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UGANDA ADVANCED CERTIFICATE OF EDUCATION
NOVEMBER - DECEMBER, 2018

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Candidate's Name TR. FELIX GEOFFREY RUBANGAKENE Jr.

Signature Rubfw
Subject CHEMISTRY Paper code P525/2

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**READ THE INSTRUCTIONS BELOW
CAREFULLY BEFORE USING
THE ANSWER BOOKLET.**

1. Use a blue or black ink ball pen. Work in pencil, other than graphs and drawings, will not be marked.
2. List the question numbers, in the order attempted, in the left-hand column of the boxes opposite.
Do not list the multiple choice questions.
3. Write your answers on both sides of each sheet.
4. Do your rough work in this answer booklet. Cross through any work you do not want marked.
5. Do not fold, dismantle or tear any part of the answer booklet. Do not accept an answer booklet with missing pages.
Folding, dismantling or tearing of the answer booklet is a malpractice and shall lead to cancellation of results. All work must be handed in.
6. Check that you have written the information required on each additional answer booklet used. Tie all the booklets used together.
7. Do not share your work with another candidate or expose your work such that another candidate can copy from it.
Sharing or exposing your work may lead to cancellation of results.
8. Answer only the number of questions as instructed on the question paper. Answers to extra questions will not be marked.

Question number attempted	For Examiners' use only	
	Mark	Examiners' initials
Total		

Write here the number of answer booklets you have used.	
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NOVEMBER - DECEMBER, 2018

Page 2

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SECTION - A:

Qn01 (a) i. Relative atomic mass is the ratio of the mass of an atom of an element to a twelfth [$\frac{1}{12}$] the mass of one atom carbon-12-isotope. ✓

OR:

Relative atomic mass is the number of times the mass of a naturally occurring atom of the element is heavier than a twelfth of the mass of the carbon-12 isotope of carbon. ✓

OR:

Relative atomic mass = $\frac{\text{Mass of an atom of elt.}}{\text{Mass of an atom of hydrogen}}$ ✓

01

iii. Relative abundance is the ratio of abundance of an isotope of an element in nature as compared to the abundance of other isotopes of the same element in nature. ✓

OR:

Relative abundance is the proportion of a given isotope in nature as compared to other isotopes of the same element in a given sample. ✓

01

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NOVEMBER - DECEMBER, 2018

Page 3

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(iii) Relative intensity is the height of the peak formed by an isotope on the mass spectrum. ✓ 01

(b) - The mass spectrometer is evacuated via the evacuation pump to avoid interference to movement of the positive ions by air molecules.

- The vaporized magnesium sample is then introduced into the ionization chamber where it's subjected to a beam of first moving electrons from the electron gun that collide with magnesium gaseous atoms forming +ve gaseous ions.



- The positive gaseous ions formed are accelerated at the same velocity and Kinetic energy by the electric field so that they enter the magnetic field.

- In the magnetic field, the positive ions are deflected according to their mass to charge ratio such that ions of higher mass to charge ratio are deflected least while those of low mass to charge ratio are deflected most.

- The strength of the magnetic field is therefore varied such that different ions hit or enter the collector. The positive ions of the same mass to charge ratio enter

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Random No.			
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the collector and produce an electric current which is amplified and detected as a series of line peaks on the mass spectrum.

- Each line peak on the mass spectrum corresponds to an isotope with specific mass. The height of the line peak is directly proportional to the relative abundance of the isotope that produced it.

Mathematically:

$$R.A.M = \sum \left(\frac{\text{Isotopic mass} \times \text{Relative abundance}}{\text{Total abundance}} \right)$$

OR

$$\text{Relative atomic mass} = \sum \left(\frac{\text{Percentage abundance} \times \text{Isotopic mass}}{100} \right)$$

06

(C). Let each %age abundance of $^{24}_{12}\text{Mg}$ and $^{26}_{12}\text{Mg}$ = γ
%age abundance of $^{25}_{12}\text{Mg}$ = $100 - \gamma + \gamma = [100 - 2\gamma]$

$$R.A.M = \sum \left(\frac{\text{Percentage abundance} \times \text{Isotopic mass}}{100} \right)$$

$$= (25 \times \gamma) + (26 \times \gamma) + [24 (100 - 2\gamma)]$$

100

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$$R.A.M = \frac{25Y + 26Y + 2400 - 48Y}{100} \quad [\text{But RAM} = 24.3]$$

$$24.3 = \frac{51Y + 2400 - 48Y}{100} \Leftrightarrow 24.3 \times 100 = \frac{[3Y + 2400] \times 100}{100}$$

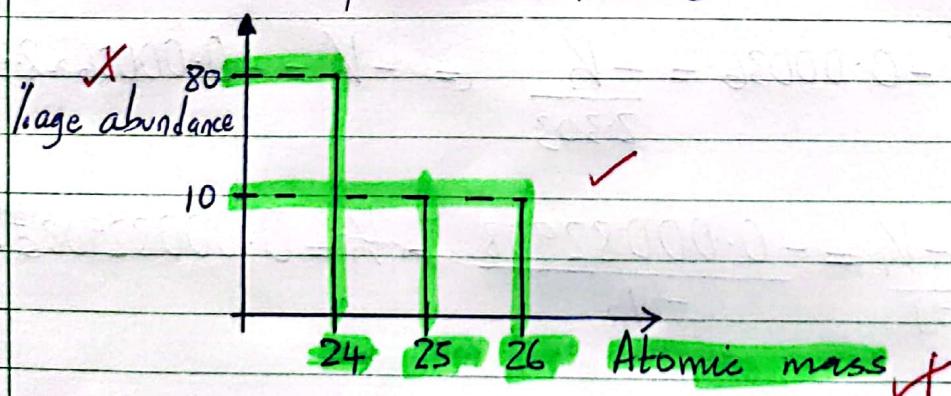
$$2430 - 2400 = 3Y \Rightarrow \frac{3Y}{3} = \frac{30}{3} \Rightarrow Y = 10. \checkmark$$

∴

The percentage abundance of ^{24}Mg =	$[100 - (2 \cdot 10)] \approx 80 \checkmark$
The percentage " ^{25}Mg =	$\approx 10 \checkmark$
The percentage " ^{26}Mg =	$\approx 10 \checkmark$

01 $\frac{1}{2}$

(ii). Mass spectrum of Magnesium:



02

(d). Values plotted:

Log [mass]	1.27	1.16	1.05	0.94	0.84	0.73	
Time (s)	300	600	900	1200	1500	1800	

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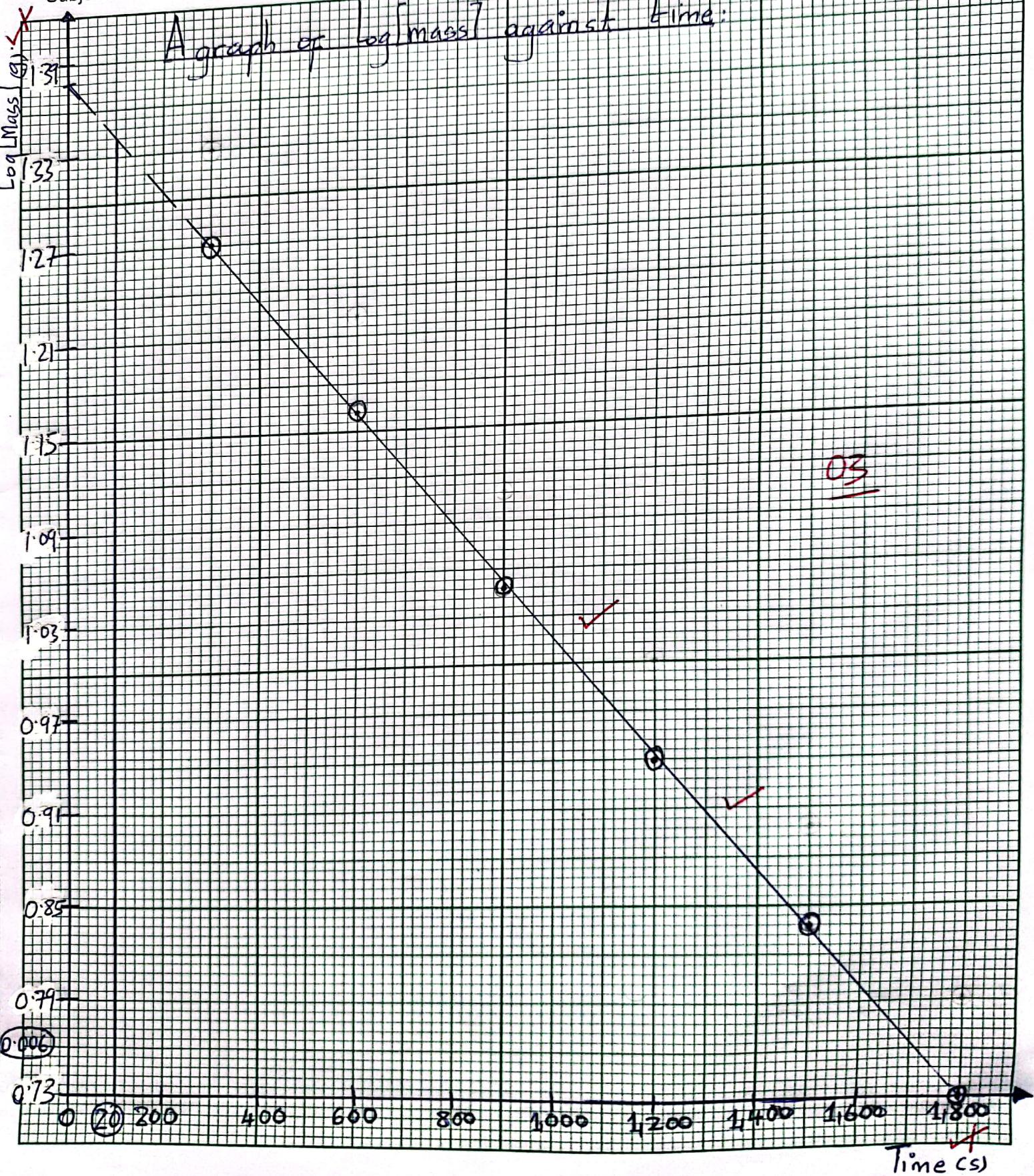
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NOVEMBER - DECEMBER, 2018

Page 6

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(e) (ii). The decay is first-order or one, because a graph of $\log(\text{mass})$ against time plotted is a straight line with a negative slope.

(iii). From first-order equation: $\log N_t = \frac{-\lambda t}{2.303} + \log N_0$

But:

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} \Leftrightarrow \text{Slope} = \frac{0.750 - 1.342}{1800 - 100}$$

$$\text{Slope} = \frac{-0.612}{1,700} \Leftrightarrow \text{Slope} = -0.00036 \quad \checkmark$$

Hence:

$$\text{Slope} = -\frac{\text{Rate constant}, K}{2.303} \quad \checkmark$$

$$-0.00036 = -\frac{K}{2.303} \Leftrightarrow -K = -0.00036 \times 2.303$$

$$-\frac{K}{-1} = \frac{-0.00082908}{-1} \Rightarrow K = 0.00082908 \text{ s}^{-1}$$

012

$$\text{Rate constant}, K = 8.29 \times 10^{-4} \text{ s}^{-1} \quad \checkmark$$

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NOVEMBER - DECEMBER, 2018

Page 7

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iii. Original mass of ^{26}Mg , N_0 = Intercept on y-axis:

At time, $t = 0\text{ s}$; Intercept on y-axis = 1.378 ✓

$$\log_{10}(\text{mass}), N_0 = 1.378 \Leftrightarrow N_0 = 10^{1.378}$$

Original mass of ^{26}Mg , $N_0 = \underline{\underline{23.87\text{ g}}}$ ✓

01

BOOKLET

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Page 8

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Qn02 case i) Tin; $_{50}^{Sn}$: $[Kr] 5s^2 5p^2$. ✓

Lead; $_{82}^{Pb}$: $[Xe] 6s^2 6p^2$. ✓

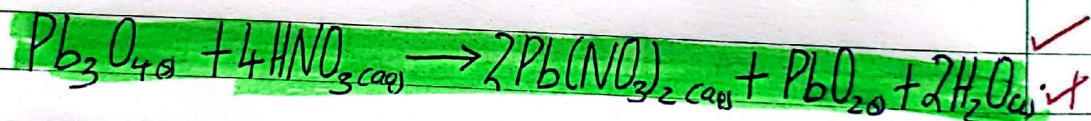
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iii. Lead (II) oxide, PbO . ✓

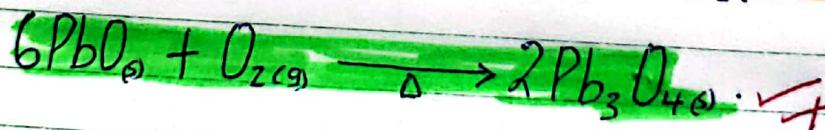
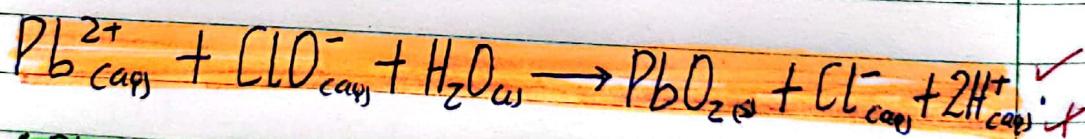
Lead (IV) oxide, PbO_2 . ✓

Tri-lead tetra oxide or [Red Lead]; Pb_3O_4 . ✓

0 1 1/2

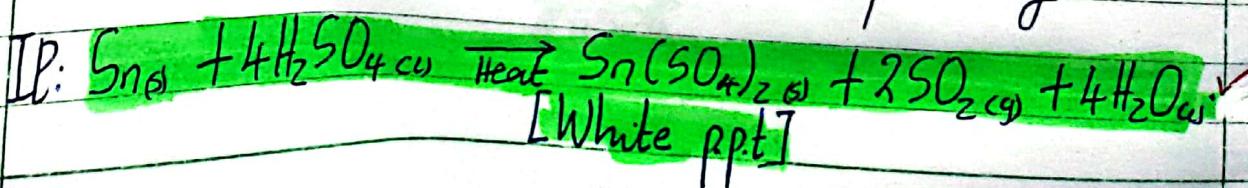


OR:



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(c). i). Tin reacts with hot concentrated sulphuric acid forming a colourless gas and white precipitate that turns orange potassium dichromate to green colour when tested and water respectively.



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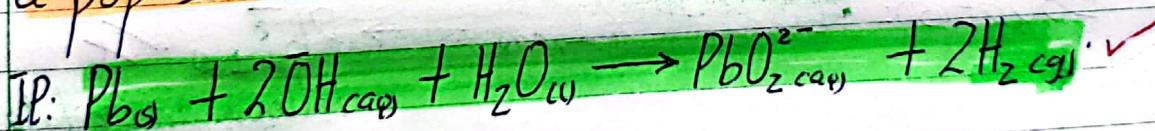
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Lead reacts with hot concentrated sulphuric acid forming a colourless gas that turns orange potassium dichromate to green colour when tested and white precipitate of lead (II) sulphate even water droplets are formed.

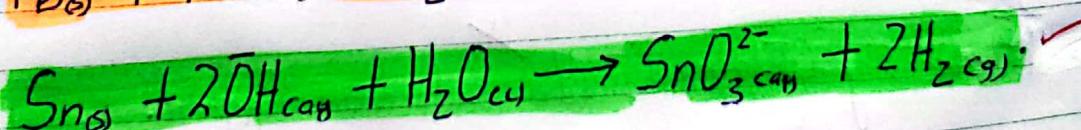
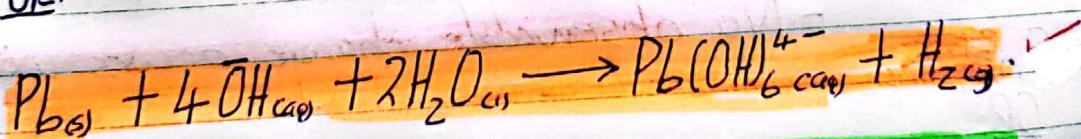


- Both tin and Lead DONOT react with dilute Sulphuric acid.

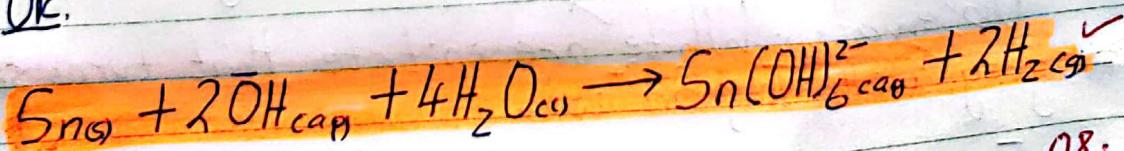
(ii). Both Lead and tin reacts with hot concentrated sodium hydroxide solution forming stannate (IV) and plumbate (II) ions with evolution of a colourless gas that turns with a pop-sound or explodes with a pop sound when tested.



OR:



OR:



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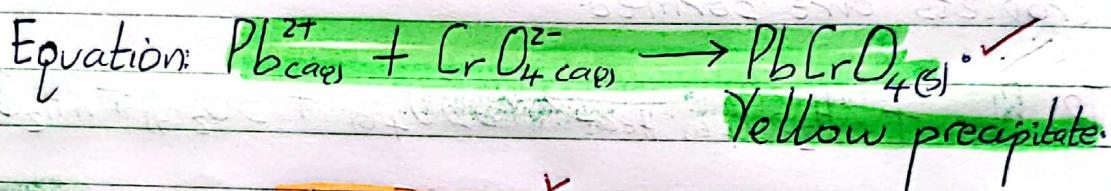
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dcii. Potassium chromate solution: Reagent:

Observation: - Yellow precipitate insoluble in Ethanoic acid with lead, Pb^{2+} ion.

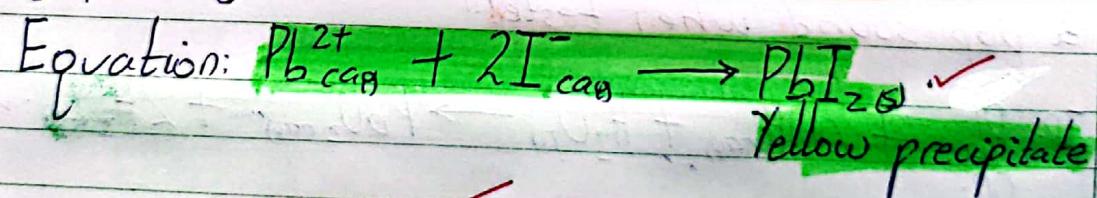


- No observable change occurs with Tin, Sn^{2+} ions.

OR:

Potassium Iodide solution: Reagent:

Observation: - Yellow precipitate soluble on heating forming a colourless solution with lead, Pb^{2+} ions.

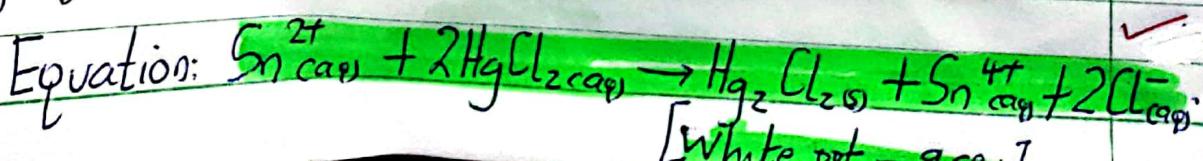


Tin, Sn^{2+} ions.

OR:

Mercury (II) chloride solution: Reagent:

Observation: White precipitate that turns slowly to grey with Tin, Sn^{2+} ions.



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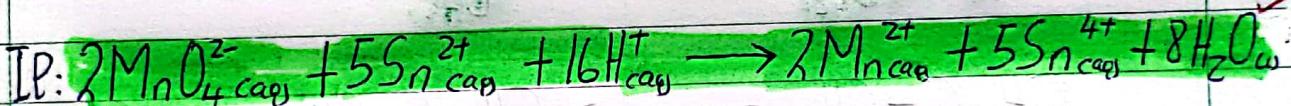
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No observable change occurs with lead, Pb^{2+} .

(ii). Reagent: Acidified potassium permanganate (VII) solution

Observation:- Purple solution turns to colourless soln with Tin_3Sn^{2+} ions.



- No observable change occurs with Tin_3Sn^{4+} ion.

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NOVEMBER - DECEMBER, 2018

Page 12

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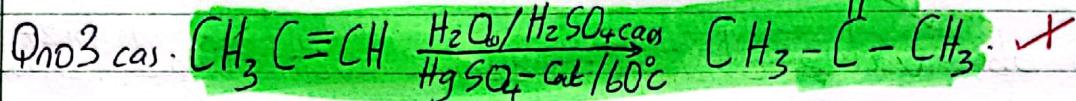
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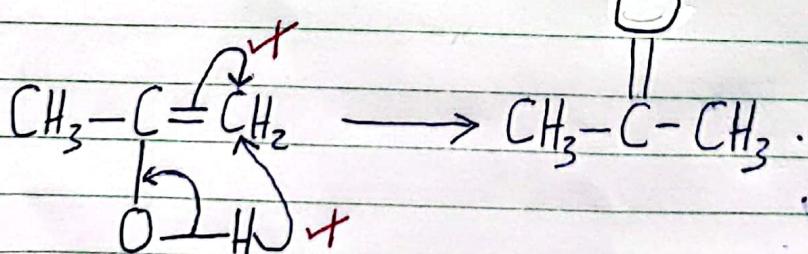
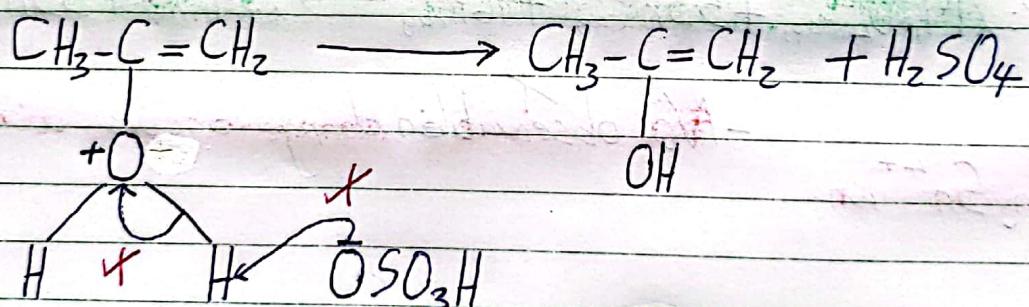
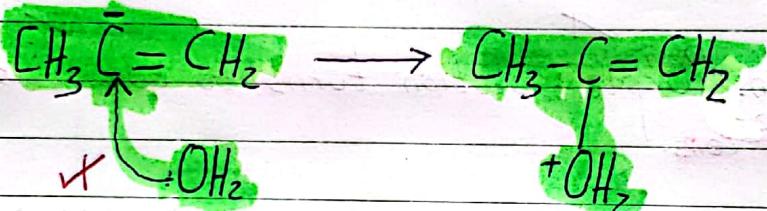
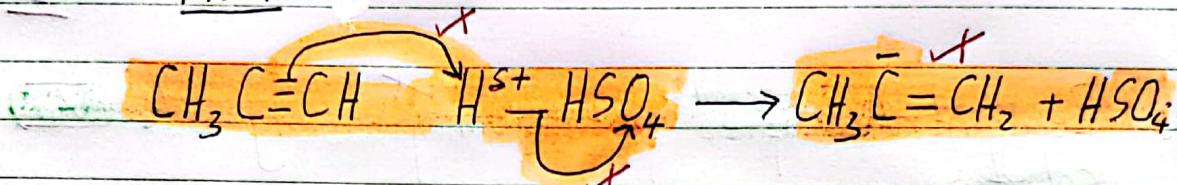
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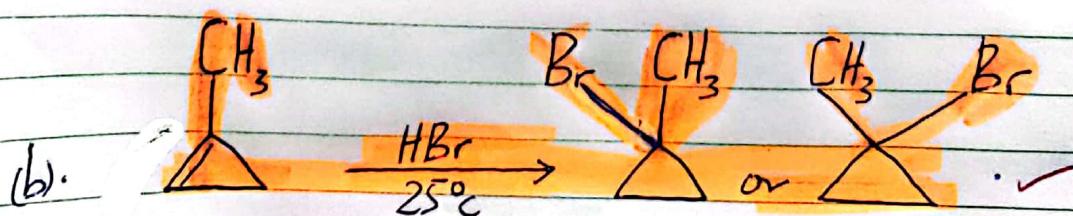
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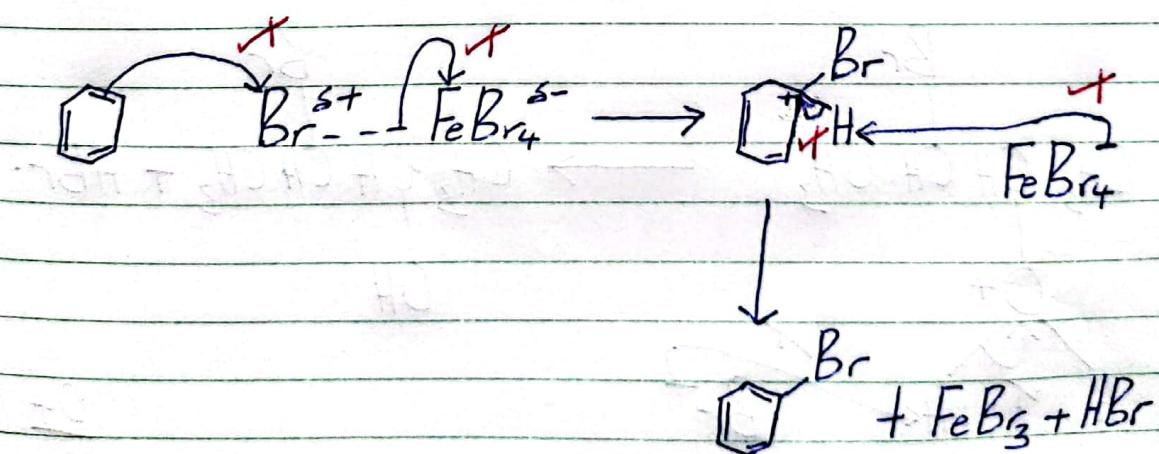
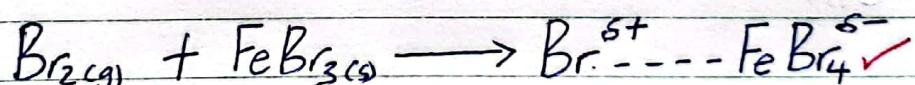
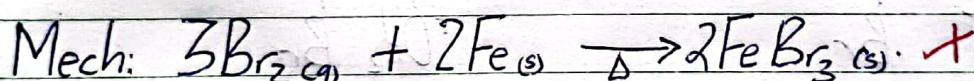
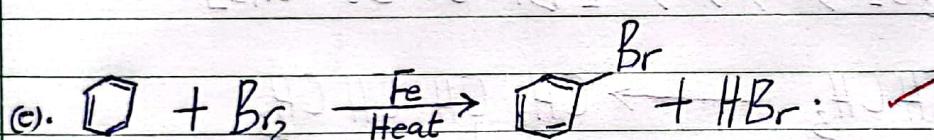
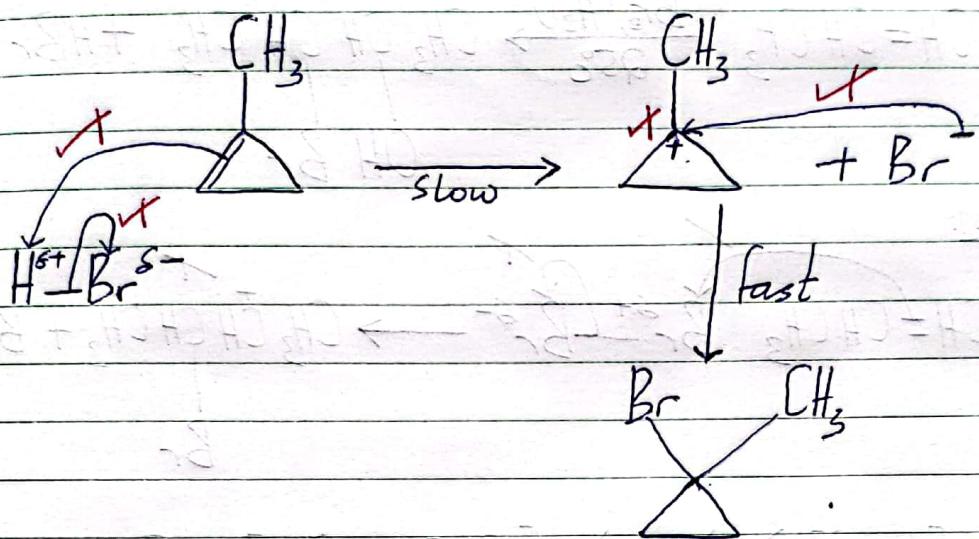
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NOVEMBER - DECEMBER, 2018

Page 14

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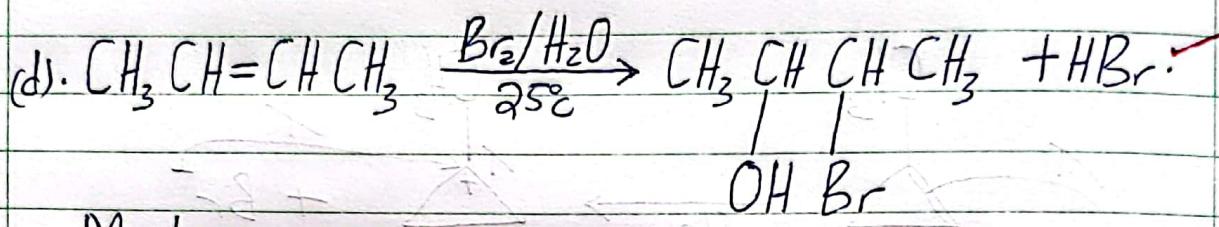
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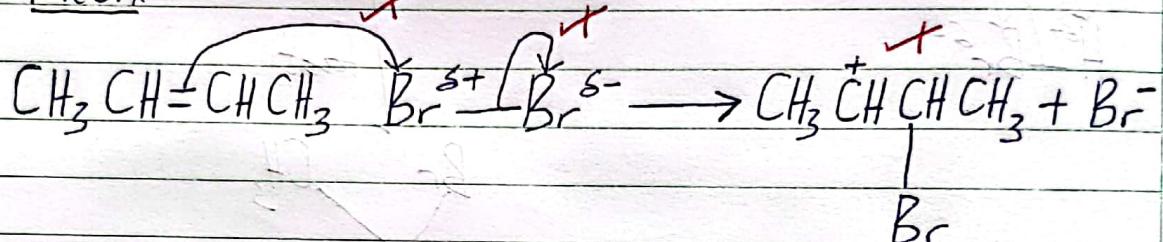
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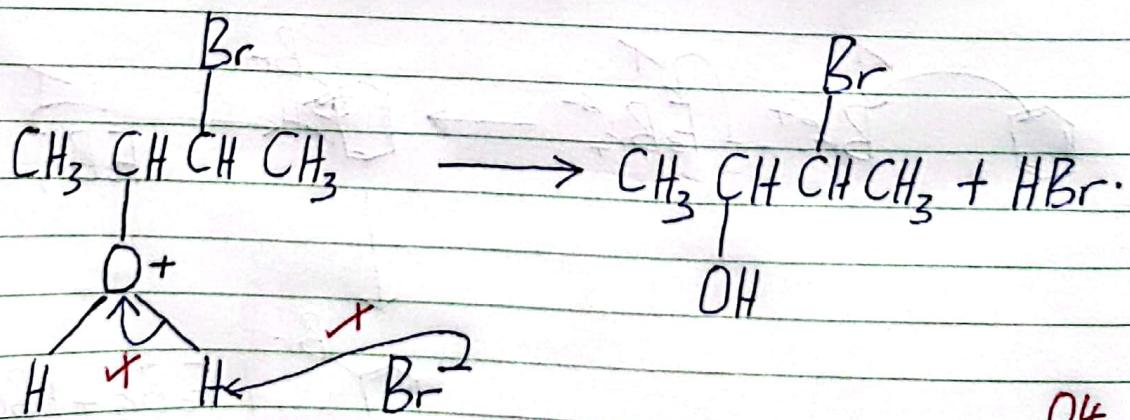
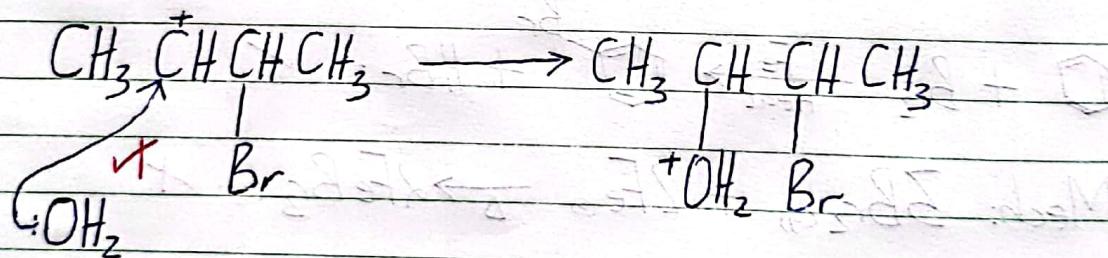
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Note: $[\text{H}_2\text{O}] > > > [\text{Br}^- \text{ or } \text{Cl}^- \text{ ions}]$



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NOVEMBER - DECEMBER, 2018

Page 15

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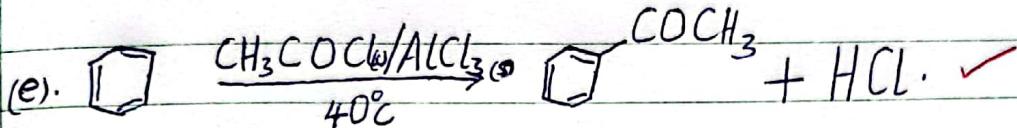
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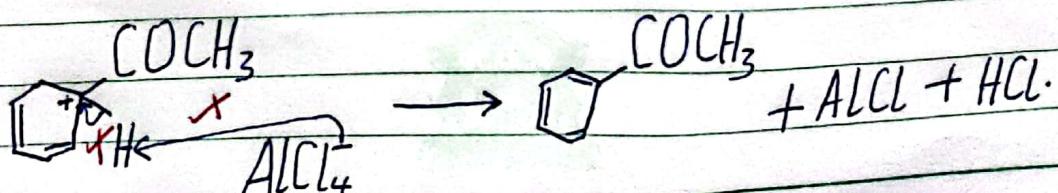
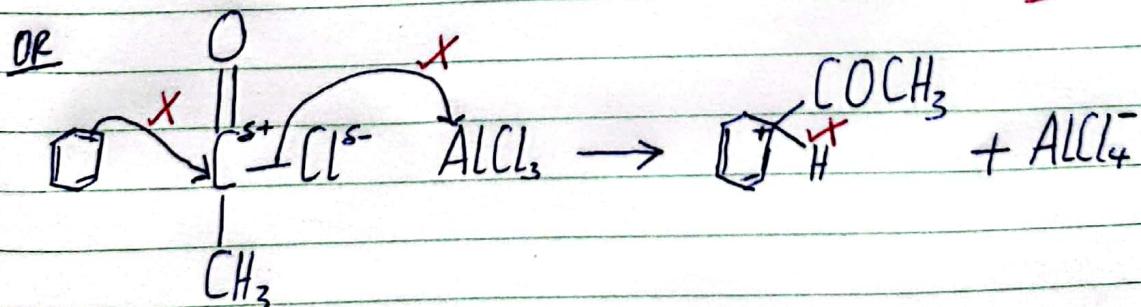
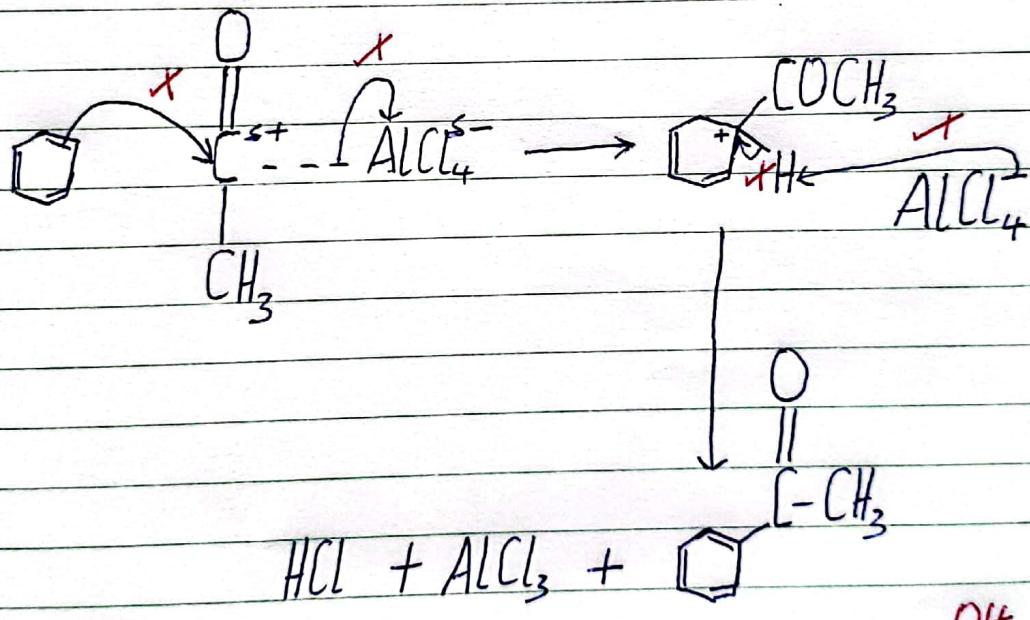
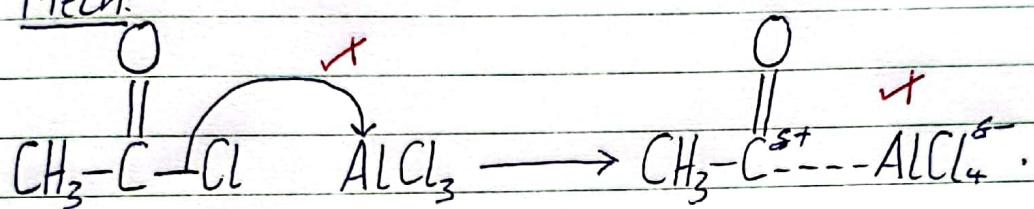
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NOVEMBER - DECEMBER, 2018

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Qn04 ca us. Freezing-point depression constant is the depression in freezing point when 1 mole of a non-volatile solute is dissolved in 1,000g of a pure solvent.

OR:

Freezing-point constant is the depression in freezing-point caused when 1 mole of a non-volatile solute is dissolved in 1,000g of a pure solvent.

(ii) Osmotic pressure is the pressure required to prevent the passage of pure solvent into a solution via a semi-permeable membrane.

OR:

Osmotic pressure is the pressure required to prevent osmosis when the solution is separated from pure solvent by a semi-permeable membrane.

OR:

Osmotic pressure is the pressure which must be applied to the solution to balance the tendency of solvent to flow from the solvent side to the solution side of a semi-permeable membrane.

OR:

Osmotic pressure is the pressure that must be applied to a solution to balance the tendency of the solvent to flow from the solvent side to the solution side across a semi-permeable membrane.

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(b) Expt to determine R.M.M using Freezing-pt depression method:

Procedure:

A Known mass ~~x~~ of the solvent [bg] is placed in the inner tube fitted with a Beckmann Thermometer and a stirrer A. The test-tube is inserted in a boiling-tube air jacket to reduce the rate ~~x~~ of cooling.

The test-tube is placed into a freezing ~~x~~ mixture with its stirrer B used to keep it uniform.

The solvent is stirred using stirrer A and temperature observations are made until a steady ~~x~~ temperature, when the solvent solidifies its noted and recorded as T_1 , $^{\circ}\text{C}$.

The tube containing the solvent is removed; allowed to warm up and melt; and a Known mass ~~x~~ of solute [ag] is preferably in pellet form is added to the solvent via the side tube C.

The mixture is stirred well using stirrer A to make a solution of known ~~x~~ concentration. A steady temperature at which the solution freezes is noted and recorded as T_2 , $^{\circ}\text{C}$.

Treatment of Results:

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NOVEMBER - DECEMBER, 2018

Page 4

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$$\begin{aligned}
 \text{Mass of solute} &= a \text{ g} \\
 \text{Mass of solvent} &= b \text{ g} \\
 \text{Molecular mass of solute} &= M_r \\
 \text{Freezing-pt depression} &= T_1 - T_2 \\
 \text{Freezing-pt constant of solvent} &= K_f
 \end{aligned}$$

Mathematically:

$$M_r = \frac{a}{DT} \propto \frac{K_f \times 1,000}{b}$$

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ALTERNATIVELY:

b g of the solvent dissolves a g of solute.
 1,000g " " " "

$$\left[\frac{1,000 \times a}{b} \right] \text{ g} \times$$

DT is the freezing-pt depression caused by $\left[\frac{1,000 \times a}{b} \right] \text{ g}$

K_f " " " " " ? g solute.

$$\left[\frac{K_f \times 1,000 \times a}{DT \times b} \right] \text{ g of solute.} \checkmark$$

Hence:

$$\text{Molar mass, } M_r = \frac{K_f \times 1,000 \times a}{DT \times b} \checkmark$$

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cis. Law of Osmotic pressure states that total numbers of moles of different solutes in the same amount of solvent have the same osmotic pressure. ✓

(iii) Limitations / Conditions:

The solute must be non-volatile. ✗

The solution must be sufficient/moderate dilute. ✗

The solute added must be less volatile than solvent. ✗

The temperature should remains constant. ✗

No reaction between solute and solvent chemically. ✗

The solute must not dissociate or associate when added to solvent. ✗

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(e). Given that:

Mass = 2.1% \approx 2.1g in 100cm³ of solvent.

Osmotic pressure, $\Pi = 0.45 \text{ mmHg} \approx \frac{0.45}{760} \approx 5.9 \times 10^{-4}$

Temperature, T = 23°C.

Using:

Osmotic pressure, $\Pi \propto \text{Volume}, V = \frac{\text{Mass}, m \times R \times \text{Temp}, T}{\text{Molar mass}, M_w}$

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NOVEMBER - DECEMBER, 2018

Page 6

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Random No.				
Personal Number				

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$$M_r = \frac{m \times R \times T}{\pi \times V} \Leftrightarrow M_r = \frac{2.1 \times 0.082 \times 296}{0.45 \times 760}$$

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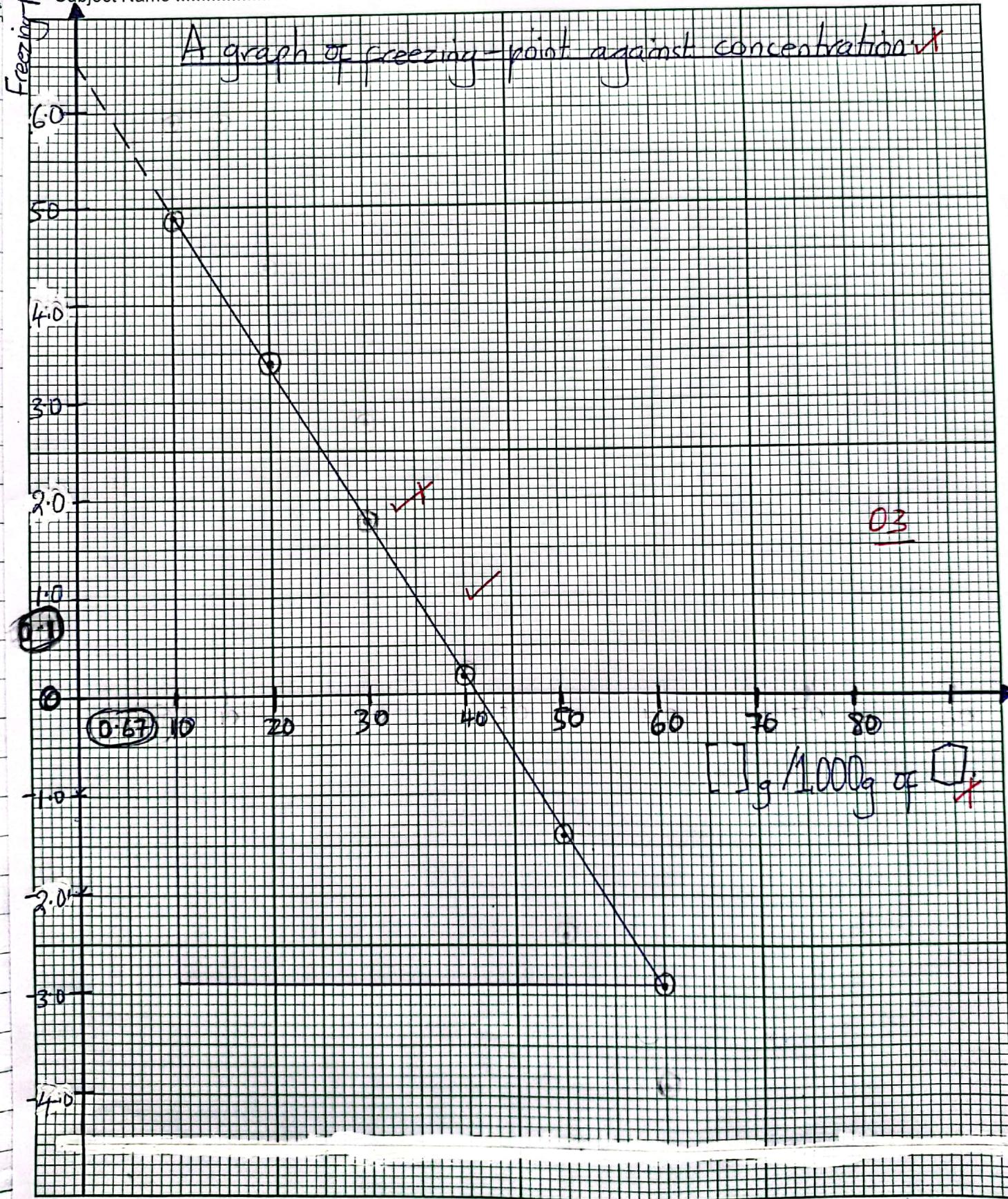
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Page 7

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(e). (ii) Refer to graph page

(iii) Freezing point = Intercept on Y-axis \checkmark

Freezing point = 6.5°C \checkmark

01

$$\text{iv). Slope} = \frac{y_2 - y_1}{x_2 - x_1} \Leftrightarrow \text{Slope} = \frac{-2.4 - (-4.9)}{60.0 - 10.0} = \frac{-7.3}{50.0}$$

$$\text{Slope} = -0.146 \checkmark$$

Hence;

$$\text{Slope} = -\frac{K_f}{R.F.M} \Leftrightarrow -0.146 = -\frac{20.1}{R.F.M} \checkmark$$

$$\text{Relative formula mass} = 137.7 \checkmark$$

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SECTION B:

Qn 05 (a) (i) Order of reaction is the power to which the concentration of reactants is raised to in an experimentally determined rate equation. ✓ 01

OR:

Order of reaction is the sum of the powers to which the concentrations of reactants are raised to in an experimentally determined rate equation. ✓

(ii). Molecularity of a reaction is the number of chemical species that participate in the rate determining step of a chemical reaction to form an activated complex. ✓ 01

(iii). Elementary reaction is a chemical reaction in which one or more chemical species react directly to form products in a single reaction step and with a single transition state. ✓ 01

(b)(ii). Order of reaction with respect to B is 2. ✓
Reason:

Keeping the $[A_2]$ constant; The $[B]$ increases by ---- units. The rate of reaction increases by ---- times hence the order of reaction is Second order.

OR:

Using calculation in experimental Nos of 2/3 as $[A_2]$ remains constant and varying $[B]$.

$$\therefore \text{D.L. or reaction, } \delta = K [A_2]^x [B]^y .$$

UGANDA NATIONAL EXAMINATIONS BOARD
NOVEMBER - DECEMBER, 2018

Page 9

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$$\frac{2.7 \times 10^{-4}}{1.2 \times 10^{-4}} = \frac{K [0.06]^x [0.09]^y}{K [0.06]^x [0.06]^y} \Leftrightarrow \frac{2.7 \times 10^{-4+4}}{1.2} = 1.5^y$$

$$2.25 = 1.5^y \Leftrightarrow (1.5)^2 = 1.5^y \therefore y=2.$$

Using calculation in experimental NQs of 1/2 since $[A_2]$ and $[B]$ increases.

∴ Rate of reaction, $\delta = \text{Constant}, K [A_2]^x [B]^y$.

$$\frac{1.2 \times 10^{-4}}{0.3 \times 10^{-4}} = \frac{K [0.06]^x [0.06]^y}{K [0.03]^x [0.03]^y} \Leftrightarrow \frac{1.2 \times 10^{-4+4}}{0.3} = 2^x \cdot 2^y$$

$$4 = 2^x \cdot 2^2 \quad [\text{Since } y=2] \Leftrightarrow 2^2 = 2^x \cdot 2^2$$

$$2 = x + 2 \Leftrightarrow x = 2 - 2 \Leftrightarrow x = 0$$

∴ The order of reaction with respect to A_2 is 0. ✓

(ii) Rate = $K [A_2]^0 [B]^2$ ✓ or Rate = $K [B]^2$. ✓

(iii) Using experimental no 1.

$$\text{Rate} = K [B]^2 \Leftrightarrow 0.3 \times 10^{-4} = K [0.03]^2 \quad \checkmark$$

$$\text{Rate constant, } K = \frac{0.3 \times 10^{-4}}{9.0 \times 10^{-4}} \underset{\text{or}}{\approx} 0.033 \text{ mol}^{-1} \text{ L s}^{-1}$$

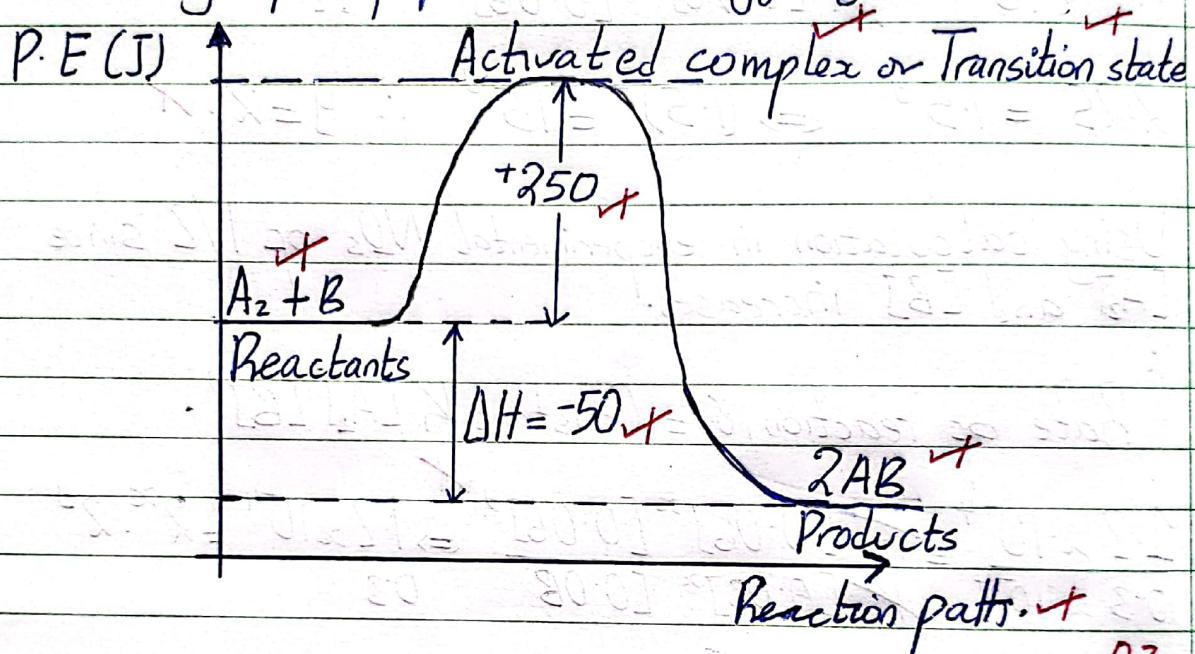
$$0.033 \text{ L mol}^{-1} \text{ s}^{-1}$$

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Subject Paper code

Random No.			
Personal Number			

c(i). A graph of potential energy against reaction path.



(ii). Activation energy, $E_{ab} = 250 + 50 \approx 300 \text{ kJ/mol.}$

01

d(i). The equilibrium constant, K_c decreases. Increasing temperature favours the backward reaction since the forward is exothermic. The products dissociates to form more of the reactants. This increases the concentration of reactants while decreasing the concentration of products hence decreasing the equilibrium constant.

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(ii). The equilibrium position shifts to left. Increasing temperature favours the backward reaction since the forward is exothermic. At equilibrium the

UGANDA NATIONAL EXAMINATIONS BOARD
NOVEMBER - DECEMBER, 2018

Page 11

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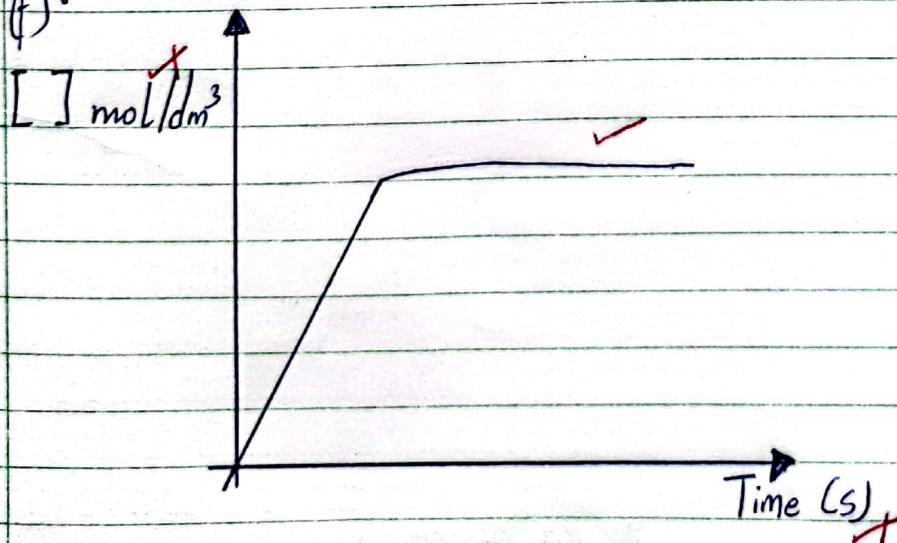
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proportion of products is lower than reactants hence
 position of equilibrium is to the left. ✓ 02½

(iii) Increasing temperature increases rate of reaction.
 this is because at higher temperature, the average kinetic energy of the particles increases; so more reacting particles have energy equal to or greater than the activation energy. also the reacting particles move at higher speed. the frequency of collision between the reacting particles increases. This causes the frequency of collision between the reacting particles increases. This causes the frequency of effective collision to increase. More products are formed per unit time hence the rate of reaction is higher.

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(f).



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Subject Paper code /

Random No.			
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Qn06(a). Melting point is a constant temperature at which pure solid is in equilibrium with the pure liquid at atmospheric pressure. ✓

OR

Melting point is a constant temperature at which pure substance turns from solid to liquid state at a given pressure when two states are at equilibrium. ✓

(b) (i) Metals. 01

Atomic radius of the metals. ✓

Type of crystal structure formed by the metals. ✓

Number of electrons @ atom contribute to the electron cloud or charge of the metallic ion. ✓

(ii). Molecular substances [Non-metals].

Molecular mass of the substance. ✓

Type of intermolecular forces of attraction. ✓

Type of close packing of the molecules in the solids. ✓

06

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 Subject Paper code / Personal Number _____

(c) Melting points decreases generally from Beryllium to Barium in group (II) elements and similarly from Carbon to Lead in group (IV) elements with abnormal high melting points in both magnesium and tin in the two groups.

From Beryllium to Barium and similarly from Carbon to Lead in the two groups; Atomic radius, bond length increases and bond strength decreases that reduces the amount of energy required to break both metallic and covalent bonds in group (II) and (IV) elements respectively, and Be.

Carbon, has the highest melting point b'cse it has a large number of short and strong covalent bonds which require high amount of energy to break it before melting or it melts.

The further decrease in melting points from calcium to barium and similarly from Germanium to tin in both groups is due to weaker metallic bonds in strontium and tin respectively.

Magnesium has an abnormal lower melting point than calcium since it has hexagonal closed packed structure compared to calcium with open packed structure.

Melting point increases slightly from tin to Lead due to increase in metallic bond strength as a result of inert pair effect.

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Subject Paper code

(i). The chloride, Cl^- ion have larger ionic radius than oxide, O^{2-} ion. The chloride, Cl^- ion is more polarized by Aluminium, Al^{3+} ion than oxide, O^{2-} ion.

This makes aluminium chloride to become more covalent in nature [character] with low melting point compared to aluminium chloride which is ionic in character with high melting point.

02

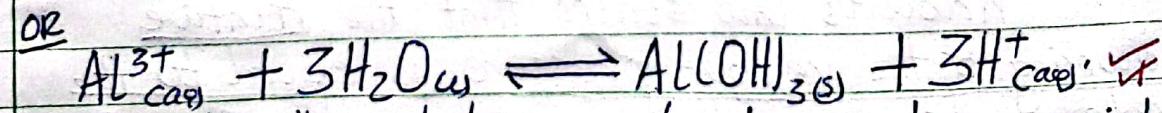
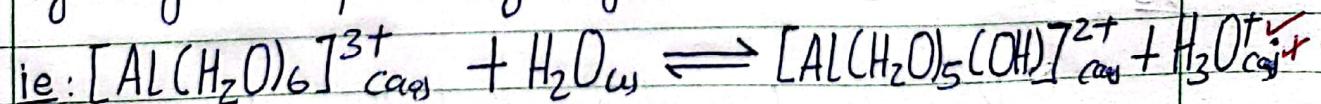
(ii). The oxide, O^{2-} ion is much smaller and highly charged than chloride, Cl^- ion.

The ionic bond in calcium oxide is stronger than those in calcium chloride since the charge on both calcium, Ca^{2+} and oxide, O^{2-} ions are doubly charged hence high Lattice energy with high melting point.

The big ionic radius of chloride, Cl^- ion easily polarized calcium, Ca^{2+} ion making the bonding partly covalent with low melting point.

03

(e). When dissolved in water, Aluminium nitrate forms hydrated Aluminium, Al^{3+} ions, that undergoes cationic hydrolysis to form Hydrogen, H^+ ion [Hydroxonium, H_3O^+] ion.



That make the solution acidic hence turns moist blue litmus paper red.

03

UGANDA NATIONAL EXAMINATIONS BOARD
NOVEMBER - DECEMBER, 2018

Page 2

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Signature

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Qn 07. (a) (i). The requirements refer to conditions:

- The solvent should be volatile. ✓
- The solute should be non-volatile. ✓
- The solvent should be immiscible with water. ✓
- The boiling-point of solvent should be close to that of water. ✓

01½

(ii). The solvent and water contribute independent vapour pressures such that the total vapour pressure quickly equates to atmospheric vapour pressure hence the mixture boils at a temperature below the boiling-point of both solvents.

b). Datas:

03

Vapour pressure of \square = $760 - 655 \approx 105 \text{ mm Hg}$. ✓

Relative molecular mass of $\text{H}_2\text{O} = 1(2) + 16(1) \approx 18$.

Relative " " of $\square = 12(6) + 1(12) \approx 84$. ✓

$$\frac{\% \text{age mass of } \text{H}_2\text{O}}{\% \text{age mass of } \square} = \frac{\text{V.P of } \text{H}_2\text{O}}{\text{V.P of } \square} \times \frac{M_w \text{H}_2\text{O}}{M_w \square}$$

$$\% \text{age mass of } \square = x$$

$$" " " \text{H}_2\text{O} = 100 - x \quad [\text{Since Original \%} = 100]$$

UGANDA NATIONAL EXAMINATIONS BOARD
NOVEMBER - DECEMBER, 2018

Page 3

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Hence:

$$\frac{100-x}{x} = \frac{655}{105} \times \frac{18}{84} \Leftrightarrow \frac{100-x}{x} = \frac{11,790}{8,820}$$

$$8,820[100-x] = 11,790x \Leftrightarrow 882,000 - 8,820x = 11,790x$$

$$[11,790 + 8,820]x = 882,000 \Leftrightarrow 20,610x = 882,000$$

$$x = \frac{882,000}{20,610} \Leftrightarrow 42.80 = x$$

$$\% \text{age of } C_6H_{12} = 42.80 \cdot \checkmark$$

$$\% \text{age of } H_2O = 57.20 \cdot [\text{Since } 100-x=42.80]$$

03

c ii). Refer to graph page.

(ii). The mixture deviate negatively because of the stronger bonds formed between water and nitric acid than the bond between water and nitric acid molecules alone hence this reduces escaping tendency of molecules into vapour phase. Vapour pressure above the mixture is less than expected from Raoult's law. the mixture maximum boiling-point at a certain composition.

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(iii). When a mixture containing 40% of nitric acid is fractionally distilled it boils at constant temperature to form vapour with higher

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(To be fastened together with other answers to paper)

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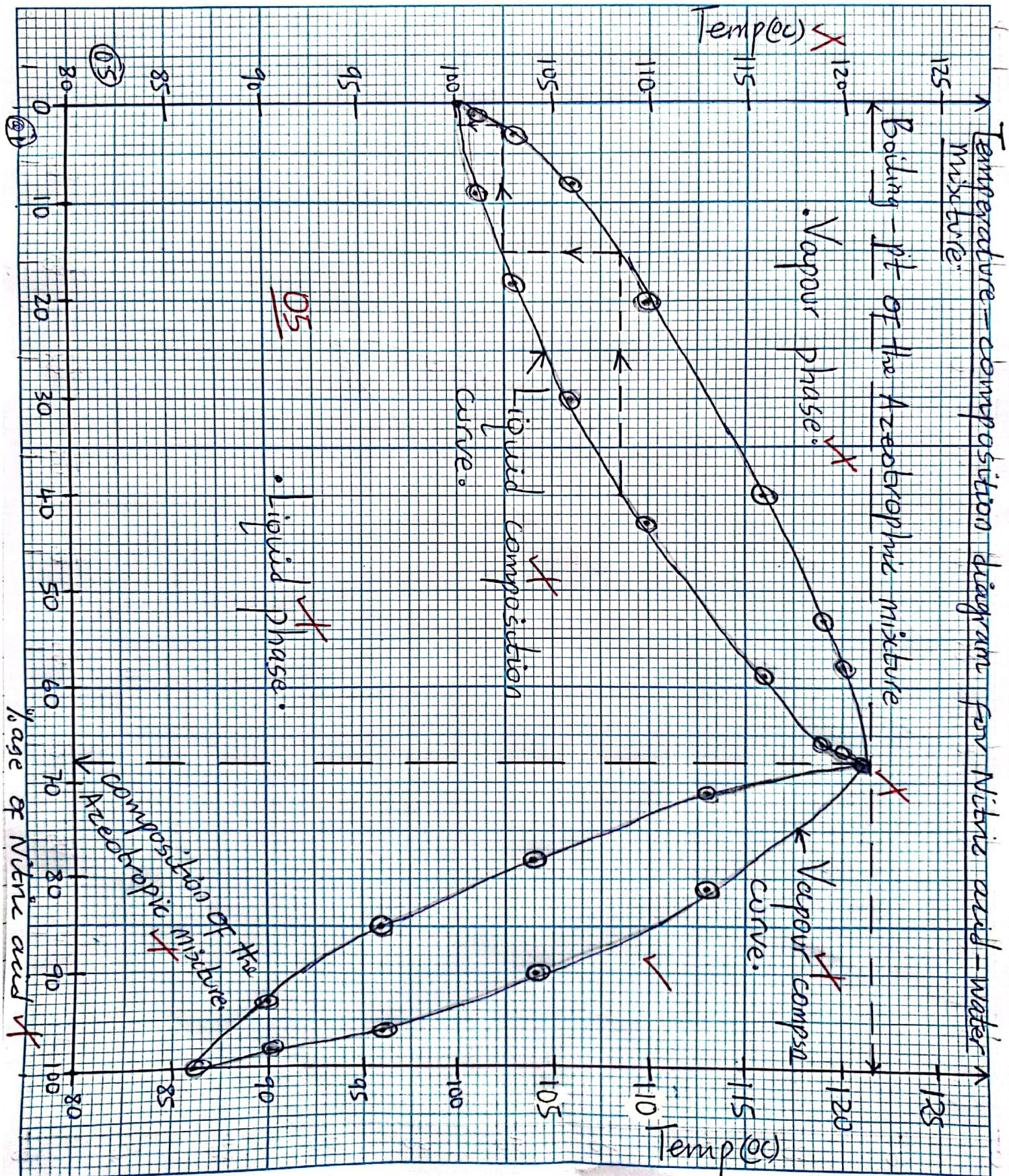
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NOVEMBER - DECEMBER, 2018

Page 4

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of water than nitric acid. Cooling this vapour forms a liquid mixture with the same composition as the vapour. Successive heating and cooling gives pure water as the distillate and azeotropic mixture as the residue.

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NOVEMBER - DECEMBER, 2018

Page 5

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$$\text{Qn 08(a). } \frac{\text{Mass of bromine, } Y}{\text{Mass of bromoalkane, } P} \times 100 = \% \text{age of Br atom.}$$

Let the mass of Bromine atom is 6.20 g & $P = Y$.

$$\therefore \frac{Y}{6.20} \times 100 = 65.04 \Leftrightarrow \frac{100Y}{6.20} = 65.04$$

$$\frac{6.20 \times 100Y}{6.20} = 65.04 \times 6.20 \Rightarrow 100Y = 65.04 \times 6.20$$

$$Y = \frac{403.248}{100} \Rightarrow Y = 4.03 \text{ g. } \checkmark$$

$$\begin{aligned} \text{R.A.M of Bromine atom} &= 80 \\ \text{R.A.M of bromoalkane, } P &= W \end{aligned}$$

$$\therefore \frac{\text{Mass of Bromine atom}}{\text{Mass of Bromoalkane, } P} = \frac{\text{R.A.M of Bromine atom}}{\text{R.A.M of Bromoalkane, } P}$$

$$\frac{4.03}{6.20} = \frac{80}{W} \Rightarrow W = \frac{80 \times 6.20}{4.03} = 123.08$$

$$\text{R.A.M of Bromoalkane, } P = 123.08$$

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80.00 > 6.20] g of Bromoalkane, P.
4.03

= 123.08 g of Bromoalkane, P. ✓

ALTERNATIVELY:

$$\text{No of moles of Bromine atom} = \frac{\text{Mass of Bromine atom}}{\text{R.A.M of Bromine atom}}$$

$$= \frac{4.03}{80.00} = 0.050375 \text{ moles}$$

Hence:

Molecular mass of Bromoalkane, P $M_{rW} = \frac{\text{Mass of Bromoalkane, P}}{\text{No moles of P}}$

$$= \frac{6.20000}{0.050375} \checkmark$$

[Since mole ratio of $C_nH_{2n+1}Br$: Bromine atom = 1 : 1]

$$= 123.08 \cdot \cancel{H}$$

Empirical formula = Molar mass, Mr of Bromoalkane, P

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NOVEMBER - DECEMBER, 2018

Page 7

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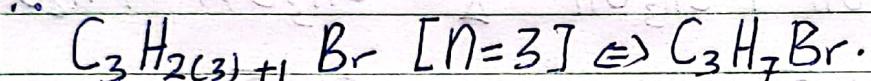
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$$C_nH_{2n+1}Br = 123.08 \Leftrightarrow 12n + 2n + 1 + 80 = 123.08$$

$$14n + 81 = 123.08 \Leftrightarrow 14n = 123.08 - 81$$

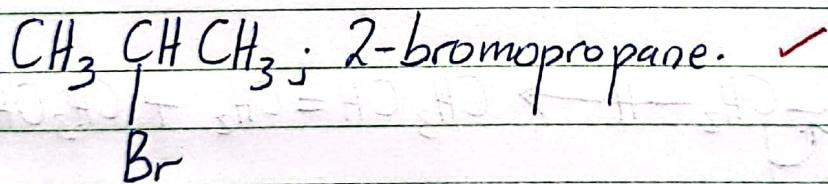
$$\frac{14n}{14} = \frac{42.08}{14} \Leftrightarrow n = 3$$



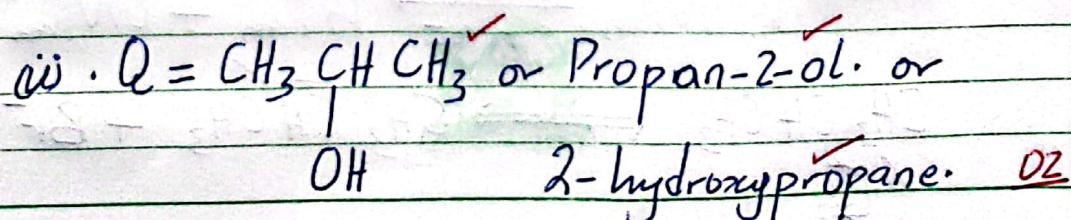
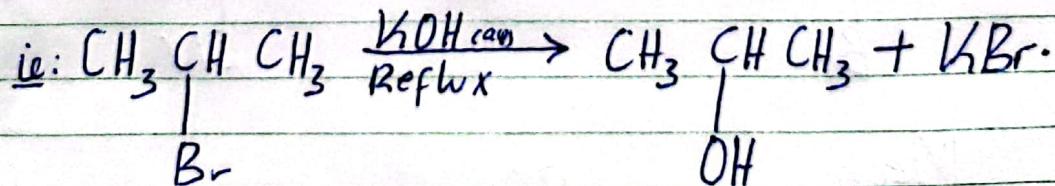
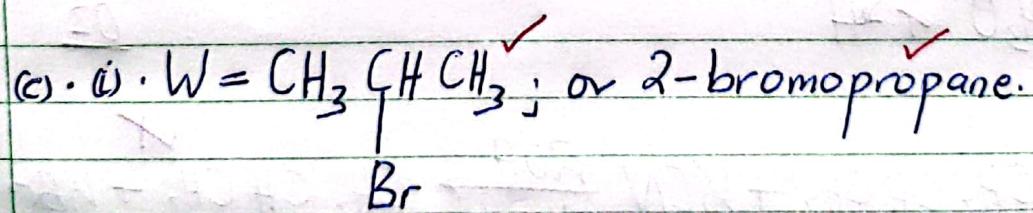
The molecular formula of Bromoalkane, P = C_3H_7Br . ✓

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(b). $CH_3CH_2CH_2Br$; 1-bromopropane. ✓



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NOVEMBER - DECEMBER, 2018

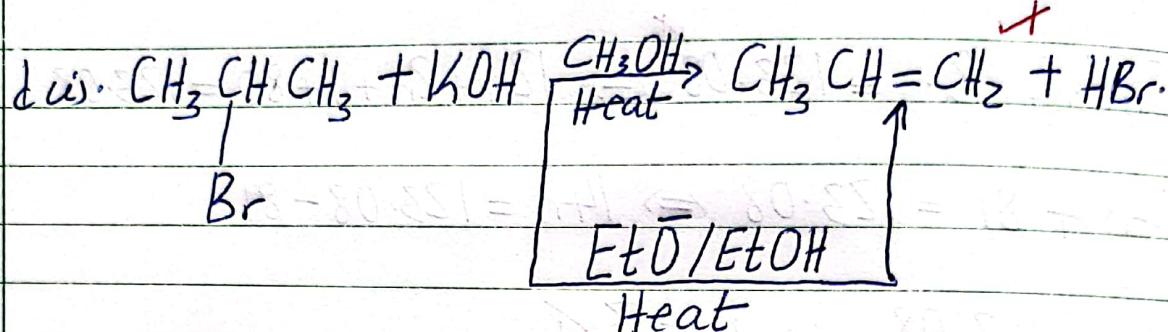
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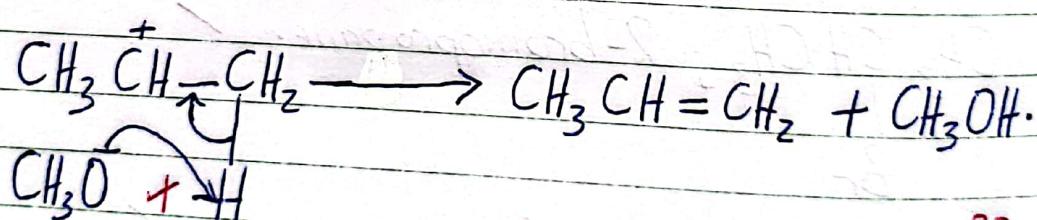
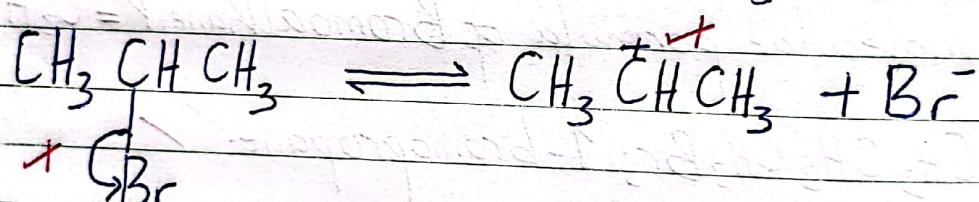
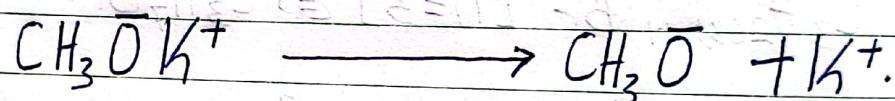
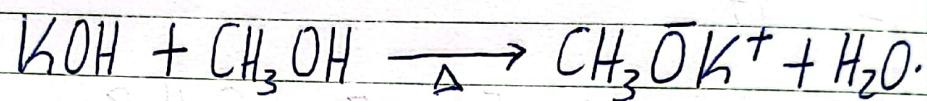
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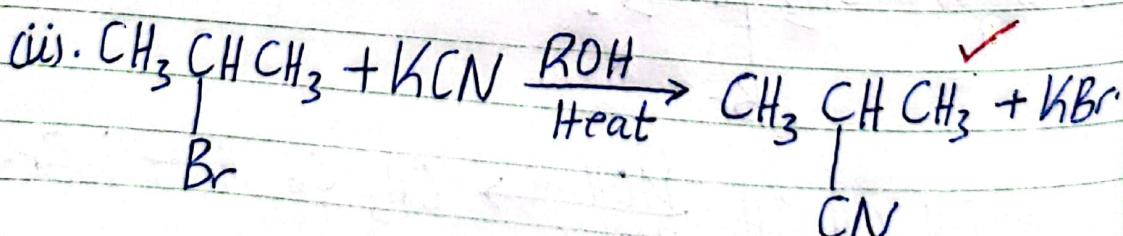
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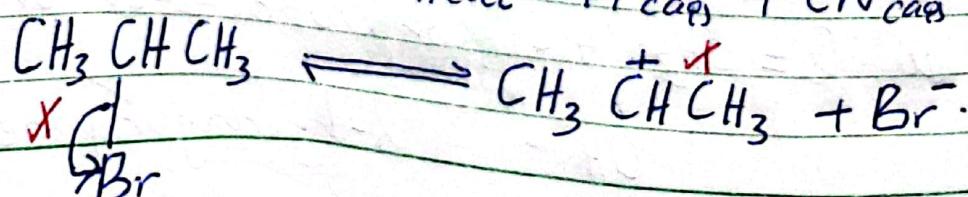
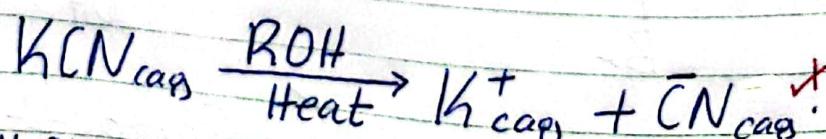
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NOVEMBER - DECEMBER, 2018

Page 9

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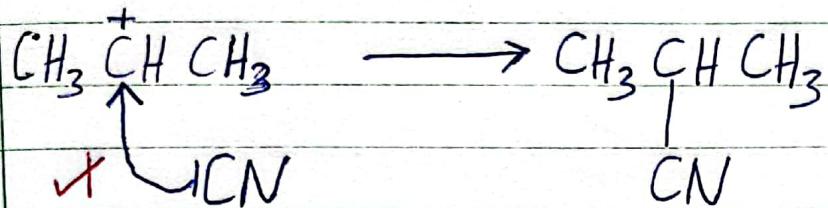
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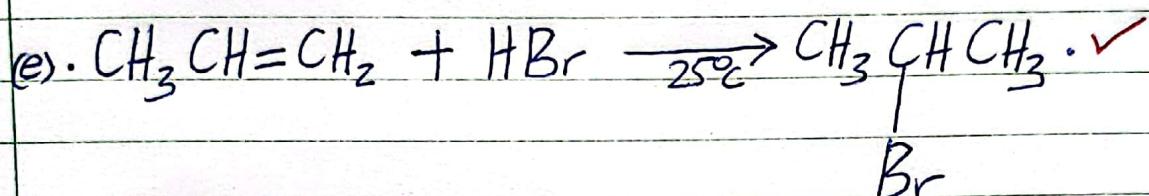
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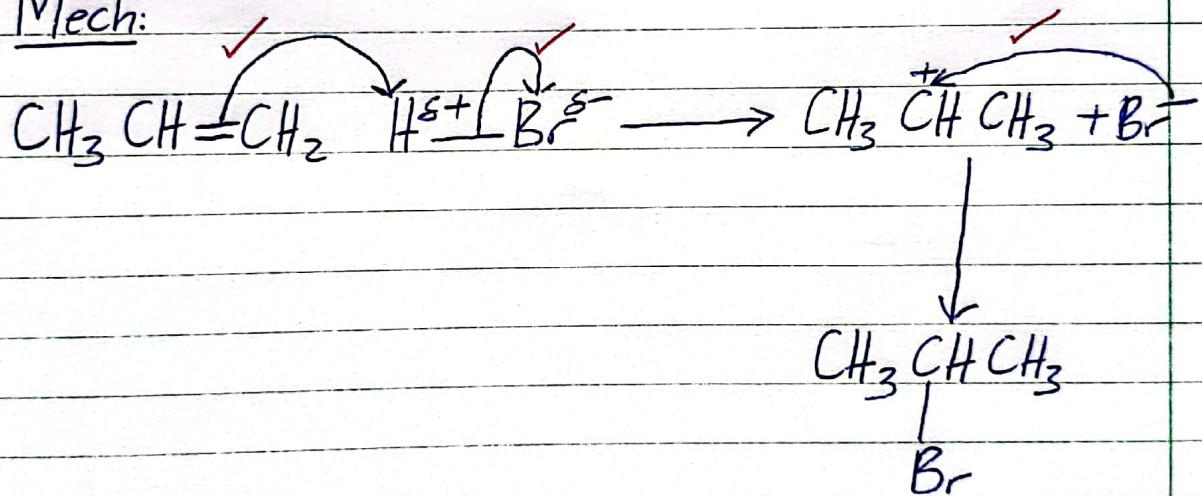
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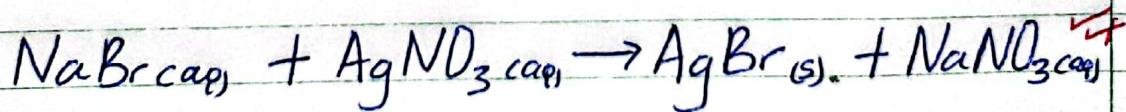
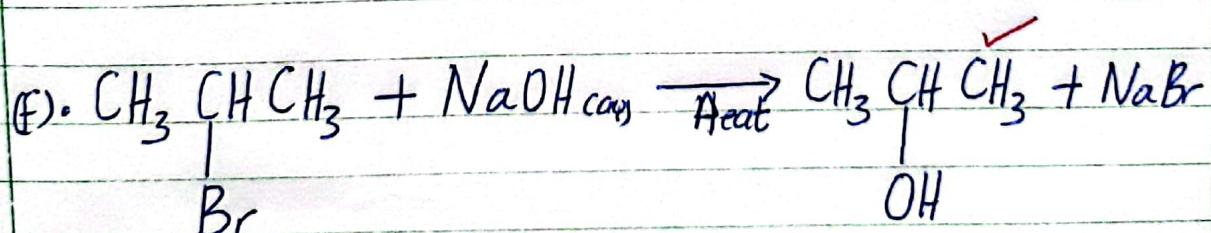
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Observation:

Pale yellow precipitate is formed with 2-bromopropane.

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