S_2O_3^{2-} + H_2O \longrightarrow$

(ii) $Cr_2O_7^{2-} + Sn^{2+} + H^+ \longrightarrow$

(c) Which of the following has maximum number of unpaired electrons?

Ti^{3+}, V^{3+}, Fe^{2+}, Mg^{2+}

(d) Based on the data, arrange Fe^{2+} , Mn^{2+} and Cr^{2+} in the increasing order of stability of +2 oxidation state

$E^0(Cr^{3+}/Cr^{2+}) = -0.4\ V \quad E^0(Mn^{3+}/Mn^{2+}) = 1.5V \quad E^0(Fe^{3+}/Fe^{2+}) = 0.8V$

Q.30 (a) Identify A, B and C in the following reaction

$$CH \equiv CH \xrightarrow[HgSO_4]{dil.\ H_2SO_4} A \xrightarrow{dil.NaOH} B \xrightarrow{heat} C$$

(b) Give reasons:

(i) p-Nitro benzoic acid has higher K_a value than benzoic acid.

(ii) Acetone is highly soluble in water but benzophenone is not.

OR

(a) An organic compound(A) has molecular formula ($C_5H_{10}O$). It does not reduce Tollen's reagent but forms an orange precipitate with 2,4 - DNP reagent. It forms a carboxylic acid(B)with molecular formula ($C_3H_6O_2$) when treated with alkaline $KMnO_4$, and a yellow precipate on treatment with NaOH and I_2. On oxidation under vigorous conditions gives ethanoic acid and propanoic acid. Sodium salt of (B) gave a hydrocarbon (C) in Kolbe,s Electrolytic Reduction. Identify (A) , (B) and (C) and write the reactions involved.

(b) Predict the products formed in the following cases :

(i) (A) reacts with PhMgBr and is then hydrolysed.

(ii) (A) reacts with hydrazine and is then heated with KOH and ethylene glycol.

MARKING SCHEME OF
CHEMISTRY
SAMPLE PAPER-III

A.1 Negative deviation. 1

A.2 Fe^{3+} is a better coagulating ion due to greater positive charge on it 1

A.3 Octahedral crystal field. 1

A.4 Due to electron withdrawing effect of nitro group. 1

A.5 In preserving biological specimens and in making polymer like bakelite. ½ + ½

A.6 Due to the presence of lone pair of electrons on nitrogen of amines. 1

A.7 Because aluminium is a stronger reducing agent than carbon. 1

A.8 Amino acids. 1

A.9 $d = \frac{Z \times M}{N_a \times a^3}$ ½

$a = 2\sqrt{2}.r$

$a = 2 \times 0.144 \times 1.414 nm$

$= .407 nm = 0.407 \times 10^{-7} cm$ ½

$$d = \frac{4 \times 197 g\ mol^{-1}}{6.022 \times 10^{23}\ mol^{-1} \times (0.407 \times 10^{-7})\ cm^3}$$

$d = 19.6 g / cm^3$ 1

A.10 (a) p-type, because In has 3 valence electrons. Holes are produced which can move through the crystal like positive charge.

(b) n-type, because P has 5 valence electrons. The fifth electron becomes delocalised and is free to contribute to electrical conduction. 1+1

A.11 No. of moles of ethylene glycol = n_B

Molar mass of $C_2 H_6 O_2 = (24+6+32) g\ mol^{-1}$

$N_B = \frac{222g}{62\ mol^{-1}} = 3.58\ mol$ ½

mass of solution = (250 + 222)g = 472g.

$$\text{Volume of Solution} = \frac{\text{mass of solution}}{\text{density of solution}}$$ ½

$$V = \frac{472g}{1.07g/ml} = 441.12ml$$

$$M = \frac{n_B}{V} \times 1000$$

$$= \frac{3.58mol}{441.12L} \times 1000 = 8.12mol\,L^{-1}$$ 1

A.12 The vapour pressure of the aqueous solution containing urea is less than the vapour pressure of pure water because urea is a nonvolatile solute. To boil this solution we have to heat it to the temperature higher than the normal boiling point of water. 1

To freeze the solution the temperature is lowered, the vapour pressure of solution also lowers. The vapour pressure of solution equalizes the vapour pressure of solid solvent at temperature lower than the normal freezing point of water. 1

A.13 (a) Rate = $k[H_2O_2]^1[I^-]^1$ ½

order w.r.t. $H_2O_2 = 1$ ½

(b) Molecularity -step I = 2 ½

step II = 2 ½

A.14 (a) Depressant is used in the froth floatation process for preventing the specific sulphide ore from forming froth in a mixture of sulphides. 1

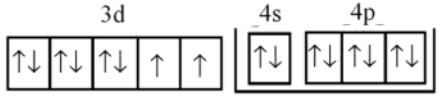
(b) C is better reducing agent at higher temperature ½

CO is better reducing agent at lower temperature. ½

A.15 (a) $P_4 + 8\,SOCl_2 \longrightarrow 4PCl_3 + 4\,SO_2 + 2\,S_2Cl_2$

(b) $2I^-(aq) + O_3(g) + H_2O(l) \longrightarrow 2OH^-(aq) + I_2(s) + O_2(g)$ 1+1

A.16 $[NiCl_4]^{2-}$ =



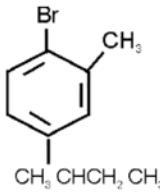
Sp^3 hybridisation

Four pairs of electrons from $4Cl^-$ ions

Geometry - Tetrahedral due to sp^3 hybrdisation 1

Magnetic character-Paramagnetic, due to the presence of 2 unpaired electrons in 3d orbitals. 1

A.17 (a)



3

(b) $CH_3Br + NaI \xrightarrow{\text{dry acetone}} CH_3I + NaBr$ 1+1

Methylbromide Methyl Iodide

A.18 (a) Grignard reagents react with water to give corresponding alkanes, therefore they are prepared under anhydrous conditions.

$RMgX + H_2O \longrightarrow R\text{-}H + Mg(OH)X$ 1

(b) $C_6H_5CHClCH_3$ is a 2° benzylic halide which can form a carbocation more easily in S_N1 displacement reaction than $C_6H_5CH_2Cl$ which is a 1° benzylic halide. Therefore $C_6H_5CHClCH_3$ is more easily hydrolysed with KOH. 1

OR

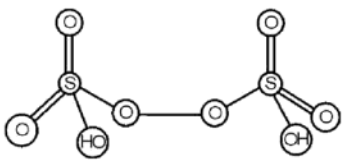
(a) $C_2H_6I > C_2H_5Br > C_2H_5Cl$

C-I bond is weaker than the C-Br bond which in turn is weaker than C-Cl bond; the S_N2 displacement reaction becomes slower as the bond strength increases. 1

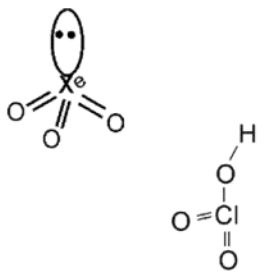
b) $CH_3CH_2CH_2CH_2Br > CH_3CH_2CHBrCH_2 > (CH_3)_3CBr$

As the steric hinderance on C which is attacked by nucleophile increases, the rate of S_N2 displacement reaction decreases. 1

A.19 (i)



(ii)



1x3=3

A.20 $a = 22g/L$

$a - x = (22 - 5) = 17g/L$

$t = 300$ min 1

$$K = \frac{2.303}{t} \log \frac{a}{a\text{-}x}$$ 1

$$= \frac{2.303}{300\ \text{min}} \log \frac{22\text{gL}^{-1}}{17\text{gL}^{-1}}$$

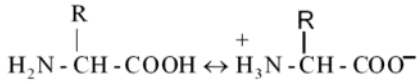
$= 7.6 \times 10^{-3} \log 1.29\ \text{min}^{-1}$

$= 7.6 \times 10^{-3} \times 0.11\ \text{min}^{-1}$ 1

$= 8.36 \times 10^{-4}\ \text{min}^{-1}$

A.21 (a) (i) In the cyclic structure of glucose - CHO group is not free as it forms a hemiacetal linkage with -OH group at C-5. 1

(ii) The amino acids have high melting points and solubility in water due to zwitter ion (polan) structure and strong intermolecular forces between them.

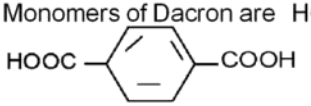
 1

(b) Secondary structure of proteins refers to the shape in which a long polypeptide chain can exist. 1

A.22 (a) Buna-N

It is resistant to the action of petrol, lubricating oil and organic solvents. 1

(b) Monomers of Dacron are $HOCH_2CH_2OH$ and

 1

(c) Buna-S < Polythene < Nylon 1

A.23 (a) Aspartame 1

(b) Ester of stearic acid and poly ethylene glycol

$CH_3(CH_2)_{16}COO(CH_2CH_2O)_nCH_2CH_2OH$ 1

(c) Morphine 1

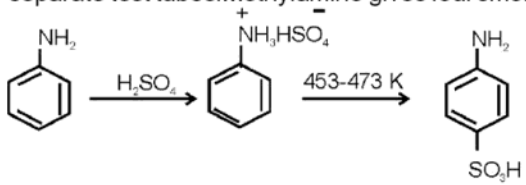
A.24 (a) (i) Aniline and Ethylamine:-

Add benzenediazonium chloride to both the compounds in separate test tubes at low temperature.Aniline forms an orange dye. 1

(ii) Methylamine and Dimethylamine

Add chloroform and aqueous sodium hydroxide solution to both the compounds in separate test tubes.Methylamine gives foul smell of isocyanide. 1

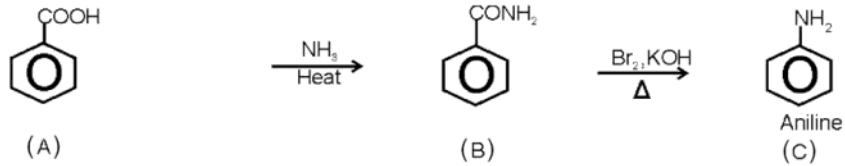
(b)



1

Anilinium hydrogensulphate Sulphanilic acid

OR



(1,1,1)

A.25 (a) The formation of ether is a nucleophilic bimolecular reaction (S_N2) involving the attack of alcohol molecule on a protonated alcohol, as indicated below:

(i) $CH_3 - CH_2 - \ddot{O} - H + H^+ \longrightarrow CH_3 - CH_2 \overset{+}{\underset{H}{O}} - H$

(ii) $CH_3CH_2 - \ddot{O}H + CH_3 - CH_2 - \overset{+}{O}H_2 \rightarrow CH_3CH_2 - \overset{+}{O}H - CH_2CH_3 + H_2O$

(ii) $CH_3CH_2 - \overset{+}{O}H - CH_2CH_3 \longrightarrow CH_3CH_2 - O - CH_2CH_3 + H^+$

2

(b) Hydroboration oxidation reaction: 1

$$R - CH = CH_2 + H - BH_2 \rightarrow \underset{\text{Alkyl borane}}{R - CH_2 - CH_2 - BH_2} \xrightarrow{R-CH=CH_2} \underset{\text{Dialkyl borane}}{(R\,CH_2\,CH_2)_2\,BH} \xrightarrow{RCH_2=CH_2} \underset{\text{Trialkyl borane}}{(RCH_2CH_2)_3\,B} \xrightarrow{H_2O,3H_2O_2/OH^-} 3R\text{-}CH_2CH_2\text{-}OH + B(OH)_3$$

A.26 (a) Interhalogen compounds are more reactive than halogens because the X-X' bond present in interhalogens is weaker than the X-X bond present in halogens as the overlapping between orbitals of dissimilar atoms is less effective. 1

(b) PCl_5 exists because phosphorus can extend its covalency to five using empty 3d orbitals. Since d orbitals are not present in the valency shell of N, it can not form NCl_5 . 1

(c) Xenon has bigger size and lower ionization enthalpy than the other noble gases As a result it is the only noble gas which is able to form compounds with oxygen and fluorine . 1

A.27 (a) Lyophillic colloids - (i) They have strong forces of attraction between the dispersed phase and dispersion medium. (ii) They are reversible in nature.

Lyobhobic colloids- (i) They have weak forces of attraction between the dispersed phase and dispersion medium.

(ii) They are irreversible in nature. (Any one difference) 1

(b) (i) Due to the scattering of light by colloidal particles, the path of light becomes visible. The effect is called **Tyndall effect.** The illuminated path of the beam of light is called **Tyndall cone.** 1

(ii) The colloidal particles get precipitated at one of the electrodes, having charge opposite to the charge they have. 1

A.28 (a) In the first cell silver is deposited at cathode according to the equation:-

(i) $Ag^{+}_{(aq)} + e^{-} \rightarrow Ag(s)$

$107.8gAg = 1\text{F electricity}$

$1.078gAg = 0.01F$

$= 965\text{C electricity}$ 1

(ii) The oxygen gas is liberated at anode of first cell as well as second cell according to equation

$2H_2O(l) \rightarrow 4H^{+}_{(aq)} + 4e^{-} + O_2(g)$

4F electricity = I mol O_2 in each cell

4F = 32 g O_2 in each cell

$0.01F = \frac{32g}{4g} \times 0.01\ g = 0.08\ g\ O_2$ in each cell

Total wt of O_2 liberated = 2 x 0.08g = 0.16g (in both cells) 2

(b) (i) The equilibrium constant K and E^0cell are related by the relation

$E^0cell = (RT / nF)\ \ln K$

(ii) When the concentration decreases the number of ions present in unit volume of solution decreases, as a result electrical conductivity decreases. 1

OR

(a) Galvanic cells, that are designed to convert the energy of combustion of fuels like H_2, CH_4, CH_3OH etc. directly into electrical energy are called fuel cells. They produce electricity with an efficiency of about 70% and are pollution free. 1

(b) Reactions taking place in Leclanche cell

Anode : $Zn(s) \text{—} Zn^{2+}(aq) + 2e^{-}$

Cathode : $2\ Mno_2(s) + 2NH_4^{+}(aq) + 2e^{-} \text{—} 2Mno(OH) + 2\ NH_3$ 1

(c) $Zn(s)/\ Zn^{2+}(aq)//\ Ag_2o(s)/\ Ag(s)/\ OH^{-}(aq)$

$E^0cell = E^0(Ag_2O/Ag) - E^0Zn^{2+}/Zn$

$E^0(Ag_2O/Ag) = 0.344v - (-0.76V)$

$= 1.104\ V$ 1

$Zn(s) + Ag_2O(s) + H_2O(l) \rightarrow Zn^{2+}(aq) + 2Ag(s) + 2OH^-(aq)$

n=2

$\log K_c = \frac{nE^0cell}{0.059}$ at 25°C 1

$\log k_c = \frac{2 \times 1.104}{0.059}$

= 37.42

K_c = anti log (37.42)

$= 2.34 \times 10^{37}$ 1

A..29 (a) Due to comparable energies of 5f, 6d and 7s subshells, all the electrons present in these subshells may participate in bonding, resulting in large number of oxidation states for actinoids. 1

(b) Transition metals form a large number of complexes because of small size and high charge of ions. They also have empty d orbitals to accept electron pairs from ligands. 1

(c) M-M interactions are strong in chromium due to the presence of six unpaired electrons in the 3d and 4s subshell , while in mercury all the electrons in the 5d and 6s subshell are paired and M-M interactions are weak. 1

(d) As the oxidation state of Mn in MnO is +2 while in Mn_2O_7 it is +7, MnO is basic while Mn_2O_7 is acidic. As the oxidation number of a metal increases, its acidic character increases due to decrease in size of the metal ion and increase in charge density and increase in the covalent character of Mn-O bond. 1

(e) There are unpaired electrons in the ions formed by silver as silver can exhibit +2 oxidation state where it will have incompletaly filled - orbitats hence a transition element but zinc does not form any ion with incomplete d orbitals.

$_{47}Ag = [Kr]\ 4d^{10}\ 5s^1$ 1

$_{30}Zn = [Ar]\ 3d^{10}\ 4s^2$

OR

(a) (i) 4d and 5d transition series have almost same atomic radii.

(ii) It is difficult to separate lanthanoids from their mixture 1

(b) (i) $8MnO_4^- + 3S_2O_3^{2-} + H_2O \rightarrow 8MnO_2 + 6SO_4^{2-} + 2OH^-$ 1

(ii) $Cr_2O_7^{2-} + 3Sn^{2+} + 14H^+ \rightarrow 2Cr^{3+} + 3Sn^{4+} + 7H_2O$ 1

(c) Ion E.C. of ion — No. of unpaired electrons

Mg^{2+} = [Ne]$3s^o$ — 0

Ti^{3+} = [Ar]$3d^1 4s^o$ — 1

V^{3+} = [Ar]$3d^2 4s^o$ — 2

Fe^{2+} = [Ar]$3d^6 4s^o$ — 4

Fe^{2+} has maximum number of unpaired electrons 1

(d) As the value of reduction potential increases, the stability of +2 oxidation state as compared to +3 oxidation state increases, therefore Cr^{2+} is less stable than Fe^{2+} which in turn is less stable than Mn^{2+}. 1

A.30 (a) A = CH_3CHO

B = $CH_3CH(OH)CH_2CHO$

C = $CH_3CH{=}CHCHO$ 1x3=3

(b) (i) $-NO_2$ group at p- position increases the positive charge at C-1 due to -I and -R effect, making the fission of O-H bond easier. 1

(ii) Acetone can make hydrogen bonds with water but benzophenone can not make hydrogen bonds due to steric hinderance of two phenyl groups. 1

OR

(a) $CH_3CH_2CH_2COCH_3$ (A) $\xrightarrow{NaOH/I_2}$ CHI_3 Yellow P pt 1

$CH_3CH_2CH_2COCH_3$ (A) $\xrightarrow{oxidation}$ $CH_3CH_2COOH + CH_3COOH$ (B) 1

$CH_3CH_2COONa \xrightarrow{Kolbe\ Electrolysis} CH_3CH_2CH_2CH_3$ (C) 1

(b) (i) $CH_3CH_2CH_2COCH_3 \xrightarrow[H_3O^+]{PhMgBr} CH_3CH_2CH_2C(Ph)(OH)CH_3$ 1

(ii) $CH_3CH_2CH_2COCH_3 \xrightarrow[KOH/ethyleneglycol]{i)\ NH_2\text{-}NH_2} CH_3CH_2CH_2CH_2CH_3$ 1