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P525/1
CHEMISTRY
Paper 1
August 2023
2 $\frac{3}{4}$ hours.

Uganda Advanced Certificate of Education

END OF TERM TWO EXAMINATIONS

S.5 CHEMISTRY

Paper 1

2 hours 45 minutes

INSTRUCTIONS:

Answer **all** questions in this section **A** and **six** questions in section **B**.
Allanswers must be written in the spaces provided.
The Periodic Table, with relative atomic masses, is attached at the end of the paper.
Mathematical tables (3-figure tables) are adequate or non-programmable scientific electronic calculators may be used.
Illustrate your answers, with equations where applicable.
Where necessary, use the following;

Molar gas constant, R=8.31 $JK^{-1}mol^{-1}$.
Molar volume of a gas at s.t.p is 22.4 litres.
Standard temperature = 273K.
Standard pressure = $101325Nm^{-2}$

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

SECTION A (46 MARKS)

Answer **all** *questions in this section.*

1. (a) Complete the following equations.

(i) $^{27}_{13}Al + {}^{1}_{0}n \longrightarrow \beta + {}^{28}_{14}Si$ ✓ 01 (01 mark)

Rej; Wrong chemical Symbol of Silicon eg Si

(ii) $4\,{}^{1}_{1}H \longrightarrow {}^{4}_{2}He + 2\,{}^{0}_{+1}e$ ✓ 01 (01 mark)

(iii) $^{239}_{92}U \longrightarrow {}^{239}_{91}U + {}^{0}_{+1}e$ ✓ 01 (01 mark)

Rej; ^{0}e ← without charge

b) The half-life of a radioactive element **Z** is 36 years. After how many years will the substance take to decay to 25%. (02 marks)

$t_{\frac{1}{2}} = \frac{\ln 2}{K}$

$36 = \frac{0.693}{K}$ ✓

$K = 0.01925\ year^{-1}$

$N_o = 100,\ N_t = 25$

From $\ln\left(\frac{N_o}{N_t}\right) = Kt$ ✓

$\ln\left(\frac{100}{25}\right) = 0.01925t$

$t = 72$ years ✓ 02

2. An organic compound, **R** has the structure;

$$CH_3CH = CHC \equiv CH$$

(a) Name the functional groups present in **R**. (01 mark)

Carbon – Carbon double bond. ✓

Carbon – Carbon triple bond. ✓ 01

Rej; tripple

(b) Write equation for the reaction between **R** and:

(i) alkaline potassium manganate(vii) solution. (01 mark)

$CH_3CH=CHC\equiv CH \xrightarrow{MnO_4^-(aq)\,|\,OH^-(aq)} CH_3CH(OH)-CH(OH)C\equiv CH$ ✓ 01

(ii) ammoniacal silver nitrate solution. (01 mark)

$CH_3CH=CHC\equiv CH + NH_3(aq) + AgNO_3(aq) \rightarrow CH_3CH=CHC\equiv CAg(s) + NH_4NO_3$ ✓ 01

(c) State what would be observed in (b) (i) and (ii) (02 marks)

(i)

Purple solution turns to a colourless solution. 01

(ii)

white precipitate. 01 05

3. (a) Write an equation for the reaction between hot concentrated sodium hydroxide solution and.

(i) Al_2O_3 (1 ½ marks)

$Al_2O_{3(s)} + 2\bar{O}H_{(aq)} + 3H_2O_{(l)} \longrightarrow 2Al(OH)_4^-{}_{(aq)}$ ½½ ½

(ii) Silicon (1 ½ marks)

$Si_{(s)} + 2\bar{O}H_{(aq)} + H_2O_{(l)} \longrightarrow SiO_3^{2-}{}_{(aq)} + H_{2(g)}$ ½½ ½

(iii) phosphorus (1 ½ marks)

$P_{4(s)} + 3\bar{O}H_{(aq)} + 3H_2O_{(l)} \longrightarrow 3H_2PO_2^-{}_{(aq)} + PH_{3(g)}$ ½½ ½

Accept if balanced { $P_{(s)} + \bar{O}H_{(aq)} + H_2O_{(l)} \longrightarrow H_2PO_2^-{}_{(aq)} + PH_{3(g)}$ }

(iv) aluminium powder (1 ½ marks)

$2Al_{(s)} + 2\bar{O}H_{(aq)} + 6H_2O_{(l)} \longrightarrow 2Al(OH)_4^-{}_{(aq)} + 3H_{2(g)}$ ½½ ½

06

For; Unbalanced equ = 00

Missing or wrong state symbol used. -½

4. (a) What is meant by relative abundance? (01 mark)

Is the relative intensity of each isotope of an element, expressed as a percentage or a ratio. (01)

Accept; Is the percentage of each isotope of a naturally occuring element

(b) Bromine has two naturally occurring isotopes with isotopic masses and relative abundances as shown below.

Isotopic mass	Relative abundance
79	50.5
81	49.3

(i) Bromine has two isotopes, **Br-79** and **Br-81**. Write the ion formed on the mass spectrum when the two isotopes combine (01 mark)

$[^{79}Br—^{81}Br]^+$ (01)

(ii) Calculate the average atomic mass of **bromine**. (03 marks)

$$\text{Average atomic mass} = \frac{\sum \text{Isotopic mass} \times \text{Relative abundance}}{\text{Total Relative abundance}}$$

$$= \frac{(79 \times 50.5) + (81 \times 49.3)}{(49.3 + 50.5)}$$

(03)

$$= 79.94u$$

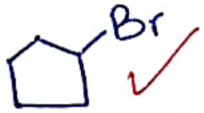
$-\frac{1}{2}$ without units

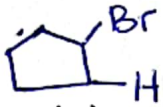
Accept; 79.9 amu

atomic mass unit

105

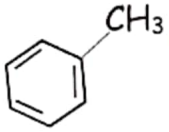
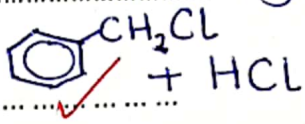
5. Complete the following organic reactions and name the major organic product in each case.

(a)  + HBr ⟶  (1 ½ marks)

Accept; 

0½

Name of product Bromocyclopentane

(b)  $\xrightarrow{Cl_2/uv\ light}$  (1½ marks)

0½

Name of product Chloromethylbenzene

(c) $CH_3CH=CH_2$ $\xrightarrow[2.\ H_2O/\ warm]{1.\ Conc.\ H_2SO_4}$ $CH_3\underset{OH}{C}HCH_3$ (1½ marks)

0½

Name of product Propan-2-ol

6. (a) Define diagonal relationship (01 mark)

Is the similarity in chemical properties between elements in period two to their diagonal neighbours in period three and adjacent groups between group I and group IV (01)

(i) State two properties in which beryllium resembles aluminium (01)

any two correct alternative

- Both are rendered passive by concentrated nitric acid
- Both react with hot concentrated sodium hydroxide solution to form hydrogen gas and complex; Accept: Beryllate and Aluminate ions respectively
- Both their oxides and hydroxides are amphoteric
- Their chlorides undergo hydrolysis.
- Their carbides undergo hydrolysis in water forming carbides and methane

(ii) State two reasons why beryllium resembles aluminium (01 mark)

Both atoms have similar electronegativities (01)

Both atoms have similar electrode potentials

Both atoms have similar electropositivity

Both form ions with similar charge density

b) State any other pair of elements on a periodic table that exhibit diagonal relationship. (01 mark)

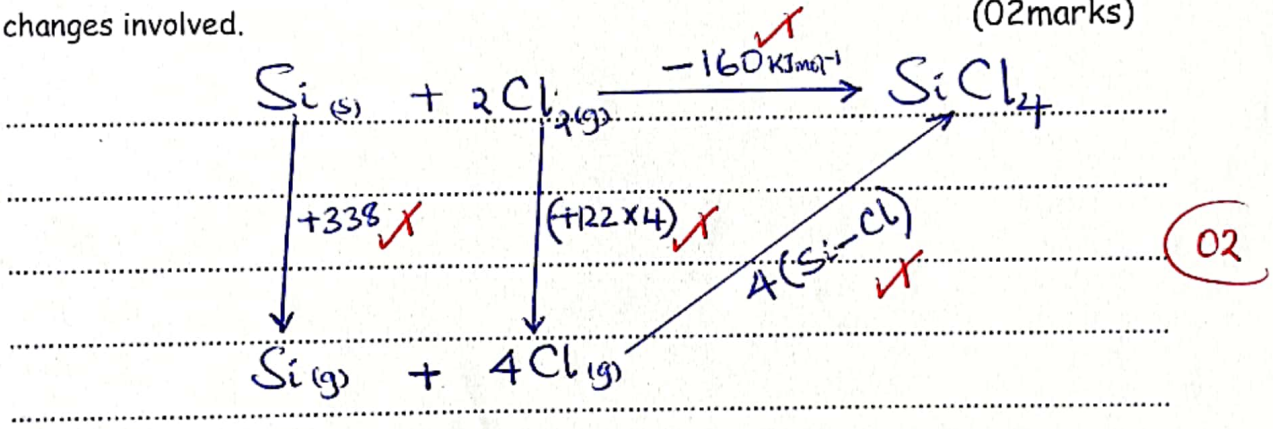
Boron and Silicon (01) Accept; Luthium and Magnesium.

7. (a) Define the term bond energy (01 mark)

Is the amount of heat evolved when one mole of covalent bonds is formed from its free gaseous atoms (01) Rej; If not bonds

(a) (i) The standard enthalpy change of formation of silicon(IV) chloride is -160 $kJmol^{-1}$.

The standard enthalpy changes of atomisation of silicon and chlorine are +338 and +122$kJmol^{-1}$ respectively. Use these values to construct a Born-Haber cycle for the formation of silicon(IV) chloride from its elements and indicate the energy changes involved. (02marks)



02

(ii) Calculate the average bond energy of the $Si - Cl$ bond (01 mark)

From Hess' law of heat summation; $-160 = 338 + (122 \times 4) + 4(Si-Cl)$

$4(Si-Cl) = -986$

$\Delta H^{\ominus}_{Bond\ energy\ of\ Si-Cl} = -246.5\ KJmol^{-1}$ (01)

b) Some bond energies are given below

Bond	Average bond energy($kJmol^{-1}$)
$Cl-Cl$	242
$C-H$	435
$Cl-H$	431
$C-Cl$	339

Determine the enthalpy change for the reaction below

$CH_4(g) + Cl_2(g) \longrightarrow CH_3Cl(g) + HCl(g)$

$\Delta H^{\ominus} = \sum$ bond enthalpies of bonds broken $- \sum$ bond enthalpies of bonds formed.

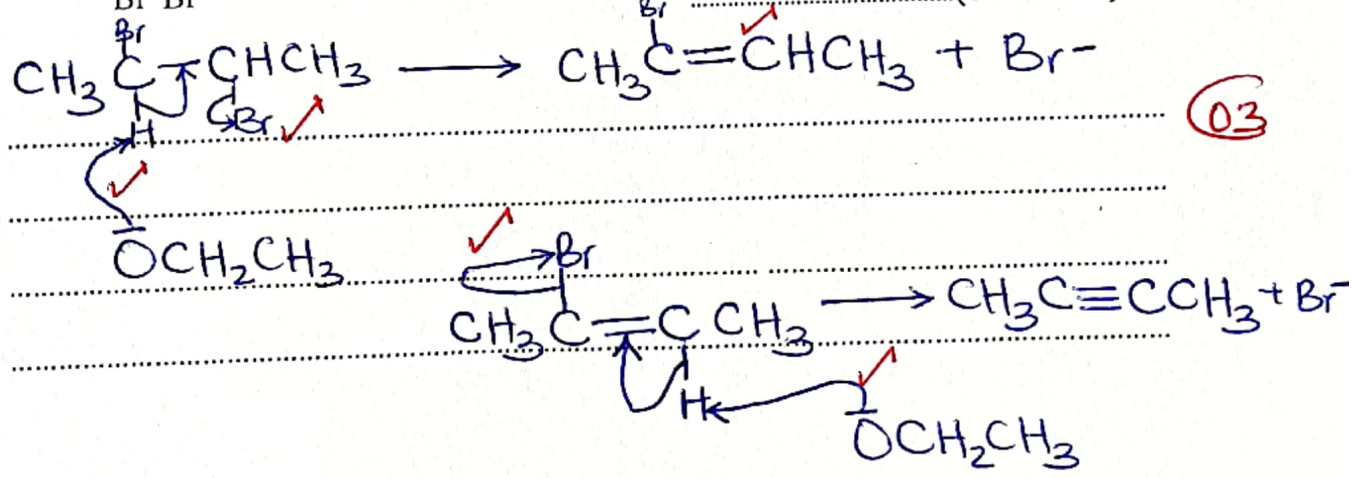
$= (4(C-H) + (Cl-Cl)) - (3(C-H) + (C-Cl) + (H-Cl))$

$= (4(435) + 242) - (3(435) + 339 + 431)$ (0½)

$= -93\ KJmol^{-1}$

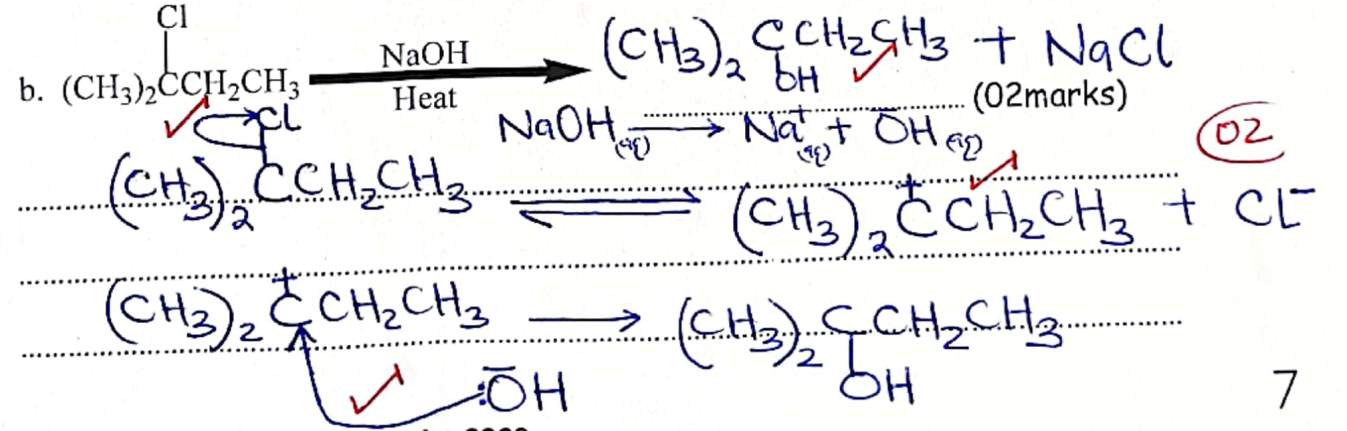
8. Complete the following reactions and suggest the possible IUPAC mechanism for each reaction.

a. $CH_3CHCHCH_3$ (Br, Br) $\xrightarrow[\text{Heat}]{CH_3CH_2O^-/CH_3CH_2OH} CH_3C\equiv CCH_3 + Br^-$ (03 marks)



b. $(CH_3)_2CCH_2CH_3$ (Cl) $\xrightarrow[\text{Heat}]{NaOH} (CH_3)_2C(OH)CH_2CH_3 + NaCl$ (02marks)

$NaOH_{(aq)} \longrightarrow Na^+_{(aq)} + OH^-_{(aq)}$ (02)



$Na^+ + Cl^- \longrightarrow NaCl$

Accept; $(CH_3)_2\overset{+}{C}CH_2CH_3$ or (self ionisation) (slow)

9. (a) What is meant by the following terms.

(i) Enthalpy of combustion (01 mark)

Is the heat given out when one mole of a substance is completely burnt in excess oxygen. (01)

(iii) Standard heat of formation (01 mark)

Is the heat change that occurs when one mole of a compound is formed from its constituent elements in their normal physical state at standard condition (01)

Accept; Standard states

Accept; ..... at a temperature of 298K and pressure of 1 atm.

b) Calculate the enthalpy of **combustion** of **methane** from the following thermochemical data. **(03 marks)**

(i) Enthalpy of combustion of carbon = $-393\ kJmol^{-1}$

(ii) Enthalpy of combustion of hydrogen = $-286\ kJmol^{-1}$

(iii) Enthalpy of formation of methane = $-75\ kJmol^{-1}$

Required Equation; $CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(l)}$ $\Delta H^{\ominus}_{Combustion\ CH_4}$

(i) $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$ $-393 KJmol^{-1}$

(ii) $H_{2(g)} + \frac{1}{2}O_{2(g)} \longrightarrow H_2O_{(l)}$ $-286 KJmol^{-1}$

(iii) $C_{(s)} + 2H_{2(g)} \longrightarrow CH_{4(g)}$ $-75 KJmol^{-1}$

$\Delta H^{\ominus}_c$ = reversing(iii) + (i) + 2(ii) (03)

$= +75 + -393 + 2(-286)$

$\Delta H^{\ominus}_{Combustion\ of\ CH_4} = -890 KJmol^{-1}$

Accept; ① Use of Born Haber cycle ② Use of eqns in 1st. part

SECTION B: (54 MARKS)

Answer any **six** *questions from this section.*

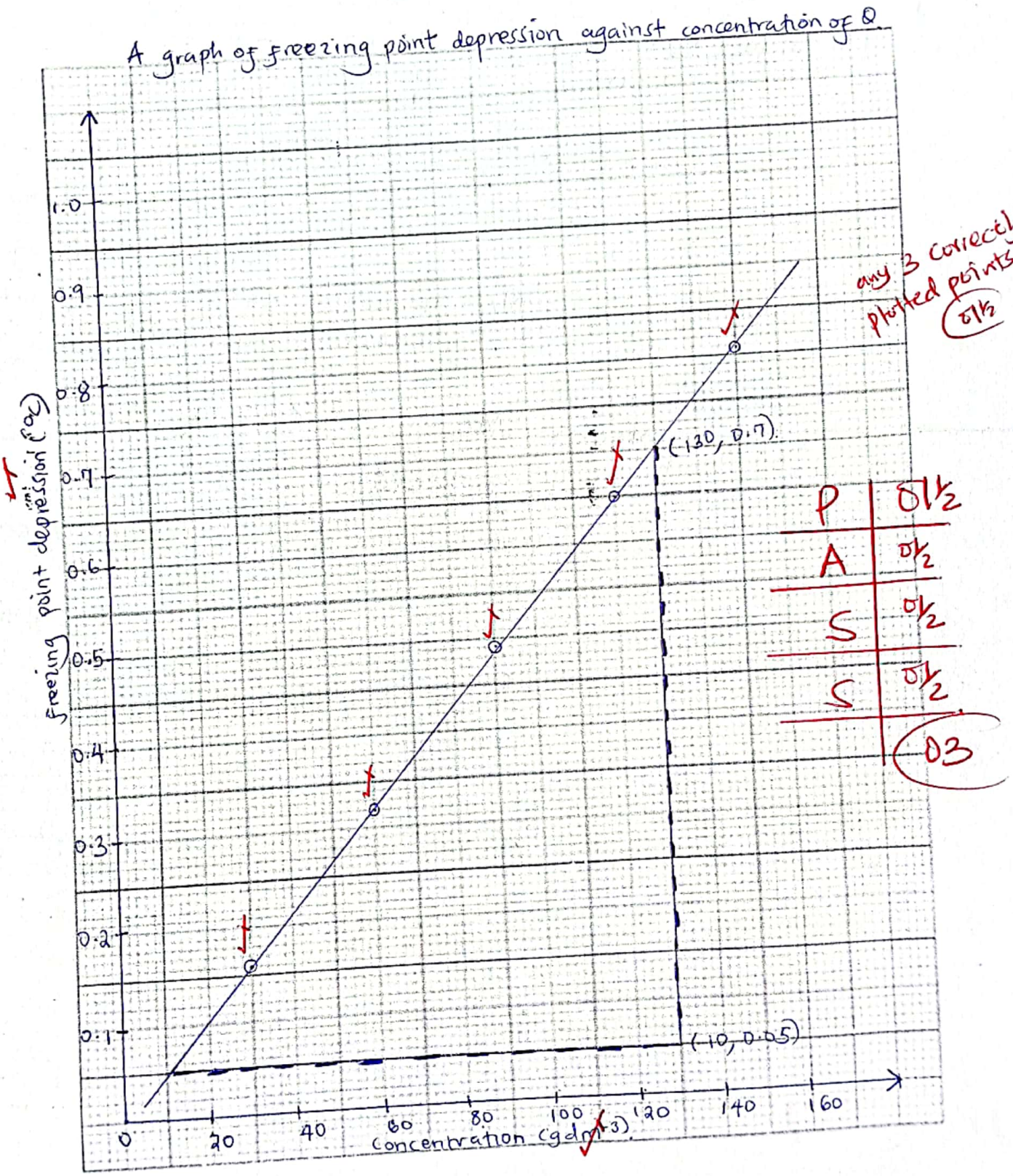
10. (a) State what is meant by the term **freezing point constant** of a substance. (01 mark)

Is the depression in freezing point caused when one mole of a non-volatile solute is dissolved in one thousand grams of a solvent. (01)

(b) The table below shows the freezing points of various concentrations of a non-volatile solute Q in water at 760mmHg.

Concentration of Q (gdm^{-3})	0	30	60	90	120	150
Freezing point(°C)	0	-0.16	-0.32	-0.49	-0.65	-0.81

Plot a graph of freezing point depression against concentration of Q



(c) Determine the :

(i) slope of the graph you have drawn in (b). (1 ½ marks)

$\text{Slope} = \frac{0.7 - 0.05}{130 - 10}$ ✓

$= 5.4167 \times 10^{-3}$ ✓ $°C\,g^{-1}\,dm^3$

01½

(ii) relative molecular mass of Q. (K_f *of water is* 1.86 $°C kg^{-1} mol^{-1}$) (2 ½ marks)

$\text{Slope} = \frac{K_f}{Mr}$ ✓

$5.4167 \times 10^{-3} = \frac{1.86}{Mr}$ ✓

$Mr = 343.38$ ✓

02½

11. Write equations to show how the following compounds can be synthesised. Indicate the condition(s) for the reaction(s).

(a)  from ethyne. (2 ½ marks)

with or without

$3HC{\equiv}CH \xrightarrow[\text{heat}]{Fe_{(s)}}$  $\xrightarrow[150°C]{3H_2 \mid Ni}$ 

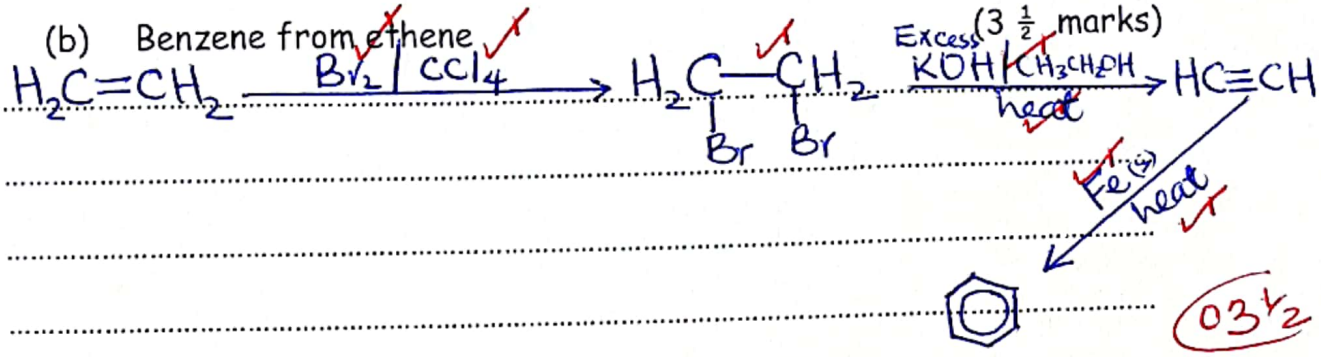
02½

Accept { H_2 + Organo-nickel catalyst, $\xrightarrow[(60-70°C)]{60°C}$ ← Any temp in range

or { $\xrightarrow[400°C]{Cu_{(s)}}$

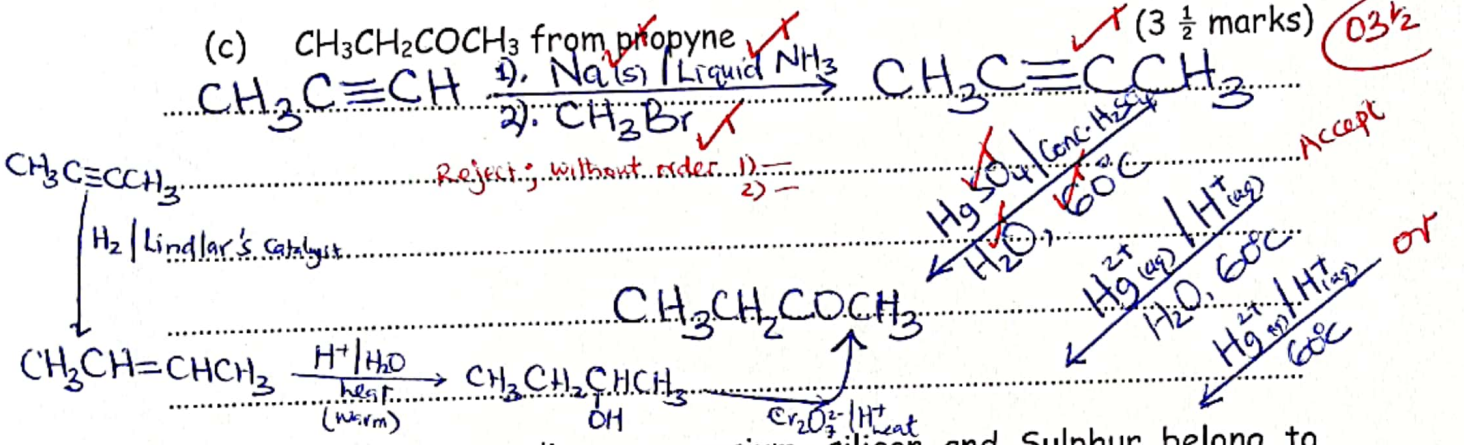
or { $\xrightarrow[400°C]{Fe_{(s)}}$

(b) Benzene from ethene (3 ½ marks)



03½

(c) $CH_3CH_2COCH_3$ from propyne (3 ½ marks)



03½

12. The elements: sodium, magnesium, silicon and Sulphur belong to Period 3 of the Periodic Table.

(a) For each element, write the formula and name the structure of the hydride it forms. (04 marks)

Element	Formula of hydride	Structure
Sodium	NaH	Giant ionic
Magnesium	MgH_2	Giant ionic
Silicon	SiH_4	Simple molecular
Sulphur	H_2S	Simple molecular

04

(b) Write equation for the reaction that takes place between water and the hydride of;

(i) Sodium (01 mark)

$NaH_{(s)} + H_2O_{(l)} \longrightarrow NaOH_{(aq)} + H_{2(g)}$ (01)

Accept; $H^-_{(s)} + H_2O_{(l)} \longrightarrow H_{2(g)} + OH^-_{(aq)}$

(ii) Sulphur (01 mark)

$H_2S_{(g)} + H_2O_{(l)} \rightleftharpoons H_3O^+_{(aq)} + HS^-_{(aq)}$ (01)

$H_2S_{(g)} + aq \rightleftharpoons 2H^+_{(aq)} + S^{2-}_{(aq)}$ ~~1×2~~

(c) Write equation for the reaction that takes place between hot concentrated sulphuric acid and;

(i) Magnesium (01½ marks) 01 01½

$Mg_{(s)} + H_2SO_{4(l)} \longrightarrow MgSO_{4(aq)} + SO_{2(g)} + 2H_2O_{(l)}$

reject (aq)

(ii) Sulphur (01½ marks) 01 01½

$S_{(s)} + 2H_2SO_{4(l)} \longrightarrow 3SO_{2(g)} + 2H_2O_{(l)}$

13. (a) What is meant by the following terms

(i) Hydration energy (01 mark)

Is the heat given out when one mole of gaseous ions is completely surrounded by water molecules (01)

(ii) Lattice energy (01 mark)

Is the heat absorbed (01) when one mole of an ionic compound is broken down into its constituent gaseous ions.

Accept; Is the heat evolved given out when one mole of an ionic compound is being formed from its constituent gaseous ions.

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Rej; Is the heat change ----

12

(iii) Enthalpy of solution (01 mark)

Is the heat change that occurs when one mole of a compound is dissolved in a specific amount of water to form an infinitely dilute solution. 01

(b) State two factors which can affect the magnitude of lattice energy

Ionic radius ✓

Ionic charge ✓ (01)

ionic — Accept

ionic ionic ionic — Reject.

c) The lattice hydration energies of salts **RX** and **TX** are given in the table below

Salt	Lattice energy($kjmol^{-1}$)	Hydration energy ($kjmol^{-1}$)
RX	880	860
TX	790	800

(c) Calculate the enthalpy of solution of each salt

-1mk if the salt is not included in the formula

(i) RX (02 marks)

$\Delta H^{\ominus}_{solution\ of\ RX} = \Delta H^{\ominus}_{Lattice\ of\ RX} + \Delta H^{\ominus}_{hydration\ of\ RX}$ ✓

$= 880 + (-860)$ ✓

$= +20 KJmol^{-1}$ ✓ (02)

(ii) TX (02 marks)

$\Delta H^{\ominus}_{solution\ of\ TX} = \Delta H^{\ominus}_{Lattice\ of\ TX} + \Delta H^{\ominus}_{hydration\ of\ TX}$ ✓

$= 790 + (-800)$ ✓

$= -10 KJmol^{-1}$ ✓ (02)

(ii) Which one of the two salts is more soluble in water at a given temperature? (0½ mark)

TX ✓ 0½

(iii) Give a reason for your answer in c(ii) above. (0½ mark)

It's enthalpy of solution is more negative ✓ 0½
or exothermic

Accept, It's hydration energy is more negative.

14. 1.363g of compound Y containing carbon, hydrogen and bromine on complete combustion gave 1.10g of carbon dioxide and 0.45g of water. When 0.35g of Y was vapourised, it occupied 39.5cm^3 at 20^{0}c and 750mmHg. Calculate

(i) the empirical formula of Y

Mass of C in $CO_2 = \left(\frac{12}{44} \times 1.10\right) = 0.3g$ ✓

Mass of H in $H_2O = \left(\frac{2}{18} \times 0.45\right) = 0.05g$ ✓

Mass of Br = $1.363 - (0.3 + 0.05) = 1.013g$

Elements	C	H	Br
Composition	0.3	0.05	1.013
Moles	$\frac{0.3}{12}$	$\frac{0.05}{1}$ ✓	$\frac{1.013}{79.9}$
	0.025	0.050	0.013
Mole ratio	$\frac{0.025}{0.025}$	$\frac{0.050}{0.025}$ ✓	$\frac{0.013}{0.025}$
	1	2	1

02½

Empirical formula is CH_2Br ✓

Accept $C_2H_4Br_2$ ✓

(ii) the molecular formula of Y_2 (1 2 4 2)

with or without, Continue marking

$PV = nRT$ ✓ $\therefore PV = \frac{m}{M_r}RT$

$\left(\frac{750 \times 101325}{760}\right) \times 39.5 \times 10^{-6} = \frac{0.35}{Mr} \times 8.31 \times 293$ ✓

$Mr = 216$

02

$(CH_2Br)_n = 216$

$12n + 2n + 79.9n = 216$

$n = 2.3 \approx 2$

$(CH_2Br)_2 = C_2H_4Br_2$

$\therefore$ Molecular formula is $C_2H_4Br_2$ ✓

b) Y forms a compound Z when treated with a mixture of potassium hydroxide solution and ethanol under reflux. Z reacts with ammoniacal silver nitrate solution to form a white precipitate Q.

Identify;

(i) Y $BrCH_2CH_2Br$ ✓

Acc; 1,2-dibromoethane

(ii) Z $HC\equiv CH$ ✓

Acc; Ethyne (01½)

(iii) Q $AgC\equiv CAg$ ✓

Acc; Disilver dicarbide

c) Write

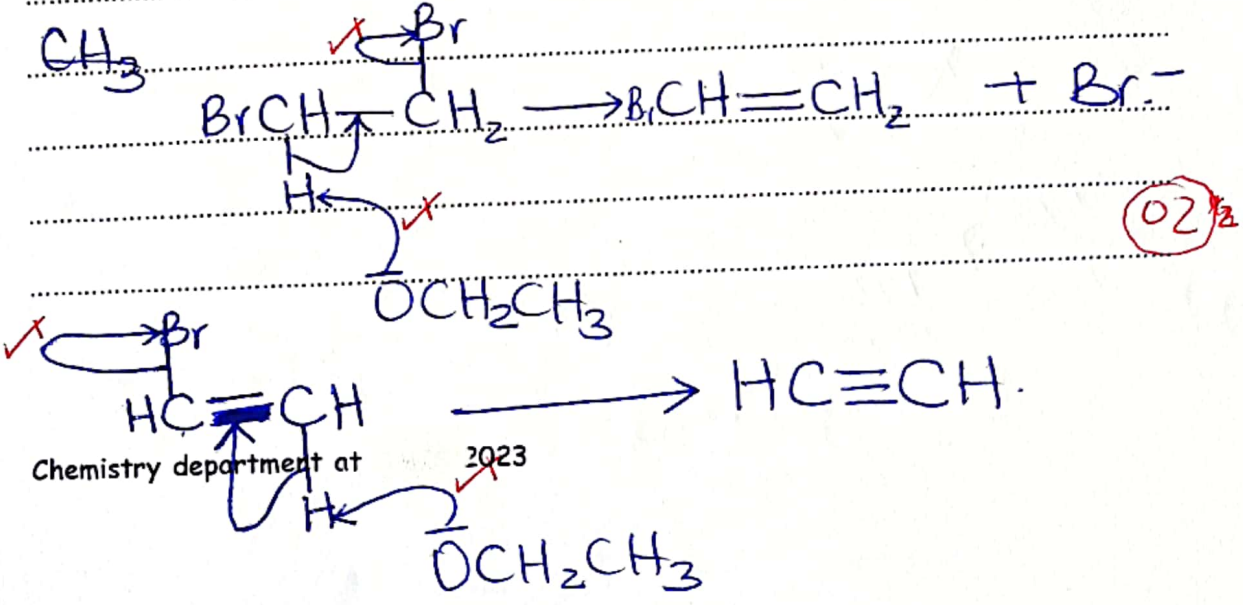
(i) an equation for the reaction between Z and ammoniacal silver nitrate solution (01)

$$HC\equiv CH + 2AgNO_{3(aq)} + 2NH_{3(aq)} \longrightarrow AgC\equiv CAg_{(s)} + 2NH_4NO_{3(aq)}$$

(ii) the mechanism for the reaction leading to formation of Z

$$KOH + CH_3CH_2OH \longrightarrow CH_3CH_2\bar{O}K^+ + H_2O$$

$$CH_3CH_2\bar{O}K^+ \longrightarrow CH_3CH_2\bar{O} + K^+$$



(02½)

15. (a)(i) What is meant by the term first ionisation energy? (01mark)

Minimum energy required to remove an electron from a neutral free gaseous atom to form a unipositively charged gaseous ion. (01)

Accept; ------ one mole of electrons from one mole of neutral gaseous atoms to form one mole of unipositively charged gaseous ions

(ii) Write an equation for the first ionisation energy of aluminium (01 mark)

$$Al_{(g)} \longrightarrow Al^{+}_{(g)} + e$$ (01)

(iii) State two factors that can affect the value of first ionisation energy

- Atomic radius
- Screening effect / shielding effect
- Nuclear charge
- Penetrating power of valence electrons
- Electronic configuration of the atom

(01)

(b) State and explain how first ionisation energy varies

(i) Down a group. (03 marks)

- Reject the explanation part if the trend is wrong or missing.

First ionisation energy decreases.

Down the group, a full energy level of electrons is being added (Accept; or Complete) from one atom of an element to the next. This increases the screening effect. Also, protons are being added to the nucleus, this also increase the nuclear charge. However, the increase in screening effect is more rapid (or faster) (Rej; outweighs) than the increase in nuclear charge resulting into a decrease in effective nuclear charge. Valence electrons experience less attraction towards the nucleus, therefore less energy is required to remove them, hence low value of first ionisation energy. (03)

(i) Across a given period. (03 marks)

First ionisation energy increases (Accept Generally increase) across a given period.

Across a period from one element to next, number of protons (in nucleus) increases by one which increases the nuclear charge.

Screening effect slightly increases (Accept; almost remains constant) because electrons are being added to the same energy level of the atoms of the elements. (03)

The increase in nuclear charge is more rapid than increase in Screening effect resulting into an increase in effective nuclear charge. Electrons are closely attracted to the nucleus with greater attraction thus requiring more energy to be removed, thus a higher value of first ionisation energy.

16. (a). What is meant by **order of reaction?** (01 mark)

Is the sum of the powers to which the molar concentrations of the reactants are raised in an experimental rate equation (01)

Accept other correct alternative definition.

(c). The table below shows some kinetic data for the reaction

$3A + B \rightarrow$ Products

Experiment	[A] ($moldm^{-3}$)	[B] ($moldm^{-3}$)	Rate($moldm^{-3}\ s^{-1}$)
1	0.2	0.2	1.2×10^{-8}
2	0.2	0.6	1.2×10^{-8}
3	0.4	0.6	4.8×10^{-8}

(i). Determine the order of reaction with respect to A and B

(i) A $Rate = K[A]^x[B]^y$ (02 marks)

Using experiments 2 and 3, $\frac{4.8\times10^{-8}}{1.2\times10^{-8}} = \frac{K(0.4)^x(0.6)^y}{K(0.2)^x(0.6)^y}$ (02)

$4 = 2^x \therefore 2^2 = 2^x \quad x = 2$

$\therefore$ order is 2

Accept; In experiments 2 and 3, when the concentration of B is kept constant, that of A doubled and the rate of reaction increased by 4 times (quadrupled) hence order with respect to A is 2. Accept: second order (02 marks)

(ii) B

Using expts 1 and 2, $\frac{1.2\times10^{-8}}{1.2\times10^{-8}} = \frac{K(0.2)^x(0.6)^y}{K(0.2)^x(0.2)^y}$

$1 = 3^y$ (02)

$3^0 = 3^y \quad \therefore y = 0$

Accept; In expts 1 and 2, when the concentration of A is kept constant, that of B increases by 3 times (thrice) and the rate of reaction remains constant, hence the order with respect to B is zero

(ii). Write the **rate equation** for the reaction. (01 mark)

Rate = $K[A]^2[B]^0$ ✓ (01)

Accept; Rate = $K[A]^2$

(c). Calculate the:

(i). **Overall order of reaction.** (01 mark)

Overall order = 2 + 0 ✓ (01)

= 2 ✓

-½ if working not shown.

(ii) **Rate constant** for the reaction and state it's units. (02 marks)

Using expt 1;

Rate = $K[A]^2[B]^0$

$1.2 \times 10^{-8} = K(0.2)^2(0.2)^0$ ✓ (02)

$K = 3.0 \times 10^{-7}$ ✓ $mol^{-1} dm^3 s^{-1}$ ✓

-½ for wrong or missing units

17. Name one reagent that can be used to distinguish between the following pairs of compounds. In each case state what would be observed if each member of the pair is treated with the named reagent.

(a) But-2-yne and But-1-yne

Reject; If solution missing.

Reagent. (01 mark) (01)

Ammoniacal silver nitrate solution ✓

Check for the spelling of ammoniacal

Accept; (2) Ammoniacal copper(I) chloride solution

Observations. (02 marks)

With But-2-yne, No observable change ✓

With But-1-yne, white precipitate ✓ (02)

(a) Propane and propene

(01 mark)

Reagent. Bromine water ✓

Accept; (2) Bromine liquid
(3) Acidified potassium manganate (VII) solution /alkaline

(02 marks)

Observations.

With Propane; No observable change

With propene; Reddish brown solution turns to Colourless solution.

Rej; Reddish brown colour turns to ----

(a) Bromoethane and chloroethane

(01 mark)

Reagent. Hot sodium hydroxide solution ✓ and silver nitrate solution

Accept; Silver nitrate solution followed by dilute nitric acid or Acidified silver nitrate solution

(02 marks)

Observations.

With Bromoethane, Pale yellow precipitate

With Chloroethane; White precipitate ✓

END.

Cl^- — White ppt

Br^- — Pale yellow ppt

I^- — Yellow ppt.

Glory be to Lord !!