Chemistry   -XII

Time- 3 Hours   **Marks:70**

General Instructions:

1. All questions are compulsory.

2. Question numbers 1 to 5 are very short answer questions of one mark each. Answer these in one word or about one sentence each.

3. Question numbers 6 to 10 are short answer question of two marks each. Answer these in about 30 words each.

4. Question numbers 11 to 22 are short answer question of three marks each. Answer these in about 40 words each. Question no. 23 is of 4 marks .

5. Question numbers 24 to 26 are long answer question of five marks each. Answer these in about 70 words each.

6. Use log tables, if necessary.

1	Why chloroform is stored in closed dark brown bottles?	**1**
2	Give IUPAC name of following compound. $(CH_3)_2CH.CHClCH_3$	1
3	Hydrolysis of ethyl acetate is slow initially but gradually it becomes faster why?	1
4	NaCl appears yellow coloured when heated in sodium vapour. Why?	1
5	Which of ions will have higher coagulating power for negative colloidal solution: Na^+, Ca^{+2}, Al^{+3}, PO_4^{-3}	1
6	a) Why is the bond angle in PH_4^+ higher than in PH_3? B)Name the oxoacid of phosphorous which is dibasic?	2

7 a) How Molar conductivity at infinite dilution varies with concentration for weak electrolyte.   2

 b) Write the product of electrolysis at cathode and anode in aqueous NaCl

OR

State Kohlrausch law of independent migration of ions. Write an expression for the molar

conductivity of acetic acid at infinite dilution according to Kohlrausch law.

8 a). Explain, why Grignard Reagents must be stored in anhydrous conditions?   2

 b) P_{Ka} value of phenol is higher than P-nitrophenol . Explain.

9 Give a chemical test to distinguish between following pair of compounds   2

 a)   Ethanal and propanal   b)   2-Methylpentan -2-ol and 2-Methylpentan -3-ol

10 *A reaction is of first order in reactant A and of second order in reactant B. How is the*   2
rate of this reaction affected when (i) the concentration of B alone is increased to three
times (ii) the concentrations of A as well as B are doubled?

11 Write the names and structures of the monomers of the following polymers: 3
(a) Bakellite   (b) Nylon 6   (c) Polythene

|		
12	Give mechanism of the following reaction $$nBuBr + NaCN \xrightarrow{\text{EtOH} + H_2O} nBuCN$$	3
13	Write the chemical equations for the following name reactions: (a) Hoffmann Bromamide degration (b) Carbylamine reaction (c) Gabriel phthalamide reaction	3
14	a) Write down the IUPAC name of $K_3[Fe(C_2O_4)_3]$ b) Using valence bond theory, explain the geometry and magnetic behaviour of $[Cr(NH_3)_6]^{3+}$ (At.no. of Cr is 24)	3
15	a)What is the role of depressant in froath flotation process? b) Outline the principle of refining of metal by following method: i) Zone refining ii) Monds process	3
16	a) What are antacids .Give an example. b) Why the use of aspartame limited to cold food and drinks? c) What is tincture of iodine ?What is its use?	3

17	a) Arrange the following in increasing order of their acidic strength. Give reason
	
	  $HClO_3$, $HClO_4$, $HClO_2$, $HClO$
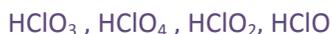	
	b) Nitrate compound after heating with H_2SO_4 and Cu turnings gave brown coloured gas name the gas and give reaction involved .
	
	 OR
	a) Draw the structure of BrF_3.
	
	  b) Bond enthalpy of F_2 is less than that of Cl_2.
	
	  c) Why BiH_3 is stronger reducing agent.
		3

18	Write balanced equations for the following:
	  (i) NaCl is heated with sulphuric acid in the presence of MnO_2.
	  (ii) Chlorine gas is passed into a solution of NaI in water.
	  (iii) Ammonia reacts with a solution of Cu^{2+}?
		3

19	The time required for 10%completion of a first order reaction at 298K is equal to time required for its 25%completation at 308K.if the value of frequency factor is $4 \times 10^{10 \, -1}$.calculate value of k at 318K and activation energy.	3
20	a) A current of 1.50 Ampere was passed through an electrolytic cell containing silver nitrate solution with inert electrode the weight of silver deposited is 1.50g. How long did the current flows in the cell? b) what is cathodic protection of iron from corrosion?	3
21	Explain what is observed when a) an electric current is passed through a sol? b) a beam of light is passed through a sol?	3

c) an electrolyte (NaCl or KCl) is added to ferric hydroxide sol.

| 22 | a) An element X with an atomic mass of 60g/mol has density of 6.23g cm^{-3}. If the edge length of its cubic unit cell is 400 pm, identify the type of cubic unit cell. | 3 |
| | b) What makes a glass different from a solid such as quartz ?.Under what condition quartz could be converted into glass? | |

23	Meena's son who is 2 years old started walking that time she observed that he has bow legs parents consulted a doctor and has suggested some remedy	4
	a) What is the remedy suggested by the doctor?	
	b) Name the sources in which the mentioned vitamin is present ?	
	c) What value you have gained from this?	

24   5

(a) An organic compound 'A' with molecular formula $C_5H_8O_2$ is reduced to n-pentane on

treatment with Zn-Hg/HCl. 'A' forms a dioxime with hydroxylamine and gives a

positive iodoform test and Tollen's test. Identify the compound 'A' and deduce its

structure.

(b) Write the chemical equations for the following conversion:
  (i) propyl benzene to benzoic acid
  (ii) Acetaldehyde to 3-hydroxy butanal
  (iii) Acetone to propan-2-ol

OR

(a)An organic compound (A) having molecular formula C_8H_8O gives positive DNP and
iodoform test. It does not reduce Tollen's or Fehling's reagent and does not decolorize
bromine water also. On oxidation with chromic acid, it gives a carboxylic acid (B) with
molecular formula $C_7H_6O_2$. Deduce the structures of 'A' and 'B'.
  (b) Complete the following reactions by identifying A, B and C.

  (i)   A + H$_2$(g) $\xrightarrow{\text{Pd/BaSO4}}$ (CH$_3$)$_2$CH-CHO

  (i)   2HCHO + conc. NaOH $\longrightarrow$ B + C
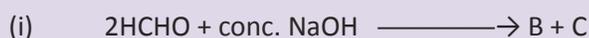
25   5
Explain following.

 a) d- block elements form coloured compounds.

b) d- block elements or their compounds are very good catalyst.

 c) Mixed oxide of iron and Chromium FeO.Cr$_2$O$_3$ is fused with Sodium Carbonate in the

   presence of air to form yellow compound (A). On acidification Compound (A) forms an

   orange coloured compound (B) which is an oxidizing agent.

    i) Identify A and B.

ii) Write balanced chemical equation for each

Or

(a) Among the lanthanoids, Ce(III) is easily oxidised to Ce(IV).
(b) Fe^{3+} / Fe^{2+} redox couple has less positive electrode potential than Mn^{3+} / Mn^{2+} couple.
(c) The second and third transition series elements have almost similar atomic radii.

d) Differentiate between. Lanthanides and actinides w.r t.

(i) Oxidation state   (ii) electronic configuration

26	a) Density of 1 M soln of glucose 1.18 g/cm^3. K_f for H_2O is 1.86 Km^{-1}. Find freezing point of solution. b) State and explain Henry's law. Write its two application. c) An organic compound tetramerises in aqueous solution . What is the value of van`t hoff factor "i" ?	5
	Or,	
	a) The osmotic pressure of human blood is 7.65 atm at 37°C. For injecting glucose solution it is necessary the glucose solution has same osmotic pressure as of human blood. Find the molarity of glucose solution having same osmotic pressure as of human blood. b) Define molal elevation constant . c)Which aqueous solution is more concentrated 1 molar and 1 molal?. Give reason.	

Marking scheme

1	Because chloroform gets oxidised to phosgene.	1 mark.
2	2-Chloro-3-methylbutane.	1 mark
3	Due to formation of acetic acid which gives H^+ ion. This H^+ ion act as auto catalyst -	1 mark.
4	Due to formation of F centre -	1 mark
5	Al^{+3}	1 mark
6	a) A lone pair of electrons is not present in PH_4^+. But in PH_3, the presence of lone pair of electrons repel the bonds giving a smaller bond angle. b) H_3PO_3	1 mark 1 mark
7	Variation of molar conductivity Product at cathode = ½ marks, product at anode = ½ marks OR Definition 1 mark , Expression 1 mark	1 marks
8	a) Because in presence of moist air it produces corresponding alkane. b) PKa = -log Ka higher value of means lower value of PKa correct explanation	1 mark ½ mark ½ mark

9	(i) Iodoform − Ethanal +ve , Propanal - -ve	1 mark.
	(ii) Any test to distinguish b/w 2^0 & 3^0 alcohol	1 mark
10	Rate = $[A][B]^2$	
	i) New rate = 9 Rate 1 mark	
	ii) New Rate = 8 rate 1 mark	
11	a) Phenol-formaldehyde resin	1 mark
	b) Caprolactum	1 mark
	c) Ethene	1 mark
12	a) Correct mechanism in three steps	2 mark
	b) Correct explanation	1 mark
13	a) Correct equation	1 mark.
	b) Correctequation	1 mark
	c) Correct equation	1 mark
14	a) Potassiumtrioxalatoferrate(III)	1 mark.
	(b) d^2sp^3 hybridisation, octahedral geometery paramagnetic	1,1 mark.
15	a) The role of depressant is to separate ZnS and PbS	1 mark
	b) (i) Basic principle	1 mark
	(ii) vapour phase equation/explanation	1 mark
16	a) Definition +example	1 mark
	b) It decomposes on heating	1 mark
	c) Tincture of iodine is 2% solution of iodine in alcohol it is use as antiseptic	1 mark
17	a) $HClO_4 > HClO_3 > HClO_2 > HClO$ -	1 mark
	Explanation	1/2mark
	b) Due to formation of NO_2 gas	1/2mark
	Chemical equation	1 mark

OR

	a) Correct structure	1 mark
	b) Due to relatively larger electronic repulsion among the lone pairs of F_2 molecule.	1 mark
	c) Because BiH3 is less stable.	1 mark
18	Correct equation	1×3 = 3 mark
19	Ea=76.640KJ/mol	1.5 mark
	K=1.035x10^{-2}	1.5 mark
20	a) 107.87 gm of silver is deposited by = 96500 C	
	1 " " " = 96500 /107.87	
	1.5 " " " = 96500X1.5/107.87	1 mark
	Total charge passed = 1341.89C -	1 mark
	Q = IT T = 894.59 sec	1 mark
	b) definition	1 mark
21	(a) Coagulation takes place at oppositely chargedelectrodes.	1 mark
	(b) Tyndal effect	1 mark

22   a)   Given ; d= 6.23g cm_{-3}

         M=60g/mol

         a = 400 pm = 4×10^{-8} cm

         z = ?...   .1/2 mark.

we know that d= $Mz/a^3 N_A$

z= d. a^3. N_A/M.............................. ....1/2 mark.

= $6.23 \times 64 \times 10^{-24} \times 6.023 \times 10^{23}/ 60$

= 4.0018............................... ....1/2 mark.

Z = 4 (fcc structure)................. ....1/2 mark.

     a)   Glass is amorphous solid whereas quartz is a crystalline solid   ½ mark.

         When molten quartz cool rapidly   ½ mark

23   Ans:- a)The doctor informed that it was due to the deficiency of vitamin D. He suggested to include food containing more vitamin D in the diet.   (2)

b) Cod liver oil, butter, milk, eggs, liver and meat.   (1)

c) Vitamins play an important role in our day to day life. Inorder to be healthy we must take vitamins along with carbohydrates, proteins and fat.   (1)

24   (a) A is a straight chain organic compound with carbonyl functional group.

         Formation of dioxime suggests the presence of two carbonyl groups.   ½

   It is positive towards iodoform test which indicates presence of CH_3CO- group   1/2.

   Positive tollens reagent test indicates the presence of –CHO group.   1/2

   Therefore the organic compound is 4-oxo pentanal   1/2

   (b) (i) n-propyl benzene to benzoic acid   1 mark.

Benzoic acid
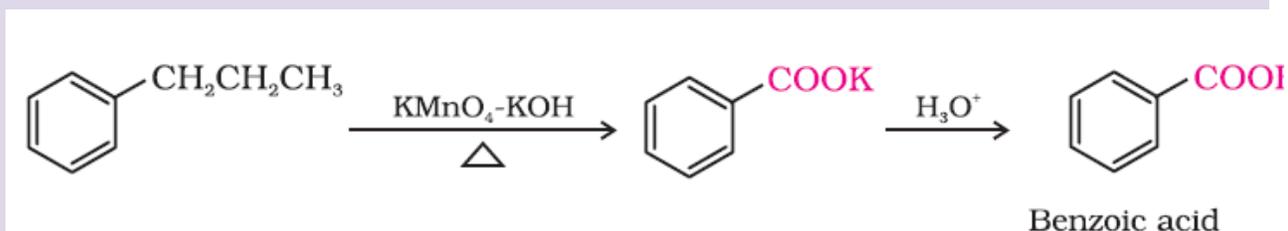
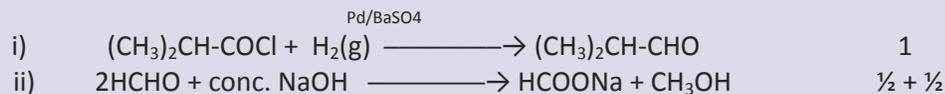(ii) Acetaldehyde to 3-hydroxy butanal   1 mark.

3-Hydroxybutanal
(Aldol)

     (ii)   Acetone to propan-2-ol   1 mark.

$$CH_3COCH_3 + H_2 \xrightarrow{\text{Ni/Pt}} CH_3CH(OH)CH_3$$

OR
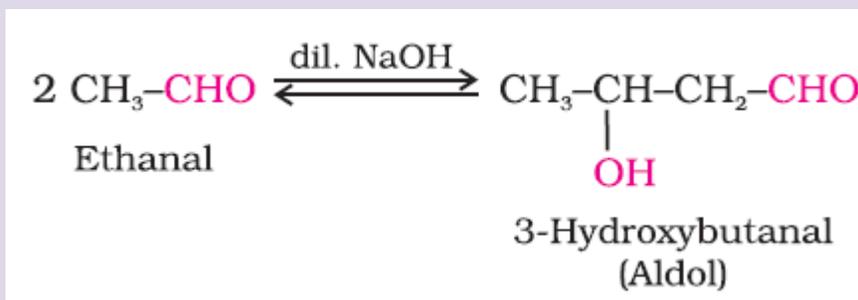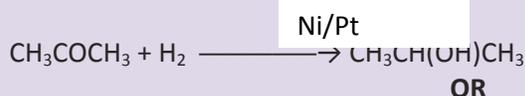
(a)Compound C_8H_8O gives positive DNP and iodoform test indicates the presence of CH_3CO- group.   1

It does not reduce Tollen's or Fehling's reagent which indicates the presence of ketonic functional group.

1

On oxidation with chromic acid, it gives a carboxylic acid (B) with molecular formula $C_7H_6O_2$. Therefore compound A is $C_6H_5COCH_3$ and compound B is C_6H_5COOH.   1

Complete the following reactions by identifying A, B and C.

i) $(CH_3)_2CH\text{-}COCl + H_2(g) \xrightarrow{Pd/BaSO4} (CH_3)_2CH\text{-}CHO$ 1

ii) $2HCHO + conc.\ NaOH \longrightarrow HCOONa + CH_3OH$ ½ + ½

25	

a) (i) Due to d - d transition   1 mark.

(ii) Due to presence of unpaired electron.   1 mark.

b) i) A= Na_2CrO_4 ; B= $k_2Cr_2O_7$ 1 mark

ii) Correct balance equation   2 mark

Or

(a) vacant (n-2) f subshell in Ce(IV).   1mark

(b) extra stability of Fe^{3+} than Mn^{3+} ion   1mark

(c) Due to lanthanoid contraction   1mark

d) lanthenoid   Actinoid

(i) Shows common   It shows common

    oxidation state of +3+4+5   oxidation state +3   1 mark

(ii) 4 f orbital   are filled   5f orbital are filled   1 mark

26 Mass of solution =volume x density   2mark

=1000 x 1.18

=1180g

Mass of water =1180 - 180

=1000g

$\therefore$ 1M C_2H_5OH = 1 m

$\Delta T_f = K_f m$

= 1.86 ×1 = 1.86

$T_f = T_f^\circ - \Delta T$

= 0 − 1.86 = −1.86°C

k

b) Henry's law   1 mark

Two application   1 mark

c) less than 1 or 1/4   1 mark

Or

(Ans a) $\pi = CRT = \dfrac{n}{V} RT$ 2 mark

Or 7.65 = $\dfrac{n}{V} \times 0.0821 \times (37 + 273K)$

$\dfrac{n}{V} = \dfrac{7.65}{0.0821 \times 310} = 0.30\ mol\ /L$

$\dfrac{n}{V} = \dfrac{moles}{litre}$ = Molarity = 0.30

b)   Definition   1 mark

c) 1M with reason   1 mark