



# MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education  
PRE-MOCK EXAMINATIONS 2022



233/2  
JUNE 2022

**CHEMISTRY**

**Paper 2**  
**TIME: 2Hours**

Name: ..... Adm No: .....

Class: ..... Candidate's Signature: ..... Date: ...../6/2022.

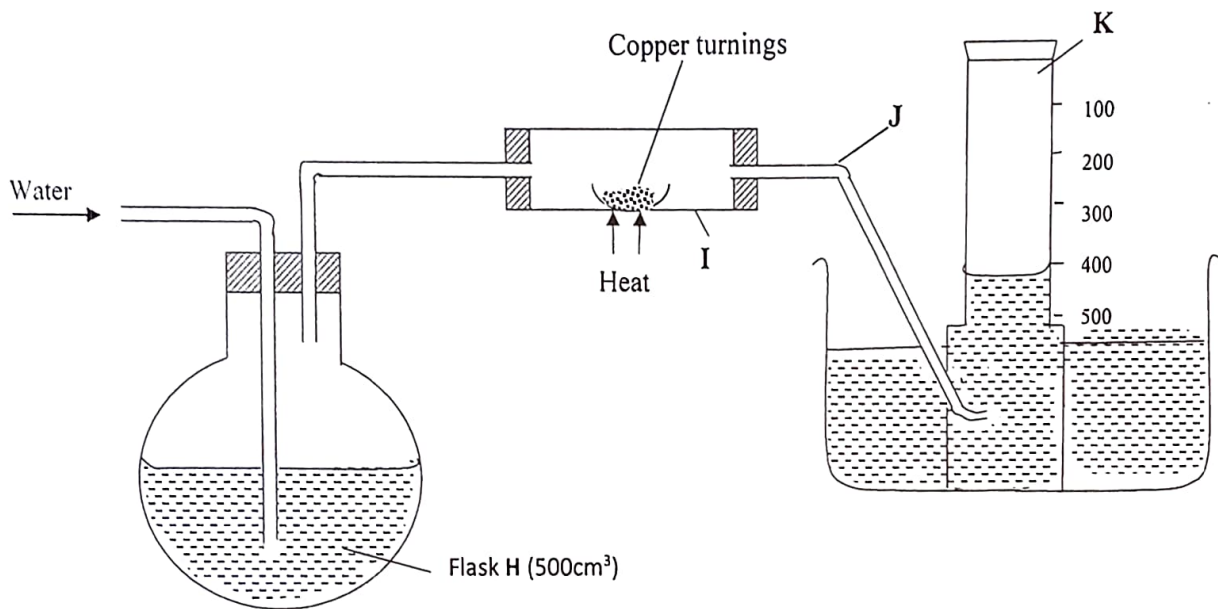
**Instructions to candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Answer ALL the questions in the spaces provided and show ALL working
- (d) KNEC mathematical tables & silent non-programmable electronic calculators may be used.
- (f) This paper consists of 13 printed pages
- (g) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing

FOR EXAMINER'S USE ONLY.

Questions	Maximum Score	Candidate's Score
1	10	
2	12	
3	10	
4	12	
5	13	
6	13	
7	10	
<b>TOTAL</b>	<b>80</b>	

1.A. In an experiment to determine the percentage of oxygen in air, the apparatus below were set up. Study the set up and the information provided to answer the questions that follow.



A 500cm<sup>3</sup> measuring cylinder **K** was filled with water and assembled for gas collection. Copper turnings were heated red hot and water was slowly passed into 500cm<sup>3</sup> flask **H** until it reached the 500cm<sup>3</sup> mark. A colourless gas was collected in **K**.

(i) What was the purpose of passing water into flask **H**? (1 mark)

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(ii) What observations were made in the tube **I**? (1 mark)

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(iii) Name one of the gases that is likely to be found in **J**. (1 mark)

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(iv) What was the volume of the gas collected in the measuring cylinder at the end of the experiment? (1 mark)

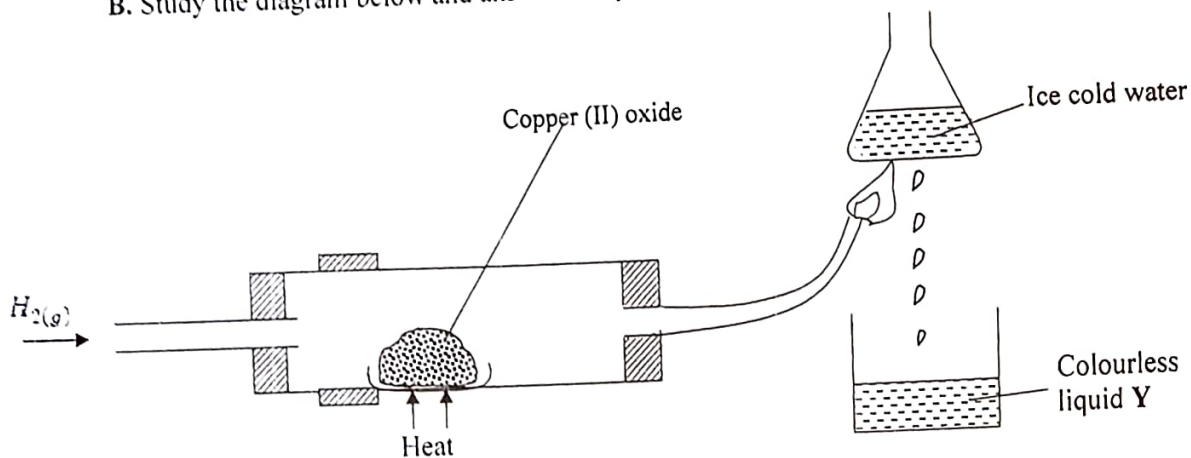
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(v) Calculate the percentage of oxygen in air using the above results. (2 marks)

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B. Study the diagram below and answer the questions that follow.



(a) Give *one* observation made in the combustion tube after some time. **(1 mark)**

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(b) Write an equation for the formation of the colourless liquid Y. **(1 mark)**

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(c) What was the aim of the above experiment as demonstrated in the combustion tube? Explain. **(2 marks)**

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2. Use the information below to answer the questions that follow. The letters are not the actual symbols of the elements.

Element	Atomic No.	M.P <sup>0</sup> C	B.P <sup>0</sup> C	Ionic radius (nm)
P	11	98	890	0.095
Q	12	650	1110	0.065
R	13	660	2470	0.050
S	14	1410	2360	0.041
T	15	44.2 & 590	280	0.034
U	16	113 & 119	445	0.184
V	17	-101	-35	0.181
W	18	-189	-186	-

(a) (i) Write the electronic configuration of the atoms represented by letters **T** and **W**. (1 mark)

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(ii) State the nature of the oxides of the elements represented by **Q** and **U**. (2 marks)

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(b) Why do the elements represented by the letters **T** and **U** have two values of melting points? (1 mark)

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(c) Explain the following observations in terms of structure and bonding.

(i) There is an increase in boiling point from **P** to **R**. (2 marks)

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(ii) Element **S** has a high boiling point. (2 marks)

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(iii) There is a decrease in boiling points from **U** to **W**. (2 marks)

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(d) (i) Compare the atomic radius of **U** and **V**. Explain. (1 mark)

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(ii) Why is there no ionic radius for W reported in the table? (1 mark)

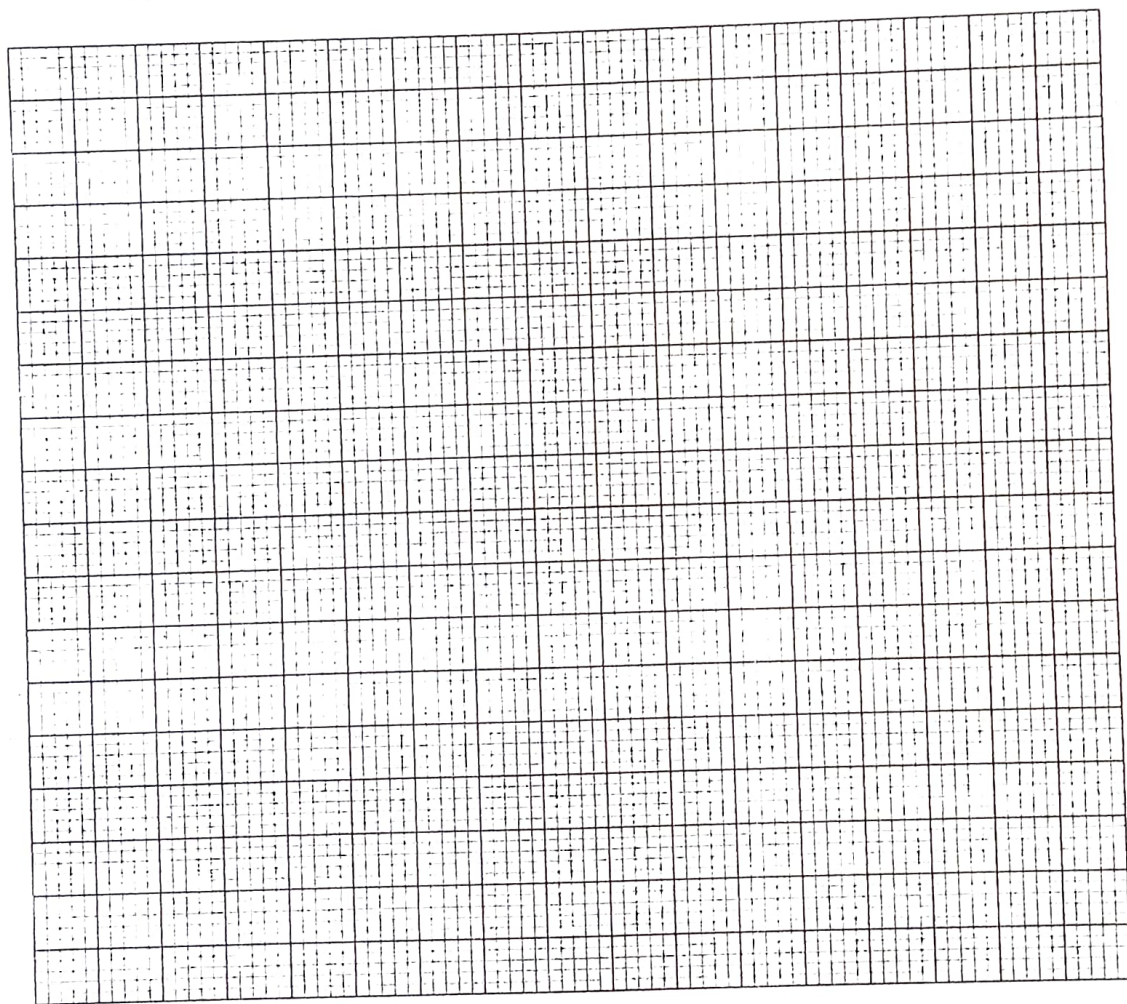
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3. (a) The solubilities of potassium nitrate and potassium bromide at different temperatures was determined. The following data was obtained.

Temperature °C		0	10	20	30	40	50	60	70	80
Solubility g/100g H <sub>2</sub> O	KNO <sub>3</sub>	5	15	26	43	61	83	105	135	165
	KBr	50	55	60	65	70	77	85	90	95

(i) Draw solubility curves for both salts on the same axis. (3 marks)



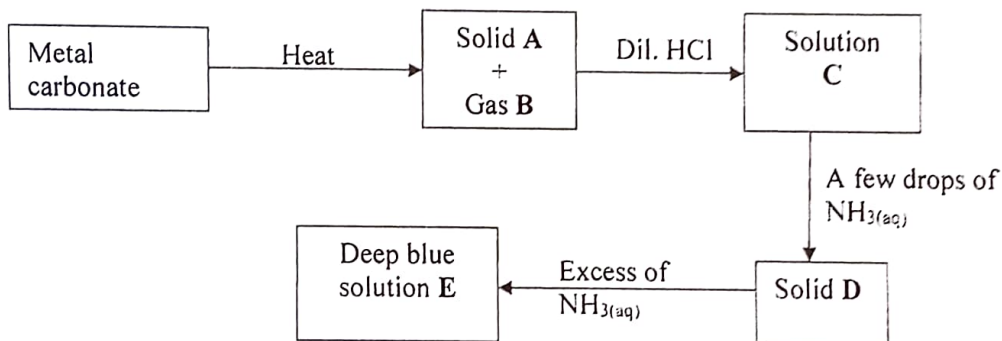
(ii) From your graph, determine the solubility of each salt at 65°C? (1 mark)

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(iii) 100g of a saturated solution of potassium nitrate at 70°C was cooled to 20°C. What mass of the crystals will be crystallized? (2 marks)

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(b) Study the flow chart below and answer the questions that follow.



(i) Write an equation for the formation of solid A and gas B. (1 mark)

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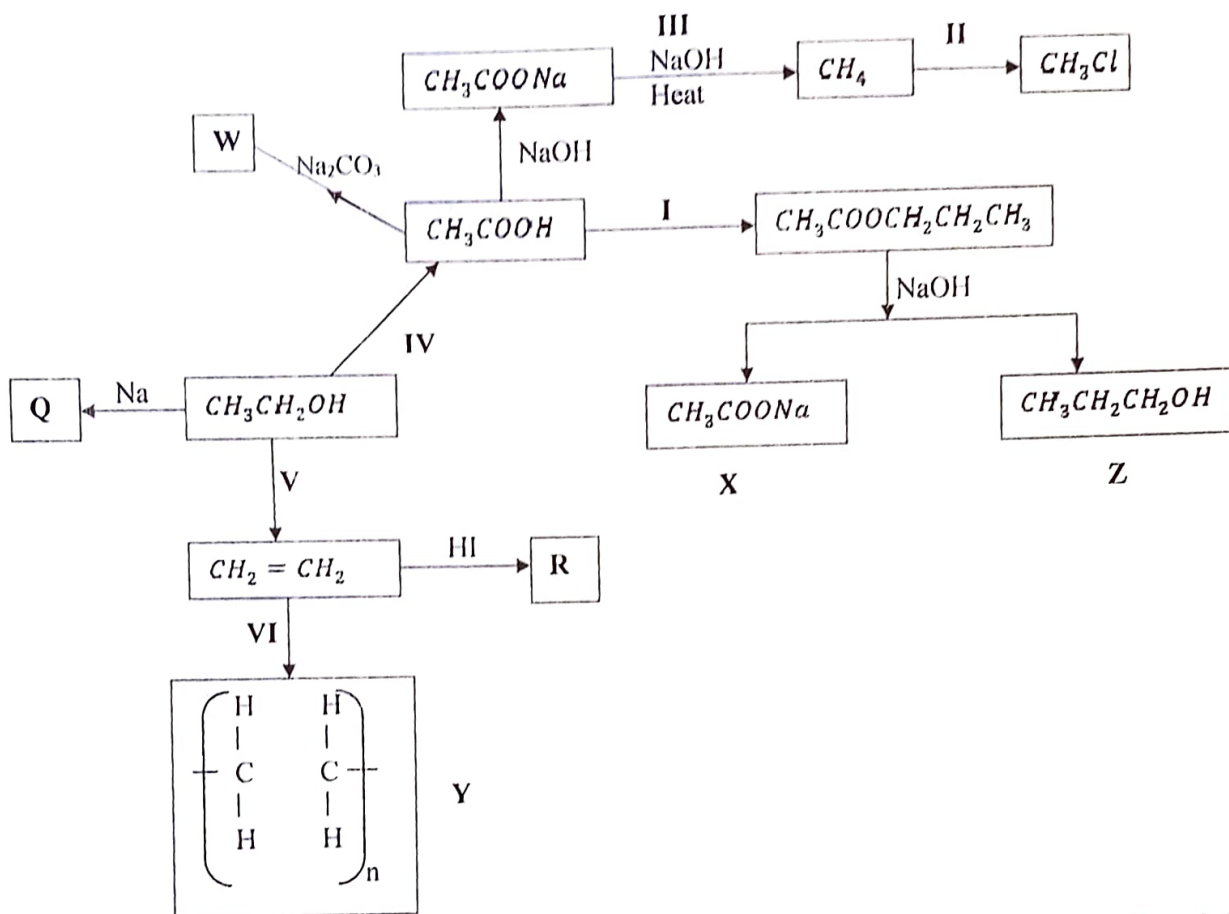
(ii) Name: Solution C - ..... (1 mark)

Solid D- ..... (1 mark)

(c) Write the formula of the complex ion in solution E. (1 mark)

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 .....

4. Study the flow chart below and answer the questions that follow.



(a) Name substance. (3 marks)

- X - .....
- Q - .....
- R - .....

(b) Write down an equation for the reaction represented by step III. (1 mark)

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(c) What are the conditions and reagent required for steps?

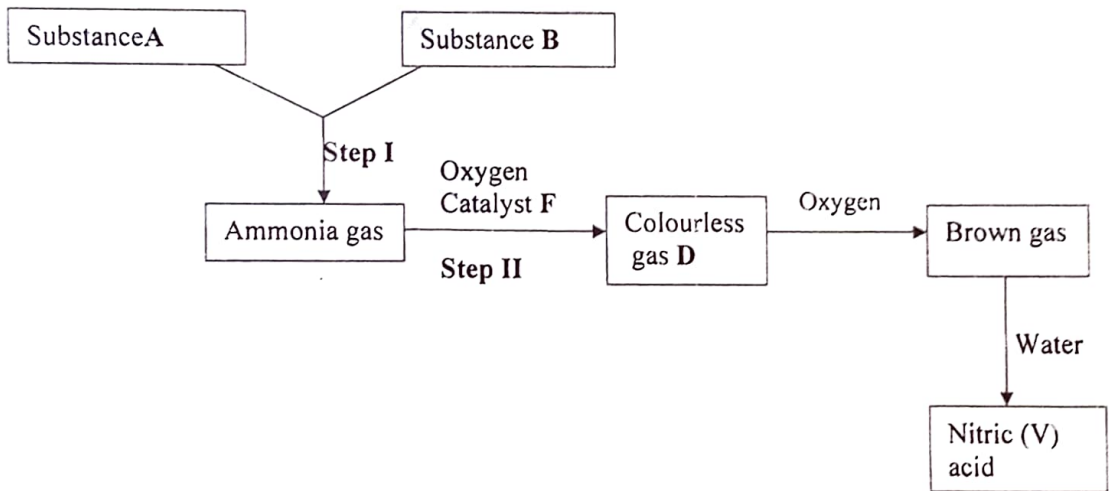
- (i) I - Reagent - .....
- Condition - ..... (2 marks)

- (ii) IV- Reagent - .....  
 Condition - ..... (2 marks)

(b) Name the process represented by: (4 marks)

- I - .....  
 II - .....  
 IV - .....  
 V - .....

5. I. Study the scheme below and answer the questions that follow.



(a) Identify substances. (3 marks)

- A - .....  
 B - .....  
 D - .....

(b) State the catalyst necessary for; (2 marks)

Step I - .....

Step II - .....

(c) Write an equation for the reaction taking place in step II. (1 mark)

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(d) Write **two** balanced chemical equations for the reaction between chlorine gas and;

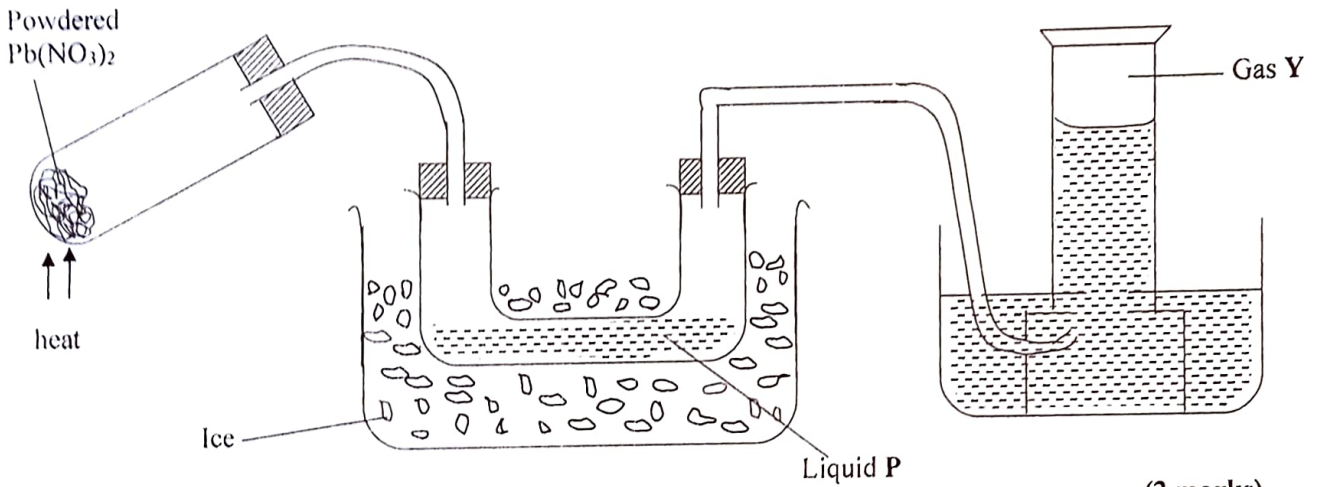
(i) Hot and concentrated sodium hydroxide. **(1 mark)**

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(ii) Dilute and cold sodium hydroxide. **(1 mark)**

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II. The diagram below shows an experiment in which the Lead (II) nitrate crystals are heated.



(a) Name; **(2 marks)**

(i) Liquid P - .....

(ii) Gas Y - .....

(b) Write a balanced chemical equation for the decomposition of Lead (II) nitrate. **(1 mark)**

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(c) Explain how you can distinguish between nitrogen (II) oxide and nitrogen (I) oxide. **(2 marks)**

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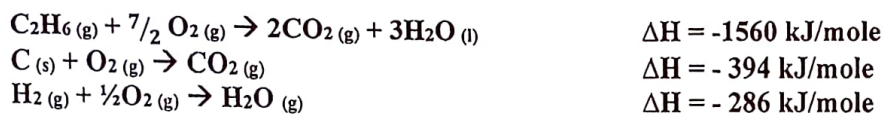
6. a) i) State Hess' Law (1 mark)

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ii) Use the equations given below to answer the questions that follow.



I) Draw an energy cycle diagram that links the enthalpy of formation of ethane to combustion of carbon, hydrogen and ethane. (1 mark)

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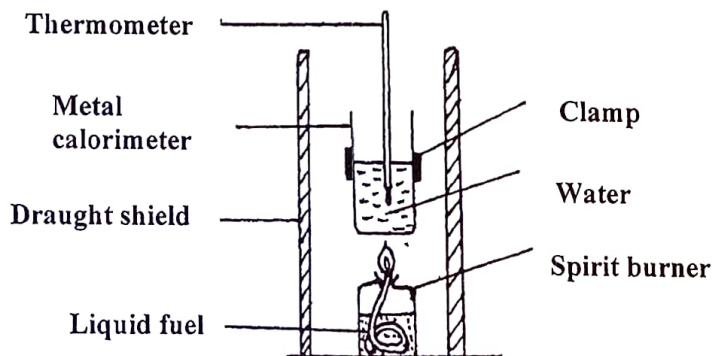
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II) Determine the enthalpy of formation of ethane (2 marks)

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b) The diagram below shows the set-up of the apparatus used by a student to determine the enthalpy change of combustion of ethanol. The heat produced by burning fuel warms a known mass of water.



Results

Volume of water in the beaker = 500 cm<sup>3</sup>  
 Initial temperature of water = 12°C  
 Final temperature of water = 31.5°C  
 Mass of ethanol burnt = 1.50g  
 Density of water = 1 g/cm<sup>3</sup>  
 Specific heat capacity = 4.2 Jg<sup>-1</sup>K<sup>-1</sup>

(i) Calculate the heat required to raise the temperature of the water from 12°C to 31.5°C. (2 marks)

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 .....

(ii) Find the molar enthalpy of combustion of ethanol. (2 marks)  
 (C = 12, H = 1, O = 16)

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(iii) An accurate value for ΔH<sub>c</sub> of ethanol is -1368 kJmol<sup>-1</sup>. State two sources of errors for the low figure obtained. (2 marks)

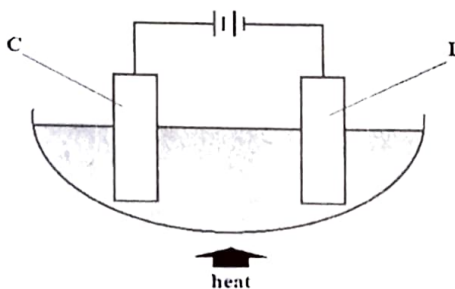
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(iv) Draw an energy level diagram for the combustion of ethanol. (2 marks)

(v) Calculate the heating value of ethanol from the above experiment. (1 mark)  
 ( $C = 12, H = 1, O = 16$ )

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7. a) The diagram below represents a set-up of apparatus used in the electrolysis of lead (II) bromide



i) Name electrodes C and D (1 mark)

C .....

D .....

ii) State and explain the observation made at electrode D (2 marks)

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iii) Write the ionic equation for the reaction at electrode C (1 mark)

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iv) State two applications of electrolysis (2 marks)

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b) The table below gives some properties of substances A, B, C, and D. Study it and answer the questions that follow.

Substance	Electrical Conductivity		Melting Point (°C)	Boiling Point (°C)
	Solid	Molten		
A	Does not conduct	Conducts	801	1420
B	Conducts	Conducts	650	1107
C	Does not conduct	Does not conduct	1700	2200
D	Does not conduct	Does not conduct	113	440

i) Which particles are responsible for conductivity in substances: (2 marks)

A .....

B .....

ii) Which substance is likely to be silicon (IV) oxide? Explain. (2 marks)

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