

Name .....Index Number.....

Admission Number.....Class.....

**CHEMISTRY PAPER 2 (233/2)**

**Time: 2 Hours**

# **KCSE TOP PREDICTION MASTER CYCLE 6**

**Instruction to the candidates**

- a)* Write your Name and Index number, Admission Number and Class in the spaces provided at the top of this page.
- b)* Answer all the questions in the spaces in the spaces provided in this paper using English.
- c)* KNEC Mathematical tables and silent electronic calculators may be used.
- d)* All working **MUST** be clearly shown where necessary

**For Examiner's use only**

Questions	Maximum score	Candidate's Score
1	10	
2	14	
3	14	
4	10	
5	11	
6	11	
7	10	
	80	

***This paper consists of 12 printed Pages  
Candidates should check the question paper to ensure that all the  
pages are printed as indicated and no questions are missing.***

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1. (a) Define nuclear fission.

(1 mark)

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(b) State two similarities between nuclear fission and nuclear fusion?

(2 marks)

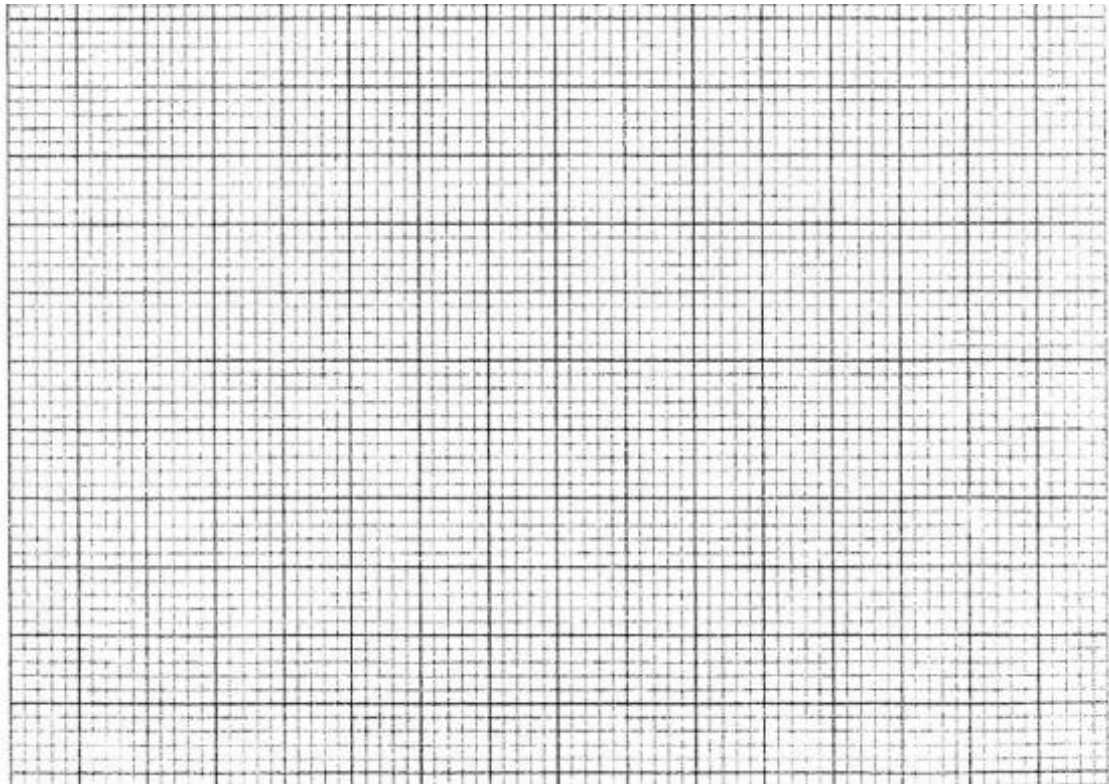
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(c) The following table shows the activity of a sample of protactinium ( $^{234}_{91}\text{Pa}$ ), a radioactive element, measured at regular intervals.

Time (sec)	10	30	50	70	90	110	130	150	170	190
Activity(c/s)	33	29	23	17	14	12	10	9	8	6

(i) Plot a graph of activity against time.

(3 marks)



(ii) From the graph:

(I) The initial activity of the element. **(1 mark)**

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(II) Determine the half-life of the nuclide. **(1 mark)**

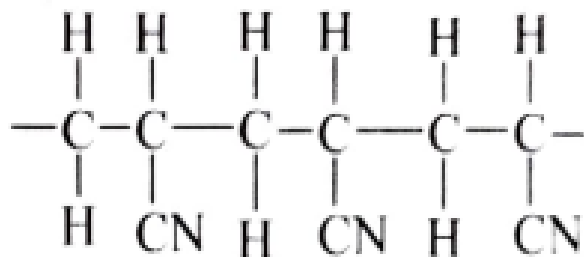
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(d) State two dangers associated with radioactivity. **(2 marks)**

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**2.** (a) Acrylan and orlon are names of fibers which are made of the polymer.



(i) How many repeat units are shown in this structure? **(1 mark)**

.....

(ii) Draw a structural formula of the monomer unit from which the polymer is made.

**(1 mark)**

.....

.....

(iii) State two disadvantages of using the above synthetic fiber. **(2 marks)**

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(b) Detergents contain additives that enhance their cleaning performance. Name two such additives. **(2 marks)**

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.....

(c) Calculate the mass of ethanol that can be made from 56g of ethene.

**(2 marks)**

.....

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(d) An organic **compound P** is found on analysis to have the empirical formula **C<sub>6</sub>H<sub>14</sub>O**. Compound P is slightly soluble in water. On oxidation compound P is converted into a **compound Q** of empirical formula **C<sub>3</sub>H<sub>6</sub>O** and relative molecular mass 116. Both compound P and Q react with sodium metal liberating hydrogen gas.

(i) To what class of compounds does compound P belong? **(1 mark)**

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(ii) Draw the displayed structural formula of P. **(1 mark)**

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.....

(iii) Deduce the molecular formula of Q and draw its displayed structural formula.

**(2 marks)**

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(iv) What other test would you carry out on Q to confirm the presence of the functional group you have indicated? **(2 marks)**  
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**3.** (a) During the electrolysis magnesium sulphate a current of 2 amperes was passed through the solution for 4 hours. Calculate the volume of the gas produced at the anode. (1 faraday 96,500 coulombs and volume of a gas at room temperature is 24,000cm<sup>3</sup>). **(2 marks)**  
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(b) Table gives standard reduction potentials for some half cells.

Half-cell	Half-cell equation	E <sup>0</sup> /V
I	$\text{Cr}^{3+}(\text{aq}) + \text{e}^{-} \rightarrow \text{Cr}^{2+}(\text{aq})$	-0.41
II	$\text{Cd}^{2+}(\text{aq}) + 2\text{e}^{-} \rightarrow \text{Cd}(\text{s})$	-0.40
III	$\text{Na}^{+}(\text{aq}) + \text{e}^{-} \rightarrow \text{Na}(\text{s})$	-2.71
IV	$\text{Cu}^{2+}(\text{aq}) + 2\text{e}^{-} \rightarrow \text{Cu}(\text{s})$	+0.34
V	$\text{Pb}^{2+}(\text{aq}) + 2\text{e}^{-} \rightarrow \text{Pb}(\text{s})$	-0.13
VI	$\text{Br}_2(\text{aq}) + 2\text{e}^{-} \rightarrow 2\text{Br}^{-}(\text{aq})$	+1.07
VII	$2\text{H}^{+}(\text{aq}) + 2\text{e}^{-} \rightarrow \text{H}_2(\text{g})$	0.00
VIII	$\text{Fe}^{2+}(\text{aq}) + 2\text{e}^{-} \rightarrow \text{Fe}(\text{s})$	-0.44V
IX	$\text{O}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) + 4\text{e}^{-} \rightarrow 4\text{OH}^{-}(\text{aq})$	+0.40V
X	$\text{H}_2\text{O}_2(\text{aq}) + 2\text{H}^{+}(\text{aq}) + 2\text{e}^{-} \rightarrow 2\text{H}_2\text{O}(\text{l})$	+1.23V

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(i) Identify: **(1 mark)**

I. The strongest oxidizing agent.

.....

II. The strongest reducing agent.

.....

**(ii)** Construct an electrochemical cell from half-cells **V** and **VI**. **(3 marks)**

(iii) Write the equation and calculate the electrode potential for the electrochemical cell constructed from half-cells **V** and **VI**. **(2 marks)**

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(iv) Explain why it is not advisable to use aqueous sodium sulphate as the salt bridge in the electrochemical cell formed between half-cells **V** and **VI**. **(1 mark)**

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(v) Write the cell diagram for an electrochemical cell made using half-cells **V** and **VI**. **(1 mark)**

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(vi) Write an equation to show how rusting occurs. **(2 marks)**

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**(vii)** Give two reasons why electroplating is necessary. **(2 marks)**

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**4.** Below is a periodic table grid study it and answer the questions. (*The letters does not represent the actual symbols of the elements*)

									<b>B</b>
<b>C</b>	<b>D</b>		<b>E</b>					<b>F</b>	
	<b>G</b>							<b>H</b>	
<b>I</b>									

(a) Which element will require the least amount of energy to remove one of the outermost electrons. **(1 mark)**

.....  
 (b) Select the most reactive metal. **(1 mark)**

.....  
 (c) What name is given to the family of elements to which **elements D** and **G** belong? **(1 mark)**

.....  
 (d) An **element A** has atomic number 9. Indicate the position of **A** on the grid. **(1 mark)**

(e) Explain why the atomic radius of **D** is smaller than that of **C**. **(1 mark)**

.....  
 .....  
 (f) Explain why the atomic radius of **A** is smaller than its ionic radius.

**(2 marks)**

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 .....  
 (g) Element **C** combines with oxygen to form an oxide. Using dots (•) and crosses(x) to

represent the outermost electrons, show how the two elements combine. **(1 mark)**

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(h) Explain why **chloride of E** has higher melting point than **chloride of D**.

**(2 marks)**

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**5.** (a) Describe how you can determine change in mass when magnesium is heated.

**(3 marks)**

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(b) The table below shows the tests that were carried out on five portions of a compound and the results obtained. Study it and answer the questions that follow.

	<b>Test</b>	<b>Observation</b>
<b>1</b>	Addition of few drops of sodium hydroxide to the first portion until in excess.	White precipitate soluble in excess.
<b>2</b>	Addition of few drops of aqueous potassium iodide to the second portion	No yellow precipitate is formed.
<b>3</b>	Addition of few drops of acidified barium nitrate to the third portion.	White precipitate formed.
<b>4</b>	Addition of few drops of Lead (II) nitrate to the fourth portion.	White precipitate formed.
<b>5</b>	Addition of few drops of dilute nitric (V)	Effervescence of a colorless gas.

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	acid to the fifth portion.	
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(i) Identify the ions likely present in; **(2 marks)**

I. **Step 2**

.....

II. **Step 5**

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(ii) Write an ionic equation for the reaction in the fifth portion. **(1 mark)**

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(iii) Dilute nitric (V) acid was added to a solid which is an alloy of copper. The resultant mixture was then filtered. To the filtrate, few drops of sodium hydroxide solution was added till in excess.

I. State any two observations made when dilute nitric (V) acid is added to the alloy. **(2 marks)**

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II. Name the other metal present in the alloy. **(1 mark)**

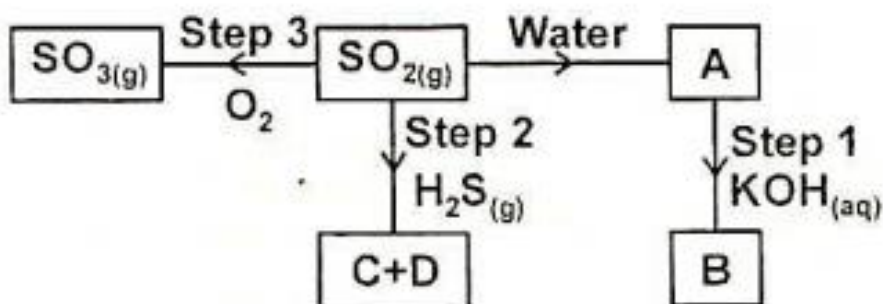
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III. Write an ion equation for the reaction that took place when few and excess sodium hydroxide solution is added. **(2 marks)**

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**6.** (a) Study the flow chart below and answer the questions that follow.



(i) Name a suitable method of gas collection that can be used to collect Sulphur (VI) oxide gas in the laboratory. **(1 mark)**

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(ii) Name substances A, B, C and D. **(2 marks)**

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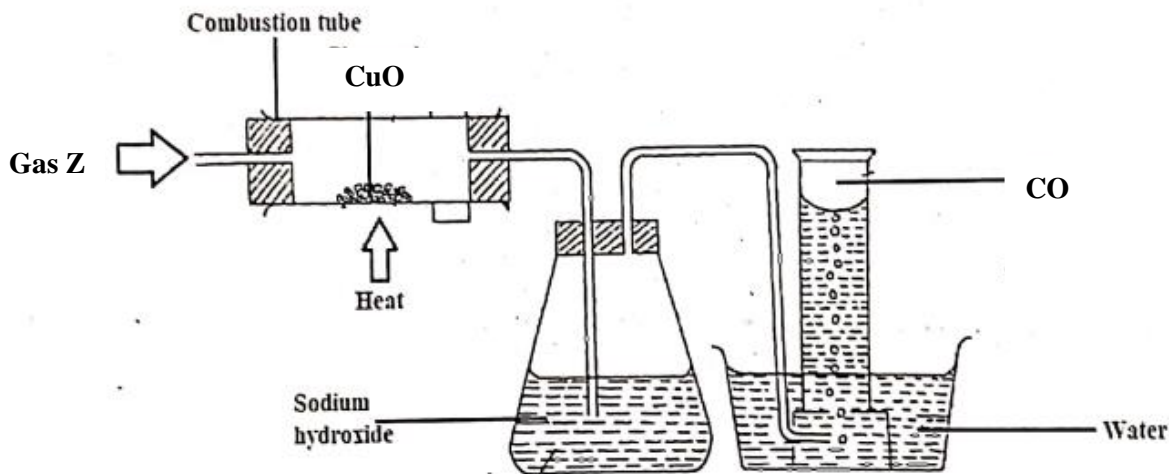
(iii) State the property of Sulphur (IV) oxide exhibited in step 2. **(1 mark)**

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(b) (i) Explain the observations made when burning magnesium is lowered into a gas jar containing carbon (IV) oxide. **(3 marks)**

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(ii) Study the diagram below and answer the questions that follows.



I. Name gas Z. (1 mark)

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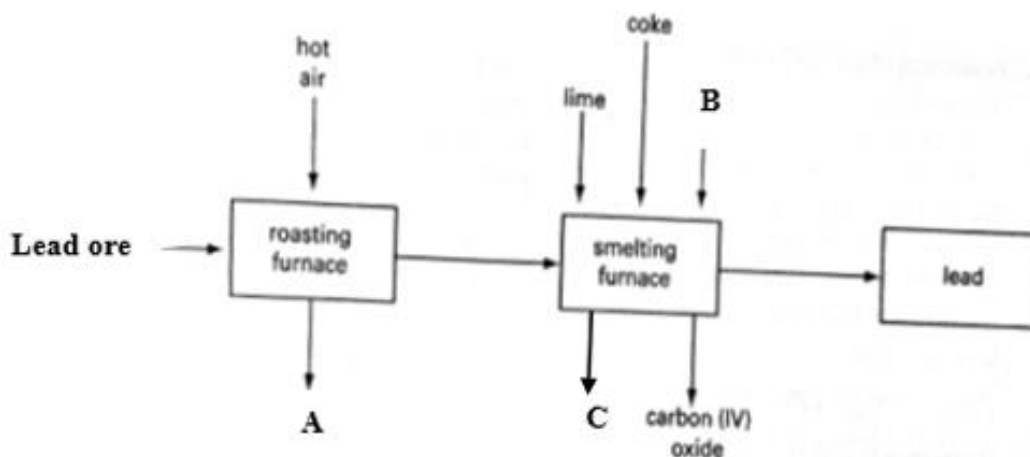
II. Write an equation for the reaction taking place in the combustion tube. (1mark)

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III. State and explain the observations made in the combustion tube. (1 mark)

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**7.** The flow chart in the figure below represents some stages in the extraction of lead metal. Study it and answer the questions that follow.



(a) Identify:

(i) The lead ore.

(1 mark)

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(ii) Substance A, B and C.

(3 marks)

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(b) Write an equation for the reaction that forms substance C.

(1 mark)

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(c) Name an impurity present in the ore.

(1 mark)

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(d) State the process by which the ore is concentrated.

(1 mark)

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(e) Write an equation for the reaction which occurs in the roasting chamber.

(1 mark)

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(f) State any one use of lead.

(1 mark)

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(g) Give one reason why the extraction of lead causes pollution to the environment.

(1 mark)

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**LAST PRINTED PAGE**

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