

NAME:.....

INDEX NO:.....

SCHOOL:.....

DATE:.....

SIGN:.....

233/2

**CHEMISTRY**

**PAPER 2**

**(THEORY)**

**JULY/AUGUST - 2012**

**TIME: 2 HOURS**

## **MANGA DISTRICT JOINT EVALUATION EXAM– 2012**

*Kenya National Examination Council (K.C.S.E)*

233/2

**CHEMISTRY**

**PAPER 2**

**(THEORY)**

**JULY/AUGUST - 2012**

**TIME: 2 HOURS**

### **INSTRUCTIONS TO CANDIDATES**

- (a) Write your name and Index number in the spaces provided above.
- (b) Answer ALL questions in the spaces provided
- (d) Mathematical tables and silent electronic calculators may be used.
- (e) ALL working MUST be clearly shown where necessary.

### **FOR EXAMINERS USE ONLY.**

<b>QUESTIONS</b>	<b>MAXIMUM SCORE</b>	<b>CANDIDATES SCORE</b>
<b>1</b>	<b>12</b>	
<b>2</b>	<b>11</b>	
<b>3</b>	<b>12</b>	
<b>4</b>	<b>12</b>	
<b>5</b>	<b>10</b>	
<b>6</b>	<b>12</b>	
<b>7</b>	<b>11</b>	
<b>Total Score</b>	<b>80</b>	

*This paper consists of 12 printed pages.*

*Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.*

1. (a) Study the information in the table below and answer the questions that follow. The letters are not the actual symbols of the element.

Element	Atomic number	Melting point (K)
H	6	646
K	8	55
L	18	24
M	11	370
N	16	386
P	20	1123
Q	13	933

- (i) Select the most stable element. Give a reason. (1mk)

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- (ii) Give a reason why the melting point of Q is higher than that of M. (1mk)

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- (iii) To which group and period does element P belong? Explain

Period ( ½ mk)

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Reason ( ½ mk)

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Group ( ½ mk)

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Reason ( ½ mk)

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- (iv) State two uses of element L. (1mk)

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- (v) Using dot (•) and cross (x) to represent electrons on the outermost energy level.

Show bonding between element K and H in the ratio 1 : 1 (2mks)

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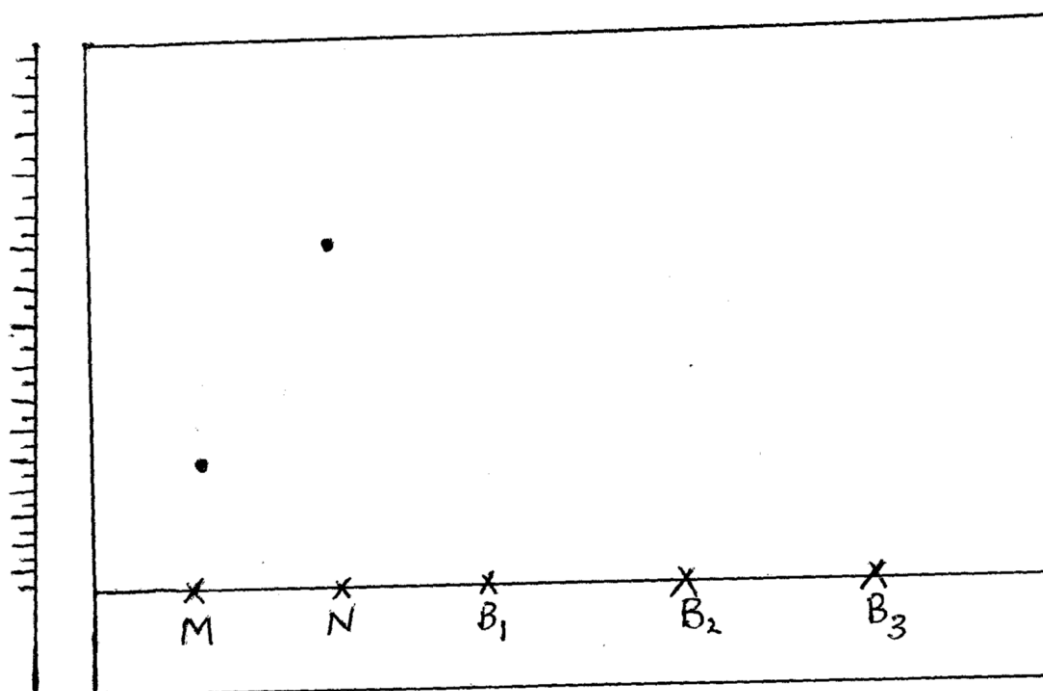
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- (b) Urine samples from three athletes B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub> at national sports meeting were spotted onto Chromatography paper alongside two banned drugs M and N. Chromatogram was run using ethanol. Study the diagram below and answer questions.



- (i) After development B<sub>1</sub> and B<sub>2</sub> were found to have moved 9cm and 4cm respectively, while B<sub>3</sub> moved 4cm and 6cm. Show the positions of all the spots after development. (2 ½ mks)
- (ii) Identify the athletes who had used the banned drug. (1mk)
- .....
- (iii) Name another substance which can be used instead of ethanol (½ mk)
- .....
- (iv) Which drug is less soluble in ethanol? Explain (1mk)
- .....
2. (a) (i) What is meant by the term picking of metals? (1mk)
- .....
- (ii) Name the substance used for picking of metals. (1mk)
- .....
- (b) (i) State and explain the observations made when hydrochloric acid added to lead (II) nitrate solution and warmed. (2mks)
- .....
- .....
- .....
- (ii) Write an equation for the reaction in b (i) above. (1mk)
- .....

(c) A sample of hydrogen chloride gas was dissolved in water to make 250cm<sup>3</sup> of solution. 18.0cm<sup>3</sup> of this solution required 30.0cm<sup>3</sup> of 0.8m potassium hydroxide solution for complete neutralization.

Calculate:

(i) the moles of hydrochloric acid in 18.0cm<sup>3</sup> of solution. (2mks)

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(ii) the mass of hydrogen chloride gas that was dissolved to make 250cm<sup>3</sup> of solution. (H = 1.0, Cl = 35.5) (2mks)

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(d) State two reasons why an inverted funnel is used to dissolve hydrogen chloride gas in water (2mks)

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3. (a) Draw the structures of the following compounds.

(i) Hexanoic acid (1mk)

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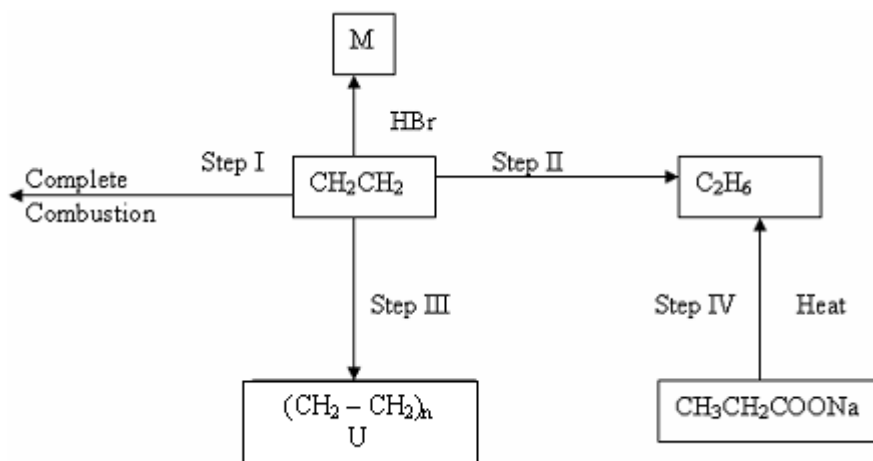
(ii) 2 – methylprop-1-ene (1mk)

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(b) Describe a physical test that can be used to distinguish between ethanol and Heptan-1-ol. (2mks)

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(c) Study the scheme below and answer the questions that follow.



(i) Name the process represented by step III (1mk)

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(ii) Identify the reagents and conditions in step II.

Reagent (1mk)

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Conditions (1mk)

.....

(iii) Draw the structure of compound M (1mk)

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(iv) Write an equation for complete combustion in step I (1mk)

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(v) The relative molecular mass of compound U is 67200. Calculate the Value of n. (2mks)

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4. (a) What is an electrolyte? (1mk)

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(b) State how the following substances conducts heat and electricity.

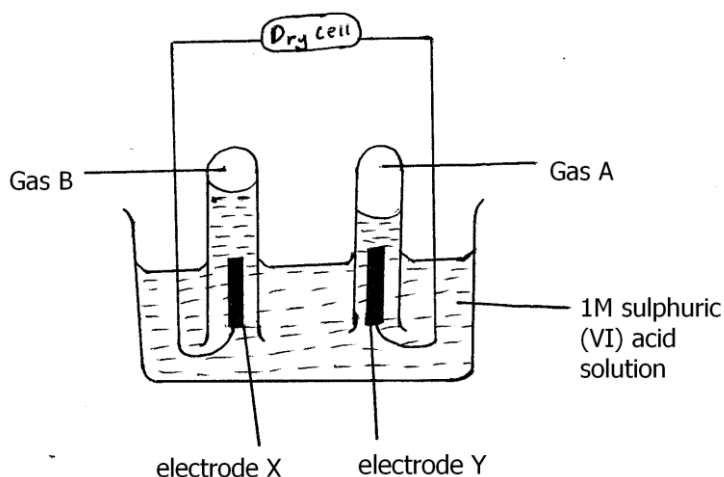
(i) graphite (1mk)

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(ii) Ammonia solution (1mk)

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(c) 1M sulphuric (VI) acid solution was electrolysed using the set up shown below.



(i) Name the type of electrode used. (1mk)

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(ii) Label the anode and cathode on the diagram. (1mk)

(iii) Write an equation for the reaction at electrode Y. (1mk)

.....

(iv) On the diagram above, using an arrow show the direction flow of electrons. (1mk)

(d) (i) In an experiment to electroplate a copper spoon with silver, a current of 0.7A was passed for 72 minutes. Calculate the mass of silver deposited on the spoon. ( $Ag = 108$ , 1 Faraday = 96500 coulombs). (3mks)

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- (ii) Give two reasons why some metals are electroplated. (2mks)

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5. The table below shows the volume of nitrogen (IV) oxide gas produced when different volumes of 3M nitric (V) acid were each reacted with 0.56g of iron powder at room temperature.

Volume of 1M nitric (V) acid (cm <sup>3</sup> )	Volume of nitrogen (IV) oxide gas (cm <sup>3</sup> )
2.5	30
5	60
15	180
25	300
35	420
45	480
55	510
65	510

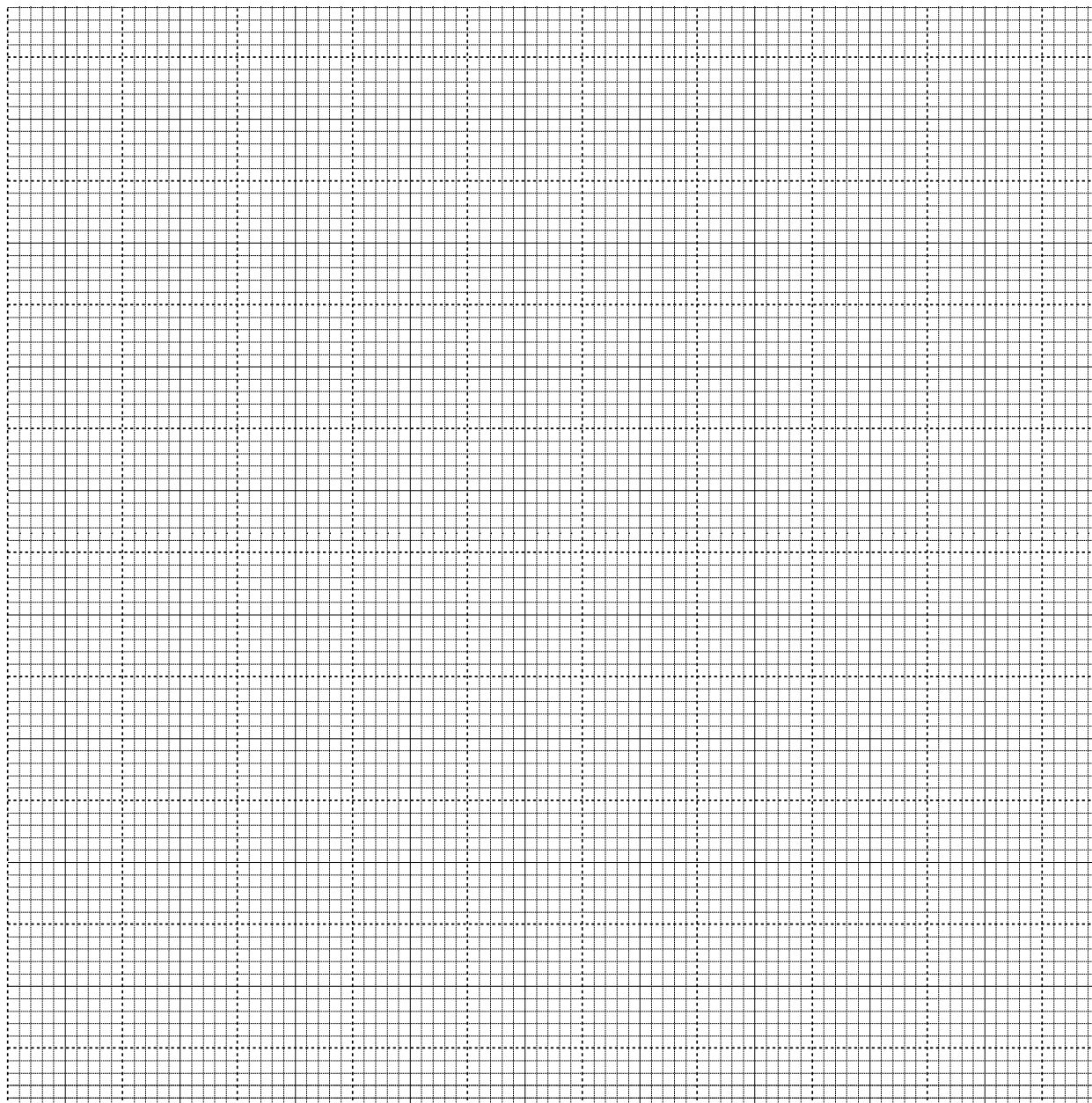
- (a) (i) Give a reason why nitric (V) acid is not preferred for preparation of hydrogen gas. (1mk)

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- (ii) Explain how the decrease in temperature would affect the rate of reaction between iron powder and nitric (V) acid. (2mks)

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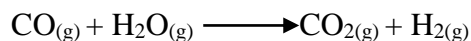
- (iii) On the grid provided below, plot a graph of the volume of the nitrogen (IV) oxide gas (vertical axis) against volume of nitric (V) acid. (3mks)



- (b) Using the graph, determine the volume of:
- (i) 3M nitric (V) acid which would react completely with 0.56 of iron. (1mk)
- .....
- .....
- (ii) Nitrogen (IV) oxide gas produced when 40cm<sup>3</sup> of 3M nitric (V) acid were reacted with 0.56g of iron powder. (1mk)



- (c) Carbon (II) oxide gas reacts with steam at a pressure of 20 atmospheres and a Temperature of 180<sup>0</sup>C, according to the equation below



What would be effect on the yield of hydrogen, if the process above is carried out at a pressure of 30 atmospheres and a temperature of 180<sup>0</sup>C. (2mk)

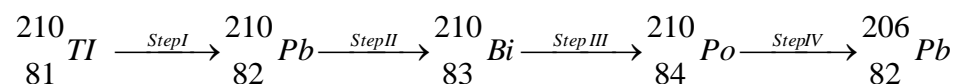
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6. (a) (i) Give two differences between nuclear and chemical reactions. (2mks)

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- (b) Below is a radioactive delay series starting with  ${}_{81}^{210}\text{Tl}$  and ending with  ${}_{82}^{206}\text{Pb}$ .

Study it and answer questions that follow.



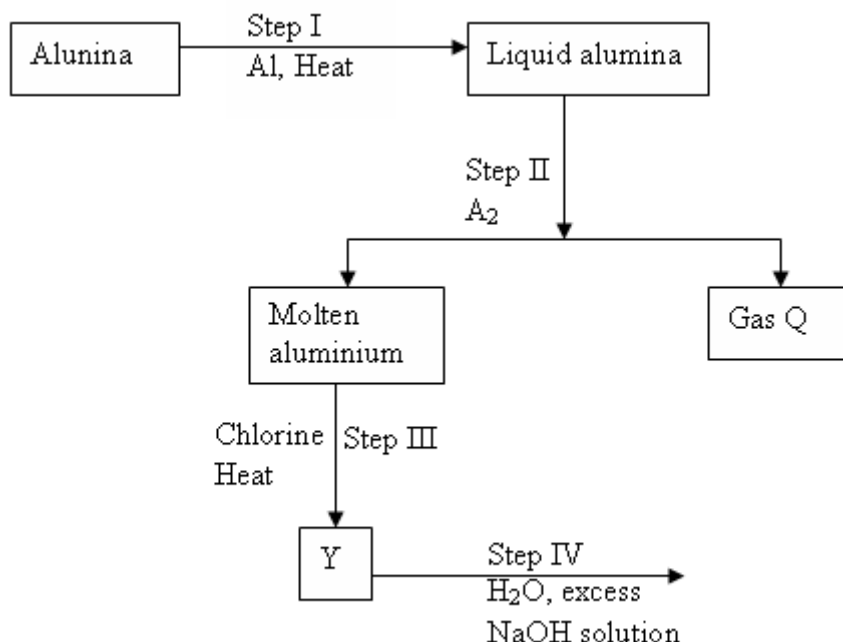
- (i) Name the particles emitted in step I and IV.  
 I..... ( ½ mk)  
 IV..... ( ½ mk)
- (ii) Write the nuclear equation for the reaction which takes place in step III (1mk)

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(c) State one application of radioactive isotopes in medicine. (1mk)

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- (d) During extraction of aluminium, the ore is first purified to obtain alumina. The scheme below shows some stages during extraction of aluminium and preparation of substance Y.



- (i) Name one ore from which aluminium is obtained (1mk)

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- (ii) Name: I. Substance A<sub>1</sub> (1mk)

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- II process A<sub>2</sub> (1mk)

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- (iii) Identify
- I. Gas Q..... (½ mk)
- II Substance Y..... (½ mk)

- (iv) State the observations that were made in step IV (1mk)

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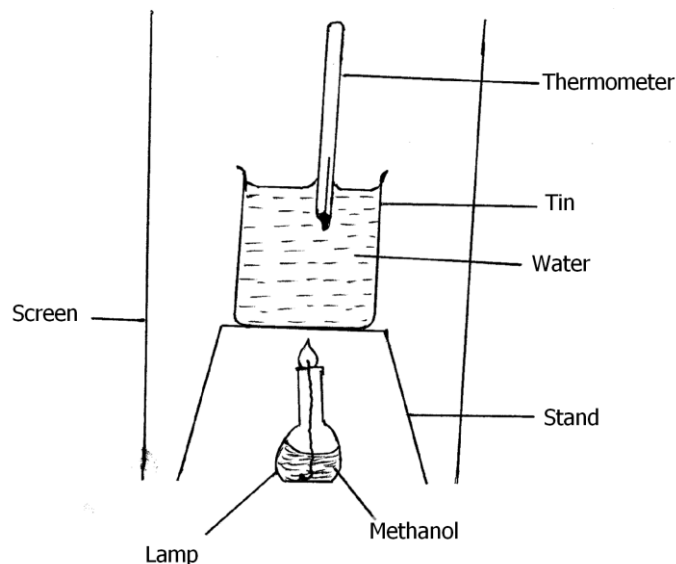
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- (v) Give two reasons why aluminium is used to make overhead cables. (2mks)

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7. The diagram below shows a set-up that was used to determine the molar heat of combustion of methanol.



During the experiment, the information below was recorded.

Volume of water	300cm <sup>3</sup>
Initial temperature of water	24.0 <sup>0</sup> C
Final temperature of water	47.5 <sup>0</sup> C
Mass of methanol + lamp before burning	142.8g
Mass of methanol + lamp after burning	141.3g

Calculate the:

- (a) heat evolved.

(Density of water = 1g/cm<sup>3</sup>, specific heat capacity of water = 4.2Jg<sup>-1</sup>k<sup>-1</sup>) (2 ½ mks)

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- (b) Molar heat of combustion of methanol.

(Molar mass of methanol = 32g) (1 ½ mks)

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(c) (i) Write the thermochemical equation for the combustion of methanol. (1mk)

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(ii) Draw an energy level diagram for reaction in (c)(i) above. (2mks)



(d) The value of molar heat of combustion of methanol in (b) above obtained is less than the literature value. State one source of the error in the experiment (1mk)

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(e) State and explain the observations which would be made during the reaction between Copper (II) sulphate solution and Zinc powder (3mks)

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