

Blue print-- chemistry

Unit No.	Title	Marks
Unit I	Solid State	23
Unit II	Solutions	
Unit III	Electrochemistry	
Unit IV	Chemical Kinetics	
Unit V	Surface Chemistry	
Unit VI	General Principles and Processes of Isolation of Elements	19
Unit VII	p -Block Elements	
Unit VIII	d -and f -Block Elements	
Unit IX	Coordination Compounds	28
Unit X	Haloalkanes and Haloarenes	
Unit XI	Alcohols, Phenols and Ethers	
Unit XII	Aldehydes, Ketones and Carboxylic Acids	
Unit XIII	Organic Compounds containing Nitrogen	
Unit XIV	Biomolecules	
Unit XV	Polymers	
Unit XVI	Chemistry in Everyday Life	
	Total	70

QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Questions	Total Marks
VSA	1	5	05
SA-I	2	5	10
SA-II	3	12	36
VBQ	4	1	04
LA	5	3	15
Total		26	70

1. **Internal Choice:** *There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions of 5 marks weightage.*
2. *The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.*

CHEMISTRY WORKSHOP AT KV HIRANAGAR

GROUP: P C RAY

Class- XII

Sub-Chemistry

Time- 3 Hours

MM: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.

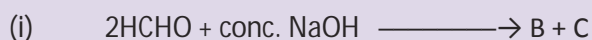
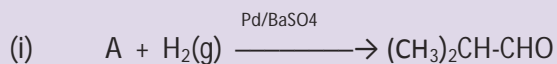
1	Define enantiomers with example.	1
2	Give IUPAC name of following compound. $C_6H_5NHCOCH_3$	1
3	Hydrolysis of ethyl acetate is slow initially but gradually it becomes faster why?	1
4	LiCl heated with potassium gave purple colour. Why?	1
5	Out of the ions given below which ions will have higher coagulating 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. b) Write the product of electrolysis at cathode and anode in aqueous NaCl	2

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). p-dichlorobenzene has higher melting point and lower solubility than o- and m-isomer. Explain? b) P^{K_a} value of phenol is higher than P-nitrophenol . Explain.	2
9	Give a chemical test to distinguish between following pair of compounds a) Ethanal and propanal b) 2-Methylpentan -2-ol and 2-Methylpentan -3-ol	2
10	<i>A reaction is of first order in reactant A and of second order in reactant B. How is the 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?</i>	2
11	a) What is the role of benzoyl peroxide in polymerization of Ethene? b) What is Biodegradable Polymer? Give one example?	3
12	i) Give mechanism of the following reaction $n\text{BuBr} + \text{NaCN} \xrightarrow{\text{EtOH} + \text{H}_2\text{O}} n\text{BuCN}$ ii) Grignard Reagents must be stored in anhydrous conditions , explain why ?	3
13	i) a) How can you convert amide into amine having one carbon less than in former one. Name the above reaction. b) Give I.U.P.A.C name and structure of amine if amide is 3-chlorobutanamide. ii) Arrange the following in increasing order of their basic strength: $\text{C}_2\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NH}_2$, NH_3 , $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$ and $(\text{C}_2\text{H}_5)_2\text{NH}$	3
14	a) Write down the IUPAC name of $[\text{Co}(\text{NH}_3)\text{Cl}(\text{NO}_2)]\text{Cl}$ b) Name the isomerism exhibited by the following pair of coordination compounds: $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$ c) Give one chemical test to distinguish between these two compounds.	3
15	a) Why copper matte is put in silica lined converter? b) Outline the principle of refining of metal by following method: i) Electolytic refining ii) Mond's process	3
16	Classify synthetic detergents giving an example of each. Or, a) What are antacids .explain with 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	<p>a) Arrange the following in increasing order of their acidic strength. Give reason HClO_3, HClO_4, HClO_2, HClO</p> <p>b) Nitrate compound after heating with H_2SO_4 and Cu turnings gave brown coloured gas name the gas and give reaction involved.</p>	3
18	<p>Write balanced equations for the following:</p> <p>(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+}?</p>	3
19	<p>The time required for 10% completion of a first order reaction at 298K is equal to time required for its 25% completion at 308K. If the value of frequency factor is $4 \times 10^{10} \text{ s}^{-1}$. Calculate value of k at 318K and activation energy.</p>	3
20	<p>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 flow in the cell? b) What is cathodic protection of iron from corrosion?</p>	3
21	<p>i) Define the following term : a) Peptisation b) Dialysis ii) Why Brownian movement takes place in colloidal solution?</p>	3
22	<p>a) An element X with an atomic mass of 60g/mol has density of 6.23 g cm^{-3}. If the edge length of its cubic unit cell is 400 pm, identify the type of cubic unit cell. b) What makes a glass different from a solid such as quartz? Under what condition quartz could be converted into glass?</p>	3
23	<p>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</p> <p>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?</p>	4
24	<p>(a) An organic compound 'A' with molecular formula $\text{C}_5\text{H}_8\text{O}_2$ 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.</p> <p>(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</p>	5
OR		
<p>(a) An organic compound (A) having molecular formula $\text{C}_8\text{H}_8\text{O}$ 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 $\text{C}_7\text{H}_6\text{O}_2$. Deduce the structures of 'A' and 'B'.</p>		

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



25

5

Explain following.

- a) d- block elements form colored compounds.
- b) d- block elements or their compounds are very good catalyst.
- c) Mixed oxide of iron and Chromium $FeO.Cr_2O_3$ 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

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- a) Density of 1 M soln of glucose $1.18g/cm^3$. K_f for H_2O is $1.86 K m^{-1}$. 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 $37^\circ C$. 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	Correct definition and example	½+½ mark.
2	Correct name	1 mark
3	Due to formation of acetic acid which gives H ⁺ ion. This H ⁺ ion act as outo catalyst -	1 mark.
4	Due to formation of F centre -	1 mark
5	Al ³⁺	1 mark
6	a) Alone 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.	1 mark
	b) H ₃ PO ₃	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) The p-isomer being more symmetrical fits directly in the crystal lattice and thus has stronger inter molecular forces of attraction than o- and m- isomers. During melting or dissolution, the crystal lattice breaks. Therefore, a large amount of energy is needed to melt or dissolve the p-isomer than the resultant o- and m- isomers.	1 mark
	B) PKa = -log Ka higher value of means lower value of PKa correct explanation	½ mark ½ mark
9	(i) Iodoform – Ethanal +ve , Propanal - -ve (ii) Any test to distinguish b/w 2 ^o & 3 ^o alcohol	1 mark. 1 mark
10	Rate = [A][B] ² i) New rate = 9 Rate ii) New Rate = 8 rate	1 mark 1 mark
11	a) Production of free radical which initiates polymerisation b) Definition of Biodegradable polymer Any one example	1 mark 1 mark 1 mark
12	a) Correct mechanism in three steps b) Correct explanation	2 mark 1 mark
13	i) Hoffman's Bromamide reaction Correct name	1 mark. 1 mark
	ii) C ₆ H ₅ NH ₂ < NH ₃ < C ₆ H ₅ CH ₂ NH ₂ < C ₂ H ₅ NH ₂ < (C ₂ H ₅) ₂ NH	1 mark
14	a) Tetraamminechloridonitro-N-Cobalt(III) Chloride (b) ionisation isomerism (c) BaCl ₂ test and AgNO ₃ test	1 mark. 1 mark. 1 mark.
15	a) (i) The role of Silica is to remove ferrous oxide as slag b) (i) Electolysis/explanation (ii) vapour phase refining/explanation	1 mark 1 mark 1 mark
16	Classification of synthetic detergent into	

	(i) Cationic + example	1 mark
	(ii) Anionic + example	1 mark
	(iii) Neutral + example	1 mark
	or,	
	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) $\text{HClO}_4 > \text{HClO}_3 > \text{HClO}_2 > \text{HClO}$ -	1 mark
	Explanation	1/2mark
	b) Due to formation of NO_2 gas	1/2mark
	Chemical equation	1 mark
18	Correct equation	$1 \times 3 = 3$ mark
19	$E_a = 76.640 \text{ kJ/mol}$ $K = 1.035 \times 10^{-2}$	1.5 mark 1.5 mark
20	a) 107.87 gm of silver is deposited by = 96500 C 1 " " " = 96500 / 107.87 1.5 " " " = 96500 X 1.5 / 107.87 Total charge passed = 1341.89C - $Q = IT$ T = 894.59 sec	1 mark 1 mark 1 mark 1 mark
	b) definition	1 mark
21	i) (a) Correct defination (b) Correct defination ii) Correct explanation	1 mark 1 mark 1 mark
22	a) Given ; $d = 6.23 \text{ g cm}^{-3}$ $M = 60 \text{ g/mol}$ $a = 400 \text{ pm} = 4 \times 10^{-8} \text{ cm}$ $z = ?$1/2 mark.
	we know that $d = \frac{Mz}{a^3 N_A}$ $z = \frac{d \cdot a^3 \cdot N_A}{M}$	1/2 mark.
	$= \frac{6.23 \times 64 \times 10^{-24} \times 6.023 \times 10^{23}}{60}$ $= 4.0018$	1/2 mark.
	$Z = 4$ (fcc structure).....	1/2 mark.
	a) Glass is amorphous solid whereas quartz is a crystalline solid	1/2 mark.
	When molten quartz cool rapidly	1/2 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. b) Cod liver oil, butter, milk, eggs, liver and meat. 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.	(2) (1) (1)
24	(a) A is a straight chain organic compound with carbonyl functional group. Formation of dioxime suggests the presence of two carbonyl groups. It is positive towards iodoform test which indicates presence of CH_3CO - group	1/2 1/2

Positive tollens reagent test indicates the presence of -CHO group.

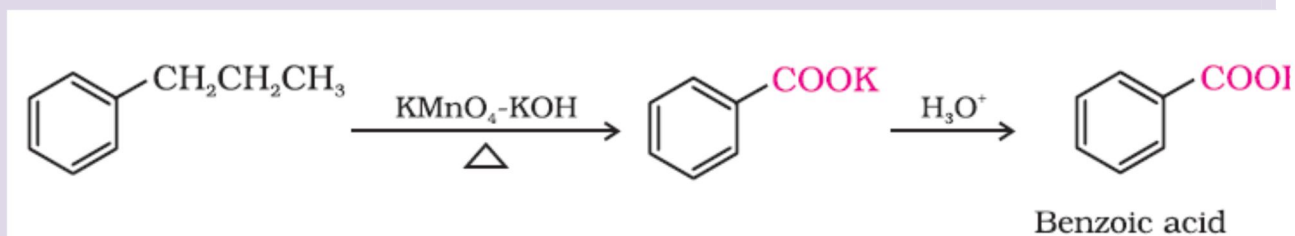
Therefore the organic compound is 4-oxo pentanal

(b) (i) n-propyl benzene to benzoic acid

1/2

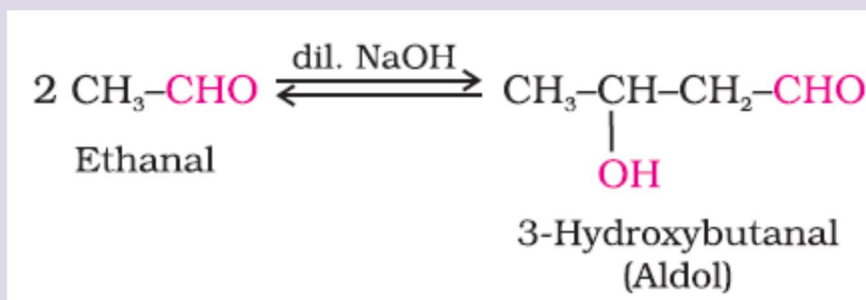
1/2

1 mark.



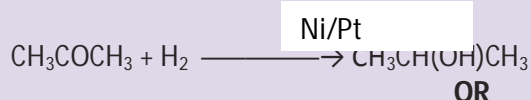
(ii) Acetaldehyde to 3-hydroxy butanal

1 mark.



(ii) Acetone to propan-2-ol

1 mark.



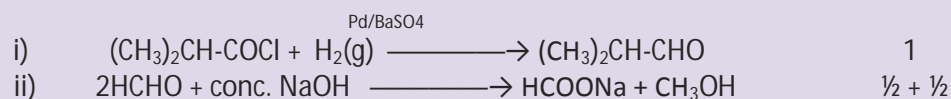
(a) Compound $\text{C}_8\text{H}_8\text{O}$ gives positive DNP and iodoform test indicates the presence of $\text{CH}_3\text{CO-}$ group. 1
It does not reduce Tollen's or Fehling's reagent which indicates the presence of ketonic functional group.

1

On oxidation with chromic acid, it gives a carboxylic acid (B) with molecular formula $\text{C}_7\text{H}_6\text{O}_2$. Therefore compound A is $\text{C}_6\text{H}_5\text{COCH}_3$ and compound B is $\text{C}_6\text{H}_5\text{COOH}$.

1

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



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 = $\text{K}_2\text{Cr}_2\text{O}_7$

1 mark

ii) Correct balance equation

2 mark

Or

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

1 mark

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

1 mark

(c) Due to lanthanoid contraction

1mark

d) lanthanoid

Actinoid

- (i) Shows common oxidation state of +3+4+5
(ii) 4 f orbital are filled

It shows common oxidation state +3
5f orbital are filled

1 mark

1 mark

26

Mass of solution = volume x density

2mark

$$= 1000 \times 1.18$$

$$= 1180\text{g}$$

Mass of water = 1180 - 180

$$= 1000\text{g}$$

$$\therefore 1M \text{ C}_2\text{H}_5\text{OH} = 1 \text{ m}$$

$$\Delta T_f = K_f m$$

$$= 1.86 \times 1 = 1.86$$

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

$$= 0 - 1.86 = -1.86^\circ\text{C}$$

k

b) Henry's law

1 mark

Two application

1 mark

c) less than 1 or 1/4

1 mark

Or

$$\text{(Ans a) } \pi = \frac{CRT}{V} = \frac{n}{V} RT$$

2 mark

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

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

$$\frac{n}{V} = \frac{\text{moles}}{\text{litre}} = \text{Molarity} = 0.30$$

b) Definition

1 mark

c) 1M with reason

1 mark