

# WAKISSHA MOCK-2022 MARKING GUIDE by

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*Ssentamu*

P525/1  
CHEMISTRY  
Paper 1  
July/August  
2 1/4 hours



## WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education

CHEMISTRY  
Paper 1

2 hours 45 minutes

### Instructions to Candidates

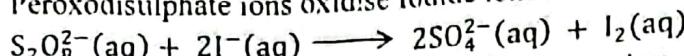
- Attempt all questions in section A and any six questions from section B.
- All questions are to be answered in the spaces provided.
- A Periodic Table with relevant atomic masses is supplied at the end of the paper.
- Mathematical tables (3 figures) and non-programmable silent scientific calculators may be used.
- Illustrate your answers with equations where applicable.
- Molar gas volume at s.t.p =  $22.4 \text{ dm}^3$

For Examiner's Use Only																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total

## SECTION A (46 MARKS)

Attempt all questions in this section.

1. Peroxodisulphate ions oxidise Iodide ions according to the equation:



The rate equation for the redox reaction is given by:

$$\text{Rate} = k[\text{S}_2\text{O}_8^{2-}] [\text{I}^-] \quad \text{at } 25^\circ\text{C}$$

(a) State two methods by which the rate of reaction above can be determined. (1 mark)

- i). By chemical analysis (Titration) .... iii). Titrimetry ..... 01  
 ii). By conductivity ..... Any two iv). Potentiometry

(b) State the effect of the following changes on the rate. In each case give a reason for your answer.

(i) Addition of Iron (II) sulphate solution to the reaction mixture. (1½ marks)

Rate of reaction increases since iron(II) sulphate solution serves as a catalyst for the reaction 1½

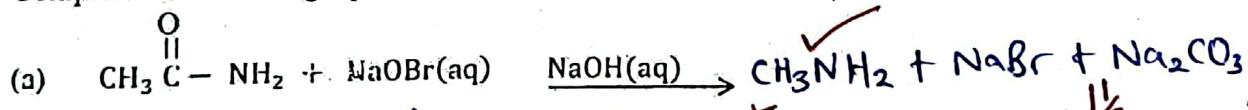
(ii) Doubling the concentration of peroxodisulphate ions while the concentration of Iodide ions is halved. (1½ marks)

The rate of reaction remains constant because the order of reaction with respect to  $\text{S}_2\text{O}_8^{2-}$  and  $\text{I}^-$  Iodide ions is 1 for each.

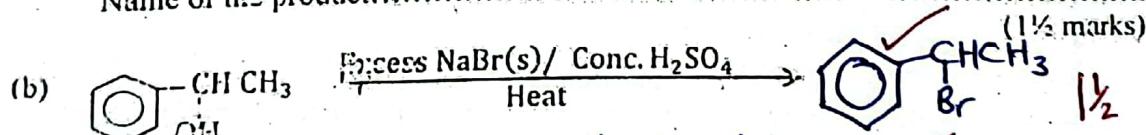
(iii) Using ice-cold solutions of both reactants. (1½ marks)

The rate of reaction decreases since ice-cold conditions (decrease in temperature) decreases the kinetic energy of the reacting molecules decreasing their velocity and consequently their rate of collision.

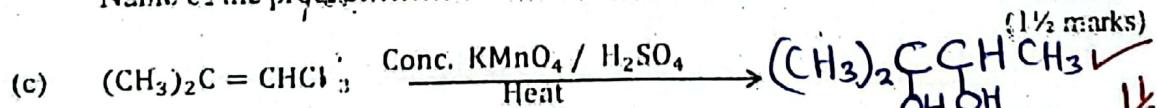
2. Complete the following equations and in each case name the main organic product.



Name of the product... Aminomethane ✓



Name of the product... 1-bromo-1-phenylethane ✓



Name of the product(s)... 2-methylbutane-2,3-diol ✓

3. A Manganese is a transition element which forms stable compounds in oxidation states +2, +4 and +7.

(a) Write the formula of the oxide of manganese in oxidation state; (1½ marks)

(i) +2: .....  $MnO$  ✓ ..... 1½

(ii) +4: .....  $MnO_2$  ✓ ..... 1½

(iii) +7: .....  $Mn_2O_7$  ✓ ..... 1½

(b) Write an equation for the reaction that takes place between:

(i) oxide in +2 and dilute sulphuric acid. (01 mark)



(ii) hot concentrated hydrochloric acid and the oxide in +4. (01 mark)



(iii) oxide in +7 and dilute sodium hydroxide solution. (01 mark)



(Rejected with equation unbalanced).

4. Methanoic acid in an organic solvent such as benzene dimerises.

(a) State the;

(i) type of bonds between the acid molecules in benzene. (½ mark)

..... Intermolecular hydrogen bonds ✓ ..... ½

(ii) observed relative formula mass of methanoic acid. (½ mark)

..... R.F.M = 92 ✓ ..... ½

(b) The vapour pressure of pure benzene at 30°C is 122mmHg. Calculate the vapour pressure of a solution containing 0.092g of methanoic acid in 156g of benzene at 30°C. (2½ marks)

$$\frac{P^o - P}{P^o} = \frac{m_B \cdot m_A}{m_B + m_A} \quad P = 122 - 0.122 \\ P = 121.878 \text{ mmHg}$$

$$\frac{122 - P}{122} = \frac{0.092}{46} \times \frac{78}{156} \quad 2\frac{1}{2}$$

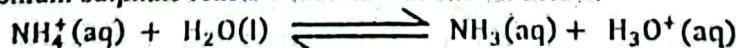
$$122 - P = 122 \times 0.092 \times \frac{78}{46 \times 156} \quad 2\frac{1}{2}$$

$$122 - P = 0.122 \quad 2\frac{1}{2}$$

(c) Compare your answer in (b) above with the vapour pressure of pure benzene at 30°C. State the reason for your answer. (1½ marks)

The vapour pressure of the solution is lower than that of pure benzene since the molecules of ethanoic acid being non volatile occupy part of the surface of benzene solvent hindering the escaping tendency hence decreasing the vapour pressure.

5. Ammonium sulphate reacts with water as shown below.



The pH of an aqueous solution of ammonium sulphate was found to be 6.24 at 25°C.

Turn Over

Calculate the;

(1/2 marks)

- (a) (i) concentration of hydroxonium ions in the solution.

$$pH = 6.24$$

$$-\log [H_3O^+] = 6.24 \quad \checkmark$$

$$[H_3O^+] = 10^{-6.24} \quad \checkmark$$

1/2

- (ii) concentration of gdm<sup>-3</sup> of ammonium sulphate in the solution.

(K<sub>b</sub> for ammonia at 25°C is  $1.78 \times 10^{-5}$  moldm<sup>-3</sup>)

(03 marks)

$$K_h = \frac{K_w}{K_b}$$

$$K_h = \frac{[H_3O^+]}{C}$$

$$K_h = \frac{1 \times 10^{-14}}{1.78 \times 10^{-5}}$$

$$C = \frac{[H_3O^+]}{K_h}$$

03

$$K_h = 5.62 \times 10^{-10}$$

$$C = \frac{(5.75 \times 10^{-7})^2}{5.62 \times 10^{-10}}$$

$$K_h = \frac{[NH_3][H_3O^+]}{[NH_4^+]}$$

$$C = 5.883 \times 10^{-4} M$$

- (b) (i) State what would happen to the pH of the solution in (a) if an equimolar solution of aqueous ammonia is added to it. (1/2 mark)

The pH remains constant ✓

1/2

- (ii) Give a reason for your answer in b (i). (1 mark)

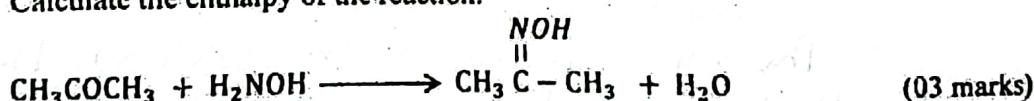
It's because the aqueous ammonia solution added reacts with hydroxonium ions to form water molecules. Therefore more ammonium ions hydrolyse to form back hydroxonium ions hence pH remains constant.

6. (a) Define the term bond dissociation energy. (1 mark)

Bond dissociation energy is the minimum energy required to break one mole of covalent bond to form free gaseous atoms.

- (b) The bond energies of; C = O, N - H, C = N and O - H are 799, 391, 615 and 463 KJ/mol<sup>-1</sup> respectively.

Calculate the enthalpy of the reaction.



$$\Delta H = \sum (\beta \cdot E_{\text{reactants}}) - \sum (\beta \cdot E_{\text{products}}) \quad \checkmark$$

$$= (2 \times C=O + 6 \times C-H + C=N + N-O + 3 \times O-H) - (2 \times C + 6 \times H + C=O + 2 \times N-H + N-O + O-H)$$

$$= (615 + 3(463)) - (799 + 2(391) + 463) \quad \checkmark \quad 03$$

$$= 2004 - 2044$$

Accept any other approach and award accordingly.

$$= -40 \text{ kJ/mol} \quad \checkmark$$

Chlorine forms oxo acids of the formulae;  $\text{HOCl}$ ,  $\text{HClO}_2$ ,  $\text{HClO}_3$  and  $\text{HClO}_4$ .

- (a) State how acid strength of the oxo acids varies with oxidation state of chlorine. (01 mark)

The acid strength of the oxo acids increases with increase in the acid ~~the~~ oxidation state of chlorine. 01

(03 marks)

- (b) Explain your answer in (a).

This is because the increase in oxidation state is caused by increase in the number of oxygen atoms in the oxo acids. 03

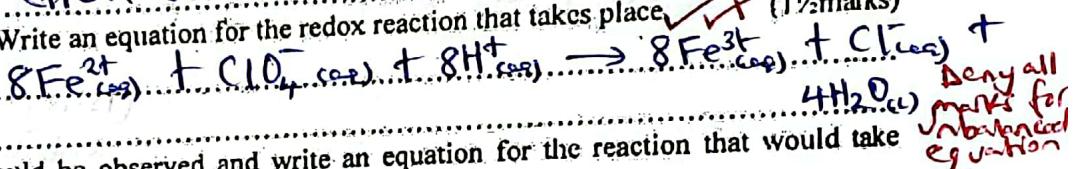
The increase in number of oxygen atoms causes the weakening of the hydrogen-chlorine bonds, weakening them due to high electronegativity of oxygen. Increasing electron displacement towards oxygen hence making release of hydrogen ions easy.

- (c) A solution containing  $\text{HClO}_4$  was added to 1M sulphuric acid followed by Iron (II) sulphate solution.

- (i) State what was observed.

Green solution turns to yellow solution. 1½ mark (Deny ½ if green is missing)

- (ii) Write an equation for the redox reaction that takes place.



Deny all marks for unbalanced equation

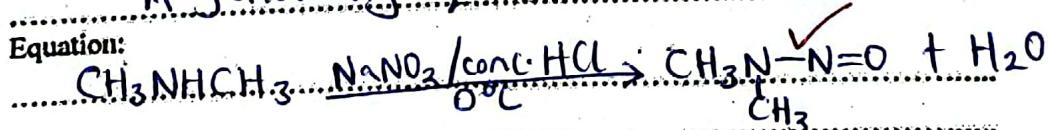
8. State what would be observed and write an equation for the reaction that would take place when each of the following substances are mixed.

- (a) Diethylamine and ice-cold sodium nitrite in the presence of concentrated hydrochloric acid. (1½ marks)

Observation:

A yellow oily liquid. 1½

Equation:

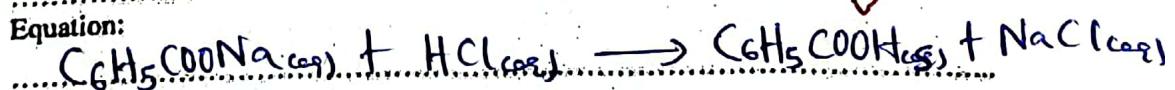


- (b) Sodium benzoate solution and dilute hydrochloric acid. (1½ marks)

Observation: A white solid.

1½

Equation:



- (c) Benzene diazonium chloride and phenol in alkaline medium. (02 marks)

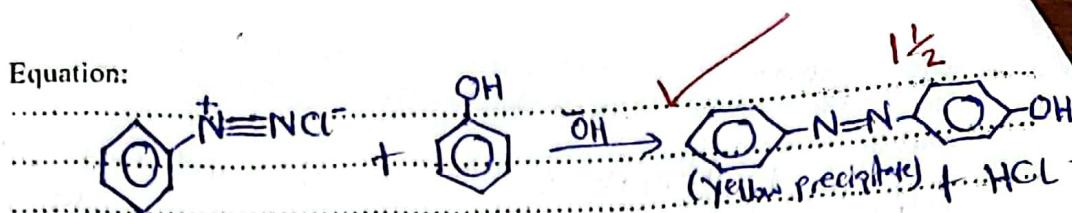
Observation: A yellow precipitate.

A coagt. (yellow-orange precipitate).

Turn Over

5

Equation:



1. Tin and carbon belong to group IV of the periodic table.

(a) Write the:

(i) formulae of stable chlorides of Tin and Carbon.

~~CCl<sub>4</sub>~~, SnCl<sub>4</sub>, SnCl<sub>2</sub>

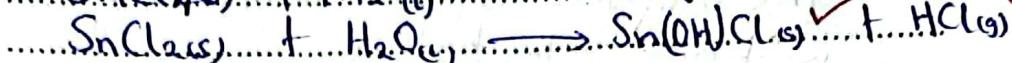
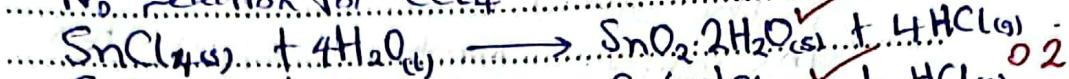
(ii) equation for the reaction of the chlorides in (a)(i) above with water.

(1½ marks)

1½

(02 marks)

No reaction for CCl<sub>4</sub>.



- (b) Excess acidified Tin (II) sulphate solution was added to potassium dichromate solution.

(i) State what was observed.

The orange solution turns to a green solution. → for missing orange solution

(ii) Write an equation for the redox reaction that took place.

(01 marks)



(Deny full marks for unbalanced equation)

## SECTION B (54 MARKS)

Attempt any six questions from this section.

10. (a) What is meant by the term cell constant? (01 mark)

~~Cell constant is the ratio of the distance between two electrodes to the cross sectional area of the electrodes in a cell.~~

- (b) The molar conductivity of 0.05M of Magnesium chloride placed between electrodes of cross sectional area  $1.25664 \times 10^{-3} \text{ m}^2$  and 0.12m apart is  $0.01945 \Omega^{-1} \text{ m}^2 \text{ mol}^{-1}$ . When 0.05M Barium chloride solution is placed in the same cell, the resistance was 93.92 $\Omega$ . Calculate the;

- (i) cell constant. (01 mark)

$$\frac{l}{A} = \frac{0.12}{1.25664 \times 10^{-3}} = 95.493 \text{ m}^{-1} \quad 0.1$$

- (ii) molar conductivity of 0.05M Barium chloride solution. (03 marks)

$$K = \frac{l}{1000 C} \quad K = \frac{93.92}{1000 \times 0.05} = 1.9167 \text{ m}^{-1} \quad 0.3$$

$$K = \frac{1.9167}{A} \quad A = 0.2033 \text{ m}^2 \text{ mol}^{-1}$$

- (c) (i) Compare the molar conductivities of the electrolytes in (b) above. (01 mark)

~~Molar conductivity of barium chloride ( $0.02033 \text{ m}^2 \text{ mol}^{-1}$ ) is higher than the molar conductivity of magnesium chloride ( $0.01945 \text{ m}^2 \text{ mol}^{-1}$ ).~~ 01

- (ii) Explain your answer. (03 marks)

~~This is because the magnesium ions in magnesium chloride have a small ionic radius and hence high charge density it therefore attracts a large shell of water molecules making it very large hence low mobility compared to the barium ions with the barium chloride with a large size hence low charge density hence high mobility.~~ 3

11. Compound Q consists of carbon, 77.78%, hydrogen 7.41%, the rest being oxygen. When steam distilled at 95°C and 760mmHg, the distillate contained 53.18% by mass of Q, the vapour pressure of water is 639mmHg.

- (a) Determine the;

- (i) empirical formula of Q. (02 marks)

Elements	C	H	O
composition	77.78	7.41	14.81
moles	$\frac{77.78}{12}$	$\frac{7.41}{1}$	$\frac{14.81}{16}$

Turn Over

$$\text{mole ratio } \frac{6.48}{0.925625} : \frac{7.41}{0.925625} : \frac{0.925625}{0.925625} \quad E: F = C_7 H_8 O$$

2

(03 marks)

(ii) molecular formula of Q.

$$\frac{M_Q}{M_{H_2O}} = \frac{P^o_{H_2O} \cdot M_Q}{P^o_{H_2O} \cdot M_{H_2O}} \quad \frac{53.18}{46.82} = \frac{121 \times M_Q}{639 \times 18}$$

$$P^o_{H_2O} = 639 \text{ mmHg}$$

$$P^o_{Q} = 7.60 - 639$$

$$= 121 \text{ mmHg}$$

$$\frac{53.18}{46.82} = \frac{121 \times M_Q}{639 \times 18}$$

$$M_Q = \frac{53.18 \times 639 \times 18}{46.82 \times 121}$$

$$= 107.97$$

$$M_Q = 107.97$$

$$M_Q = 107.97$$

3

- (b) Q burns with a sooty flame and gives no observable change with neutral Iron (III) chloride solution. Q reacts with ethanoic acid to form a sweet fruity smelling compound.

Write the:

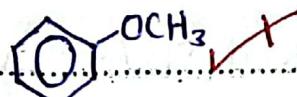
(01 mark)

- (i) structural formula and IUPAC name of Q.



1

- (ii) structural formula of an isomer of Q which does not react with sodium metal.



X

- (c) Q was added to concentrated hydrochloric acid in the presence of anhydrous Zinc chloride and the mixture warmed.

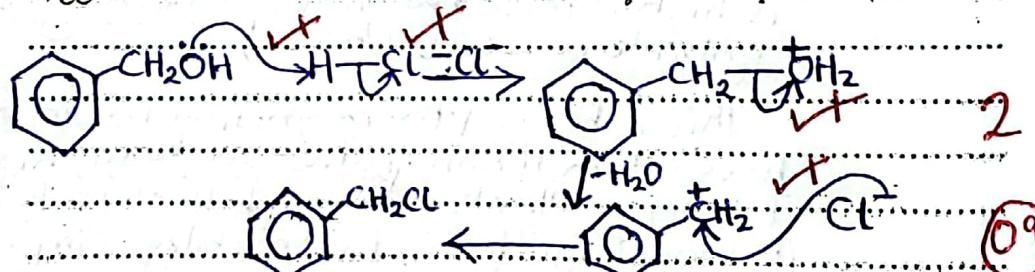
- (i) State what was observed.

(½ mark)

A cloudy solution is formed on warming.

½

- (ii) Suggest a suitable mechanism for the reaction that takes place. (02 marks)



09

12. (a) Na, Al and P belong to period 3 of the Periodic Table. Write the formulae of the chlorides of each element and state the type of bond in the table below. (3½ marks)

Element	Na	Al	P
Formula(e) of chloride	NaCl	AlCl <sub>3</sub>	PCl <sub>3</sub> , PCl <sub>5</sub>
Type of bond	Ionic	Ionic	Covalent

8

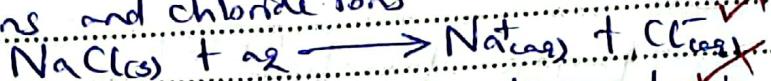
- (b) State the trend in melting points of the chlorides in (a) above.  
 Explain your answer.

(2½ marks)

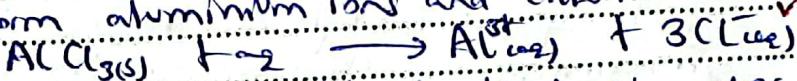
The melting points of the chlorides decrease from the chloride of sodium through that of aluminium to the chloride of phosphorus. Sodium and aluminium are metals hence ionic chlorides. The cationic radius of the metal ions in the chlorides decreases from sodium to aluminium hence an increase in the polarising power of the cations. Hence sodium chloride with very low polarising power has short electrostatic forces of attraction hence highest melting point compared to aluminium chloride. Phosphorus pentachloride however is covalent with molecules held by weak van der waals forces which are very weak hence low melting point (03 marks) point

- (c) Describe the reaction of the chlorides of Na, Al and P with water.

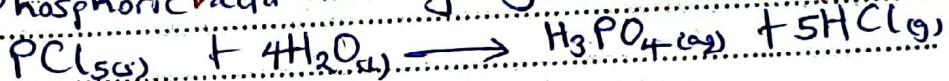
Sodium chloride dissociates in water to form Sodium ions and chloride ions



Aluminium chloride also dissociates in water to form aluminium ions and chloride ions



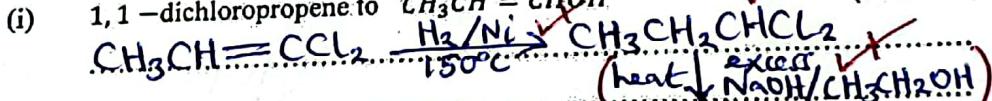
Phosphorus pentachloride dissolves in water to form phosphoric acid and hydrogen chloride gas.



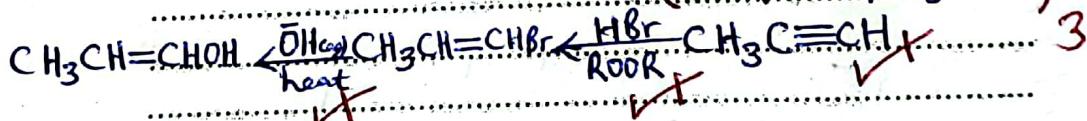
(09) 3

13. (a) Use equations to show the following conversions can be effected.

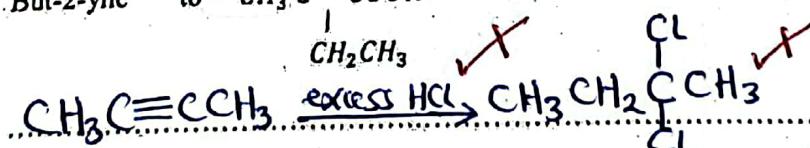
- (i) 1,1-dichloropropene to  $\text{CH}_3\text{CH}=\text{CHOH}$



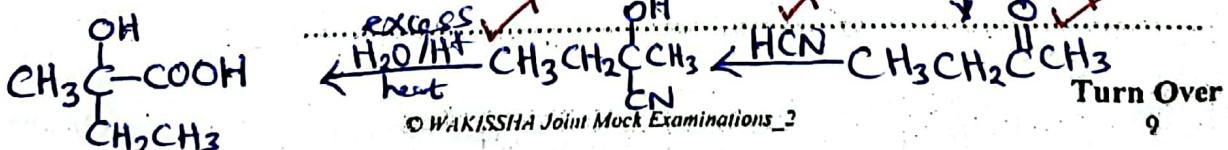
(heat) excess  $\downarrow \text{NaOH}/(\text{CH}_3\text{CH}_2\text{OH})$



- (ii) But-2-yne to  $\text{CH}_3\text{C}(\text{CH}_3)-\text{COOH}$



heat  $\downarrow 2\text{KOH(aq)}$



Turn Over

- (b) Without using equations describe how 2-bromoethanol can be synthesized from ethanoic acid. (03 marks)

Ethanoic acid is reduced by excess lithium aluminium tetrahydride in dry ether to form ethanol.  
Ethanol is heated with excess concentrated sulphuric acid at  $180^{\circ}\text{C}$  to form ethene.  
Ethene is reacted with bromine water to form 2-bromoethanol. (No more marks awarded after 2-bromoethanol. Any wrong conditions or product is given)

(09)

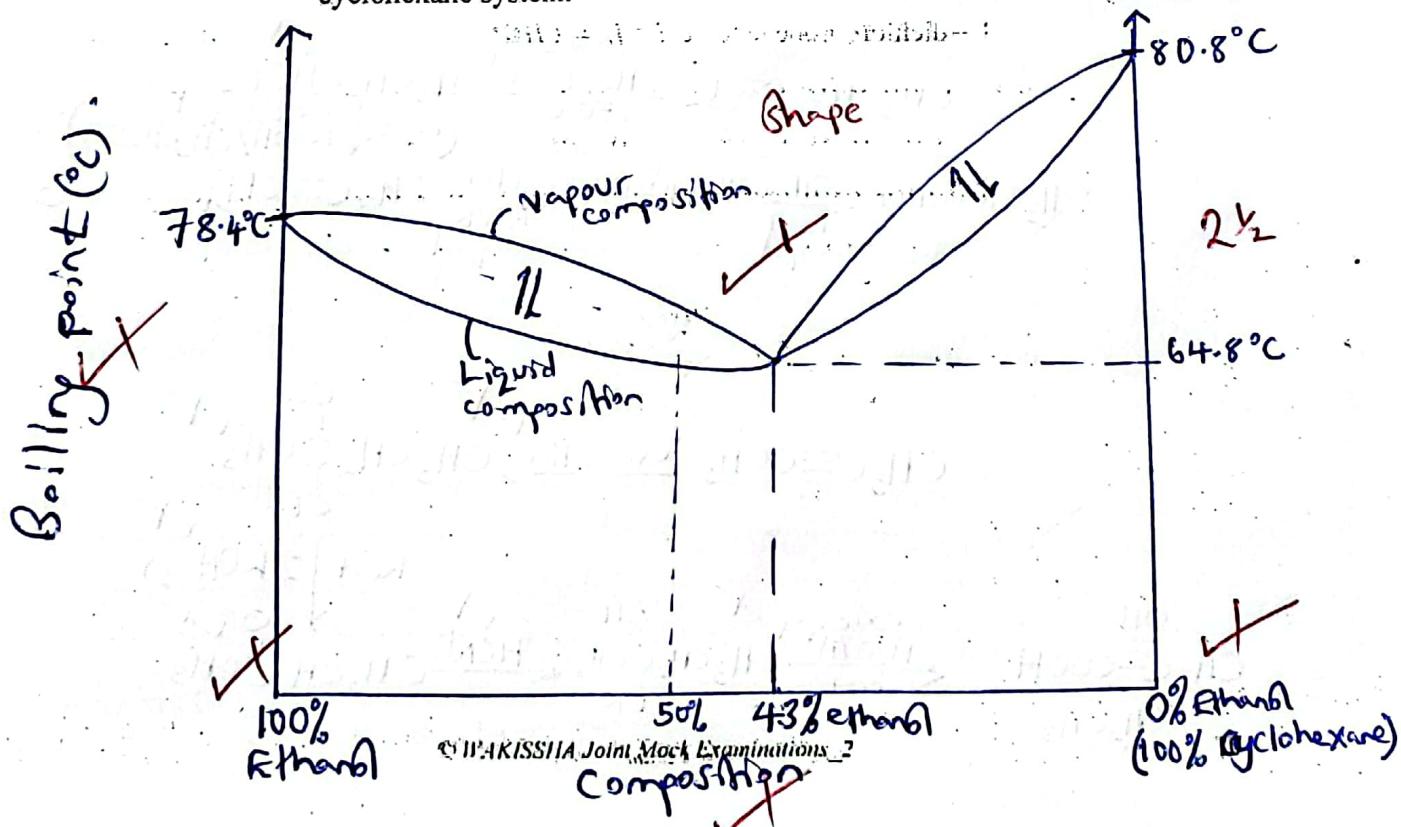
14. Ethanol and cyclohexane boil at  $78.4^{\circ}\text{C}$  and  $80.8^{\circ}\text{C}$  respectively at  $760\text{mmHg}$  while an azeotropic mixture (43% ethanol and 57% cyclohexane) boils at  $64.8^{\circ}\text{C}$ . (01 mark)

- (a) (i) Define the term azeotropic mixture. Azeotropic mixture is a liquid mixture which when heated at constant pressure boils at constant temperature to give off vapour of same composition as the liquid.
- (ii) State the type of deviation from Raoult's law in the ethanol-cyclohexane system. Explain your answer. (2½ marks)

Positive deviation ✓

This is because the mixture has a minimum boiling point and hence the eamixture has a maximum vapour pressure in the vapour pressure composition diagram than that expected from Raoult's law hence deviating positively.

- (b) (i) Sketch a well-labelled boiling point composition diagram for ethanol-cyclohexane system. (2½ marks)



- (ii) State the products of fractional distillation of a liquid mixture containing 50% ethanol. (02 marks)

Dishilate is Azeotrope (43% ethanol 57% cyclohexane)  
Residue is pure ethanol. 2

- (c) State any two methods by which the azeotropic mixture of ethanol and cyclohexane can be separated. (01 mark)

- Distillation using a third component (Azeotropic distillation)  
- Separation by Adsorption  
- Solvent extraction 1

15. (a) Name the reagent that can be used to distinguish between each of the following pairs of substances. State what would be observed in each case.

- (i)  $\text{NiCO}_3(s)$  and  $\text{BaCO}_3(s)$  (02 marks)

Reagent:

(Dilute nitric acid and sodium hydroxide solution) 02

Observations:

$\text{NiCO}_3(s)$  → Bubbles of colourless gas and green precipitate insoluble

$\text{BaCO}_3(s)$  → Bubbles of colourless gas and white precipitate insoluble

- (ii)  $\text{KI(aq)}$  and  $\text{NaBr(aq)}$  (02 marks)

Reagent:

(Dilute nitric acid, silver nitrate solution and ammonia solution)

Observations:

$\text{KI}$  - Yellow precipitate insoluble in acid and insoluble in ammonia solution

$\text{NaBr}$  - Pale yellow precipitate insoluble in acid but slightly soluble in ammonia solution.

- (b) Explain why;

- (i) a white precipitate is formed in a brown solution when potassium iodide solution is added to an aqueous solution of Copper (II) chloride. (2½ marks)

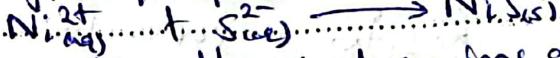
The copper (II) ions in copper (II) chloride oxidise the iodide ions in potassium iodide solution to iodine solution which is a brown solution while the copper (II) ions are reduced to copper (I) iodide which is a white precipitate. 2½

- (ii) there is no observable change when hydrogen sulphide gas is bubbled into acidified Nickel (II) sulphate solution. (2½ marks)

Hydrogen sulphide ionises in aqueous solution to release sulphide ions according to equation  
 $\text{H}_2\text{S(aq)} \rightarrow 2\text{H}^+(\text{aq}) + \text{S}^{2-}$

Turn Over

The  $\text{S}^{2-}$  ions in solution are meant to react with nickel (II) ions to form nickel (II) sulphide which is a green precipitate.

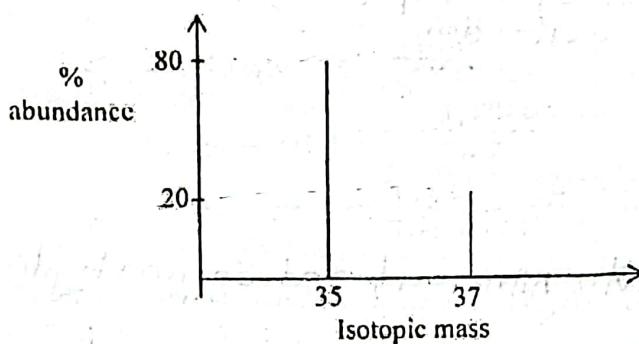


In acidic medium the hydrogen ions are in high concentration hence react with sulphide ions to form hydrogen sulphide. Reductive sulphide ion concentration hence  $K_{sp}$  of nickel (II) sulphide isn't reached hence no precipitation.

(a)

The mass spectrum of chlorine atoms is shown in the figure below.

(09)



- (i) Name the most abundant isotope of chlorine. (01 mark)

Chlorine-35 ✓

01

- (ii) Calculate the average relative atomic mass of chlorine. (02 marks)

$$\text{R.A.M} = \frac{\sum (\% \text{ abundance} \times \text{isotopic mass})}{100}$$

$$= \frac{(80 \times 35 + 20 \times 37)}{100}$$

$$= 35.4$$

- (b) Explain why the mass spectrum of chlorine gas has three peaks. (04 marks)

It's because chlorine gas is a diatomic molecule and hence will show three peaks at

04

70 due to  $^{35}\text{Cl}^{35}\text{Cl}$  (35 + 35)

72 due to  $^{35}\text{Cl}^{37}\text{Cl}$  (35 + 37)

74 due to  $^{37}\text{Cl}^{37}\text{Cl}$  (37 + 37)

- (c) State two advantages of using the mass spectrometer to determine relative atomic mass of elements. (02 marks)

- i) It is very accurate method in determining relative atomic mass.

02

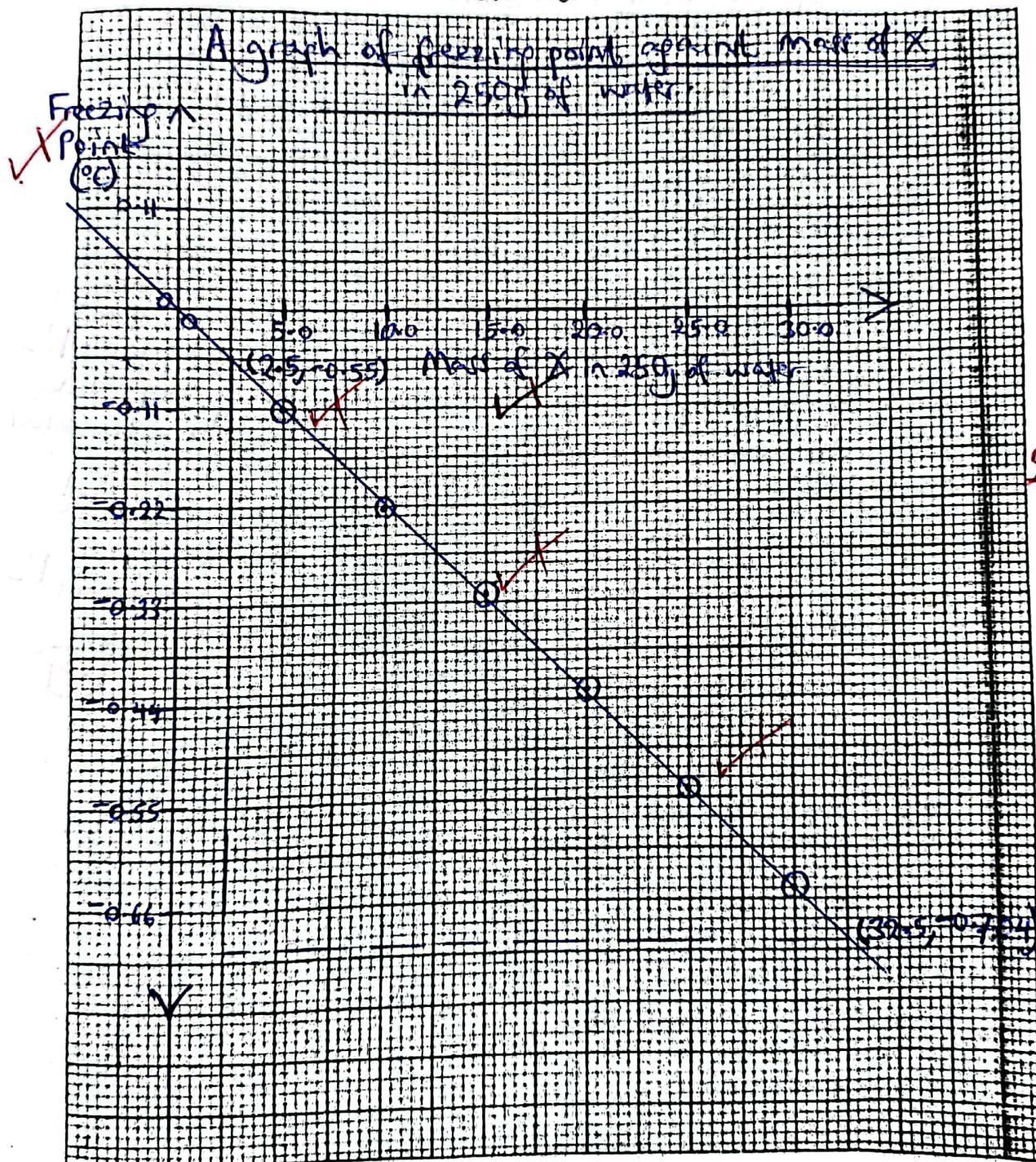
- ii) Only a small amount of the sample is required.

(09)

17. Different masses of a non-volatile compound X were separately dissolved in 250g of water at 101.325 Kpa and the freezing point of the resultant solution measured.

Mass of X in 250g of water (g)	5.0	10.0	15.0	20.0	25.0	30.0
Freezing point ( $^{\circ}\text{C}$ )	-0.11	-0.22	-0.32	-0.43	-0.54	-0.65

- (a) (i) Plot a graph of freezing point against mass of X in 250g of water. (2½ marks)



2½

Use your graph to determine the;  
(ii) freezing point of pure water.

(01 mark)

.....Freezing point is  $0^{\circ}\text{C}$  ✓  
(Award if A has been graphically obtained)

(iii) molar mass of compound X.

(2½ marks)

(cryoscopic constant of water is  $1.86^{\circ}\text{C Kg}^{-1} \text{mol}^{-1}$ )

$$\text{Slope} = \frac{-0.704 - 0.55}{32.5 - 2.5} \quad (\text{Accept slope } (-0.00633 \pm 0.0001))$$

$$\text{Slope} = -0.00633 \quad M_r = 293.84$$

$$\text{From Slope} = -\frac{K_b}{M_r} \quad \approx 294$$

$$-0.00633 = \frac{1.86}{M_r}$$

$$M_r = \frac{1.86}{0.00633}$$

(b) Explain why cryoscopy is not a suitable method to determine the molar mass of;

(i) ionic compounds with water as a solvent. (1½ marks)

.....Ionic compounds dissociate in water to form more solute particles (ions). In water and since (i) ligative property depends on number of non volatile solute particles, the calculated molar mass is always lower than the actual

(ii) short chain carboxylic acids dissolved in hexane. (1½ marks)

.....Short chain carboxylic acids tend to associate in organic solvents like hexane via intermolecular hydrogen bonds decreasing their number in the solvent and hence their calculated molar molecular mass increases ✓

(09)

# THE PERIODIC TABLE

1	2													3	4	5	6	7	8										
1 H 1.0																		1 H 1.0	2 He 4.0										
3 Li 6.9	4 Be 9.0													3 B 10.8	6 C 12.0	7 N 14.0	8 O 16.0	9 F 19.0	10 Ne 20.2										
11 Na 23.0	12 Mg 24.3													13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.4	18 Ar 40.0										
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.7	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8												
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc 98.9	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 108	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131												
55 Cs 133	56 Ba 137	57 La 139	72 Hf 178	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 Tl 204	82 Pb 207	83 Bi 209	84 Po (209)	85 At (210)	86 Rn (222)												
87 Fr (223)	88 Ra (226)	89 Ac (227)												57 La 139	58 Ce 140	59 Pr 141	60 Nd 144	61 Pm (145)	62 Sm 152	63 Eu 150	64 Gd 152	65 Tb 159	66 Dy 162	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175	
														89 Ac (227)	90 Th 232	91 Pa 233	92 U 238	93 Np 237	94 Pu (240)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf 251	99 Es (254)	100 Fm (257)	101 Md (256)	102 No (254)	103 Lw	

1. Indicates atomic number.
2. Indicates relative atomic mass.

END