

NAME: .....ADM.....

INDEX: ..... SIGN: ..... DATE: .....

233/2

**CHEMISTRY PAPER 2**

(Theory)

**AUGUST 2022**

**TIME: 2 HRS**

**LAIKIPIA EAST TERM 2 2022 FORM 4 EVALUATION EXAM**

*Kenya Certificate of Secondary Education – K.C.S.E*

**INSTRUCTIONS**

- ✓ Write your name and index number in the spaces provided.
- ✓ Answer all questions in the spaces provided.
- ✓ The paper contains 12 printed pages.
- ✓ All working must be clearly shown.

**EXAMINERS USE**

<b>QUESTION</b>	<b>MAX SCORE</b>	<b>CANDIDATES SCORE</b>
<b>1</b>	<b>13</b>	
<b>2</b>	<b>09</b>	
<b>3</b>	<b>13</b>	
<b>4</b>	<b>11</b>	
<b>5</b>	<b>12</b>	
<b>6</b>	<b>13</b>	
<b>7</b>	<b>11</b>	
<b>Total</b>	<b>80</b>	

1. The grid below shows part of the periodic table. Study it and answer the questions that follow. The letters do not represent the true symbols of the elements.

					A		
I	B		C		D		E
F	G						H

a) Which element forms an ion of charge - 2? Explain your answer 2marks

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.....

.....

b) What is the nature of the oxide formed by element C? 1mark

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c) How does the reactivity of H compare with that of E? Explain. 2marks

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.....

d) Write the chemical equation for the reaction between B and chlorine? 1mark

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.....

e) Explain how the atomic radii of the following compare; 2marks

i) F and G

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ii) B and G

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.....

f) The oxides of B and D are separately dissolved in water. State the effect of each product on litmus paper. 2marks

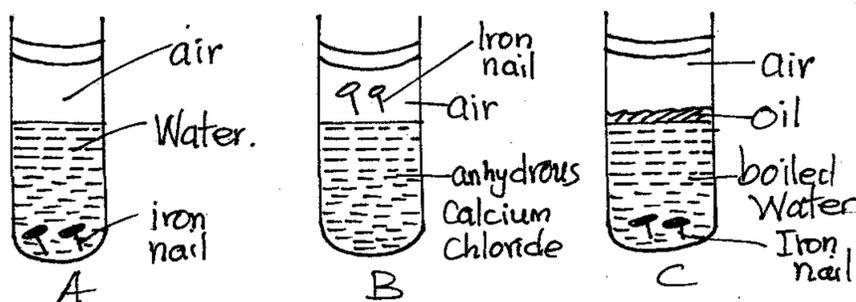
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g)  $20\text{cm}^3$  of a solution of a hydroxide of I completely neutralizes  $17.5\text{cm}^3$  of  $0.5\text{M}$  sulphuric (VI) acid.  
 Calculate the concentration in moles/litre of solution of the hydroxide of I 3marks

2. An investigation was done using the setup below. Study it and answer the questions that follow.



I State and explain the observations in each of the test tubes A,B, and C after 7 days.(3mks)

(i)Test tubes

A

.....

B

.....

C

.....

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

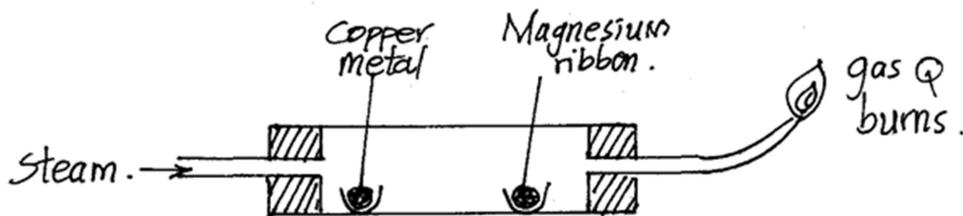
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II A student set up the apparatus below to investigate the action of steam on some metals .  
The student cleaned the magnesium ribbon with steel wool before experiment was set up.



(a) Why is necessary to clean the magnesium ribbon before the experiment was set up.(1mk)

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.....

(b) Identify gas Q (1mk)

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.....

(c) State and explain the observations made at the end of the experiment. (2mks)

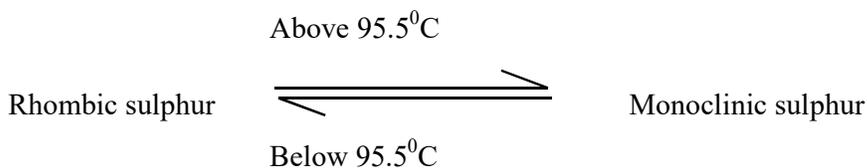
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3. a) Sulphur occurs naturally in two different forms called allotropes;

(i) What are allotropes? 1mark

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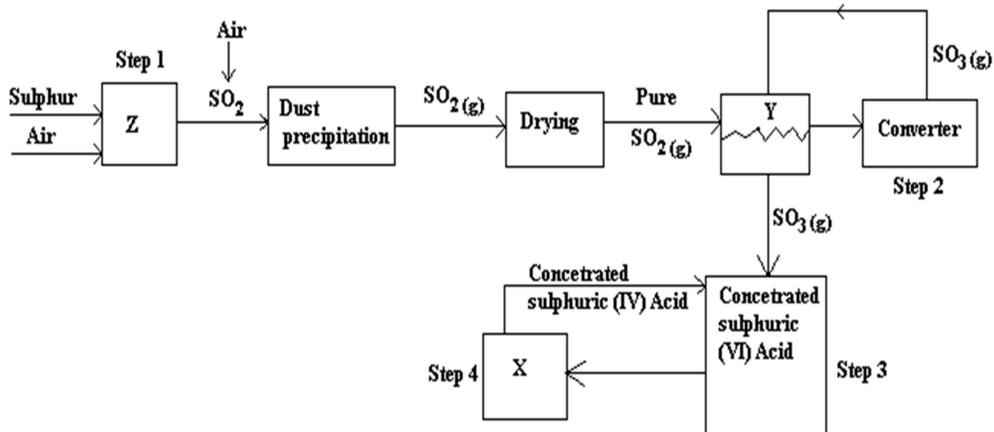
(ii) The two allotropes of sulphur are stable at different temperatures, as shown in the equation below.



Give a name to the temperature  $95.5^{\circ}\text{C}$  1mark

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b) Below is a flow chart diagram for the contact process for the manufacture of sulphuric (VI) acid.



(i) Give the name of chambers labeled

1 ½ mark

X

.....

Y

.....

Z

.....

(ii) State the three conditions in the converter.

1 ½ mark

.....  
 .....  
 .....

(iii) Explain why gases are passed through ;

2marks

I – The dust precipitator and drying power

.....  
 .....

II- The chamber labeled Y

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 .....

(iv) Write the balanced equations for the reactions in;

3marks

Step 2:

.....

Step 3:

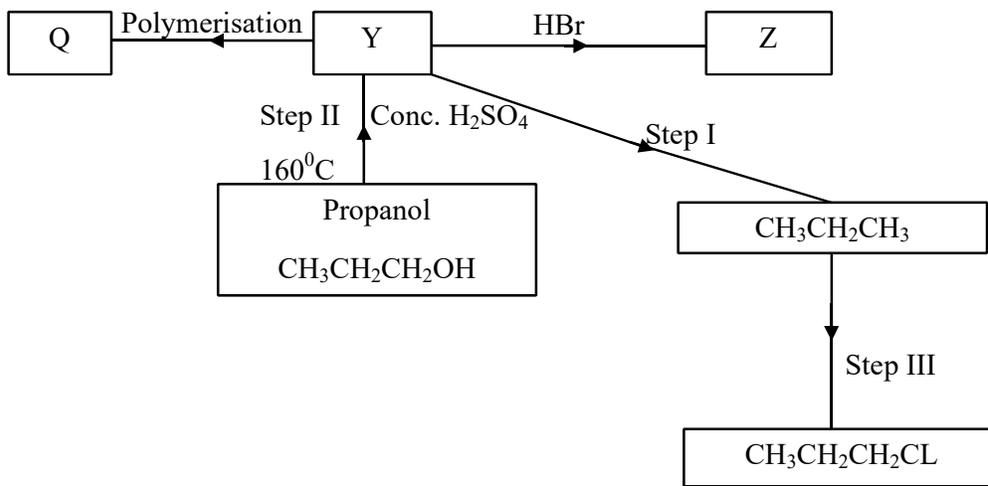
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Step 4:

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- c) Calculate the volume of sulphur (VI) oxide gas in litres that would be required to produce 178kg of Oleum in step 3. (Molar gas volume at s.t.p.=22.4l, H=1, O=16, S=32) 3marks

4. Below is a scheme of some reactions of propanol. Study it and answer the questions that follow.



- (a) State the reagents and conditions required to effect step I 3marks

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 .....  
 .....

- (b) Draw the structural formulae and name product Z. 1mark

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 .....

- (c) Name product Q 1mark

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- (d) Explain how product Y can be distinguished from the product formed after step I has taken place. 2marks

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(e) What name is given to the process in Step II and step III 2marks  
Step II

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.....

Step III

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(f) (i) Define the term hydrocarbon 1mark

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(ii) Draw the structure of 1, 2 – dibromopropane 1mark

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5. (a) State two factors to consider when choosing fuel for cooking. (2mks)

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(b) On burning C fuel, the molar heat of combustion obtained is found to be lower than the theoretical value. State two sources of the deviation. (1mk)

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(c) Below are results obtained in an experiment to determine the enthalpy of solution of sodium hydroxide.

Mass of beaker= 10g

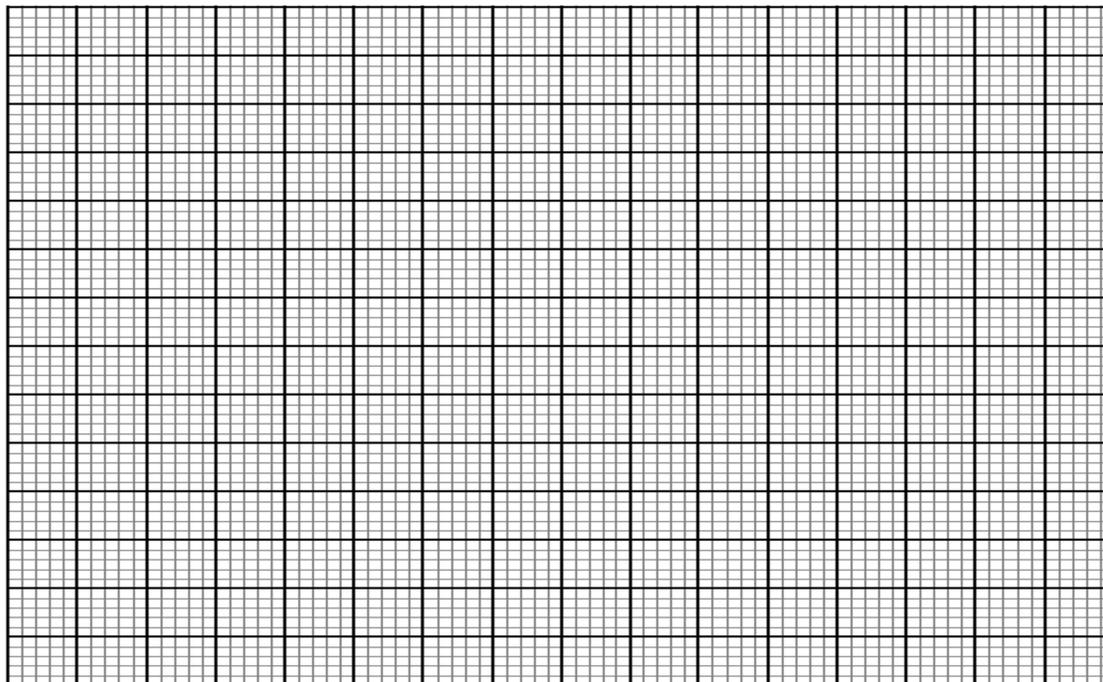
Mass of plastic beaker + distilled water = 110.15g

Mass of plastic beaker + distilled water+ NaOH=116.35g

The table below shows the temperature at fixed times after mixing sodium hydroxide and water.

Time(sec)	0	30	60	90	120	150	180	210
Temp(c°)	15	21	29	28	27	26	25	25

(i) plot a graph of temperature against time. (3mks)



(ii) From your graph ,determine the maximum temperature attained. (1mk)

.....  
 .....

(iii) Determine the temperature change of the reaction. (1mk)

.....  
 .....

(iv) Calculate the number of moles of sodium hydroxide used in the experiment (1mk)  
 (Na= 23, O= 16, H= 1)

.....  
 .....

(v) Use your results to determine the molar heat of solution of sodium hydroxide. (2mks)  
 (O= 1gcm<sup>3</sup> , C = 4.2Jg<sup>-1</sup> )

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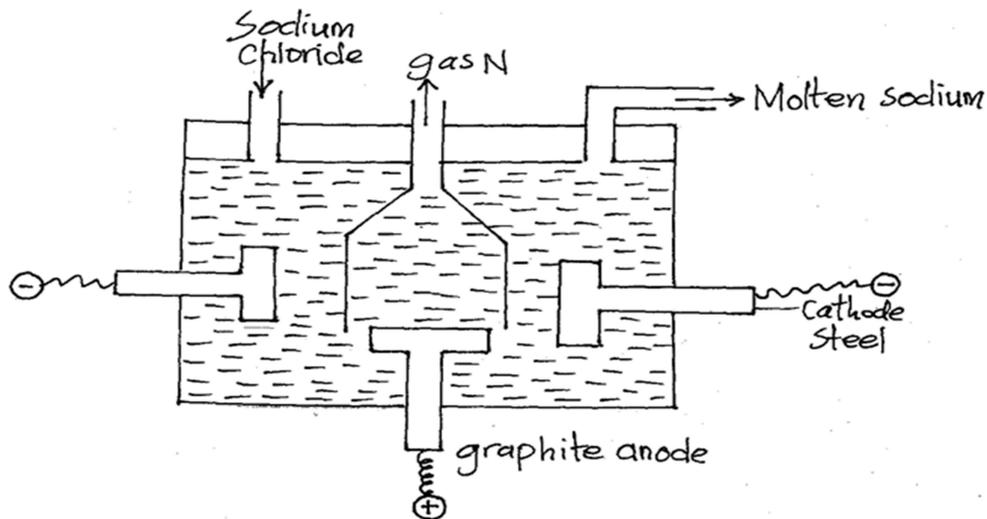
(vi) What is molar heat of solution?

(1mk)

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6. The diagram below shows the extraction of sodium.

(a) Metal using the Downs cell. Study it and answer the questions that follow.



(i) Explain why in this process sodium chloride is mixed with calcium chloride. (1mks)

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(ii) why is the anode made of graphite and not steel (1mk)

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(iii) State one property of sodium metal that makes it possible to be collected as shown in the diagram. (1mk)

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(iv). What is the function of steel diaphragm? (1mk)

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(v) Write ionic equation for the reaction which takes place at:

Cathode

(1mk)

.....  
.....

Anode

(1mk)

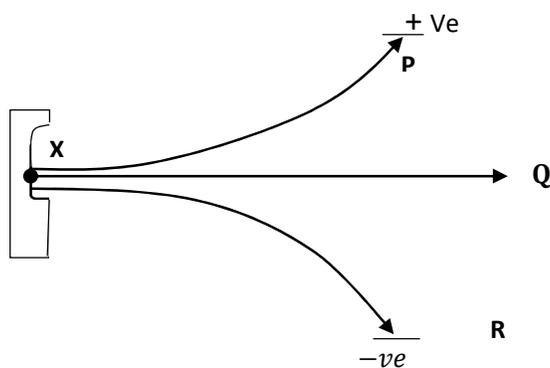
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(vi) State two industrial use of sodium metal.

(2mk)

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(b) The figure below shows the behavior of emissions by radioactive isotope X. Use it to answer questions that follow.



(a) Explain why isotope X emits radiation.

(½ mark)

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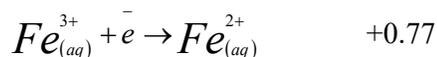
(b) Name radiations P, Q and R.

(1 ½ marks)

P .....

R.....

7. Study the information given below on standard electrode potentials for some half reactions and use it.



(a) Identify the strongest reducing agent. (1mk)

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 .....

(b) Which substance in the table will oxidize iodine ions to iodine? (1mk)

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 .....

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



(i) If connected externally write an equation taking place in the zinc half-cell. (1mk)

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 .....

(ii) Calculate the e m f of the cell. (2mks)

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 .....

(iii) State two uses of a salt bridge. (2mks)

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 .....

(iv) Draw an electrochemical cell to represent the cell above.

(3mks)

(d) Explain what would happen if  $\text{KCl}_{(\text{aq})}$  is used in the salt bridge in a case when  $\text{Pb}/\text{Pb}^{2+}$  is one of the half cells. (1mk)

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