



Name Admission no Date.....

School..... Class.....Candidate's signature.....

KALA TRIAL EXAMS

Kenya Certificate of Secondary Education

CHEMISTRY

PAPER 2 JUNE 2026

233/2 Chemistry (THEORY)

Time : 2HRS

Instructions to Candidates

- Write your name and admission number in the spaces provided above.
- Write the name of your school and sign in the spaces provided above.
- Answer **all** the questions in the spaces provided in the question paper.
- Non-programmable** silent electronic calculators and KNEC mathematical tables may be used.
- All working **must** be shown where necessary.
- 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.**
- Candidates should answer the questions in English**

Question	Maximum Score	Candidate's Score
1	10	
2	11	
3	13	
4	14	
5	08	
6	13	
7	11	
Total Score	80	

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

A	B		C		X	E	F
D						J	
K							

a) i) Write the electronic arrangement of element **E** and **J** (1 mk)

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ii) Compare the atomic radius of **E** and **J** and hence comment on their reactivity.

(2 mks)

.....

b) Element **F** has the highest 1st ionization energy. Explain. (1 mk)

.....

c) Name the chemical family to which element **B** belongs to. (1 mk)

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d) One of the isotopes of element **D** is radioactive and undergoes beta decay to form nuclide **Y**.

i) Xg of the radio isotope disintegrate to 40g in 45 hours. The half-life of the isotope is 15 hours. Determine the value of X (2 mks)

ii) Given that the mass number of **Y** is 24, write nuclear equation for the decay. (1 mk)

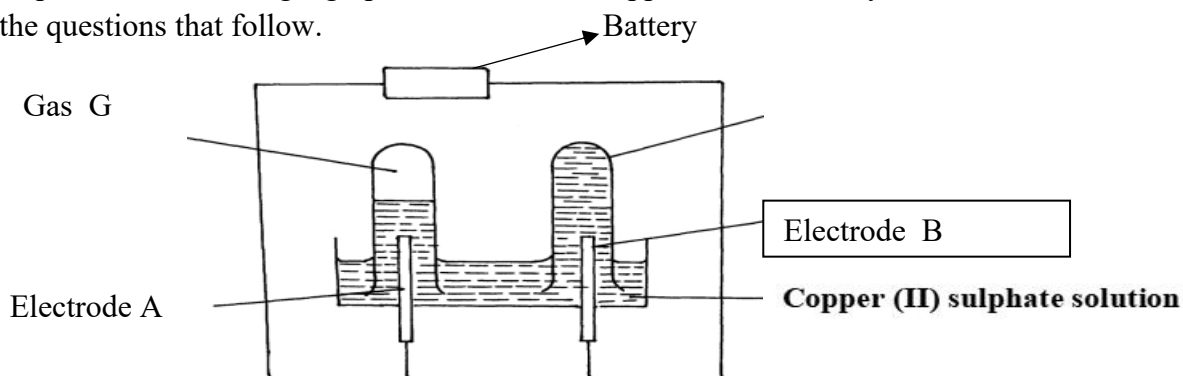
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iii) Indicate the position of element **Y** formed in the grid above. (1 mk)

iv) Suggest one application of the radioisotope above based on its property. (1 mk)

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2. a) The diagram below illustrates a set up that was used to electrolyse dilute copper (II) sulphate solution using a graphite anode and a copper cathode. Study it and use it to answer the questions that follow.



(i) Identify electrode **B**..... (½ mk)

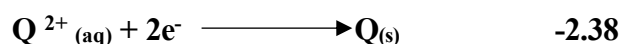
(ii) Name the colourless gas G collected and describe a test that would be used to confirm its identity. (1½ mk)

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(iii) Explain two other observations made during electrolysis apart from the evolution of colourless gas G. (2 mks)

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(b). Below are standard electrode potentials, $E^0(\text{V})$ of some half cells. Use the information to answer the questions that follow. The letters do not represent the actual symbols of the elements.



(i) Identify the strongest reducing agent. Explain. (1 mk)

.....

(ii) Which element is hydrogen, give a reason. (1 mk)

.....

(iii) Draw a well labelled diagram of the electrochemical cell formed when the half cells of **Q** and **T** are combined. Show the direction of flow of electrons. (3 mks)

(iv) Calculate the e.m.f of the cell (iii) above. (1 mk)

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(v) Write the cell notation of the cell above. (1 mk)

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3 (a) (i) Define molar enthalpy of combustion. (1 mk)

.....

(ii) 200cm³ of water was heated using a stream of butane, the temperature changed from 22 °C to 75 °C when 1g of butane burnt completely in oxygen. Calculate the molar enthalpy of combustion of butane. (C = 12 , H = 1 , Specific heat capacity of water = 4.2kJ kg⁻¹ K⁻¹ , Density of water = 1g /cm³) (2 mks)

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(iv) The calculated molar enthalpy of combustion is at variance with the theoretical value , - 2870kJ/mol , account for this. (2 mks)

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(v) What is a fuel? (1 mk)

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(vi) Other than enthalpy of combustion, state two factors which should be considered when choosing a fuel. (2 mks)

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b) Given the following data

$$\Delta H_c^\theta (\text{Carbon}) = -393 \text{ k Jmol}^{-1}$$

$$\Delta H_f^\theta (\text{Water}) = -286 \text{ k Jmol}^{-1}$$

$$\Delta H_c^\theta (\text{Butane}) = -2870 \text{ k Jmol}^{-1}$$

(i) Use an energy cycle diagram to calculate the enthalpy of formation of butane. (3 mks)

(ii) Draw an energy level diagram linking the enthalpies in b (i) above. (2 mks)

4. I) Marble chips (calcium carbonate) was put in a beaker containing 30cm³ of 2M dilute hydrochloric acid then the mixture placed on a weighing balance. The mass of the beaker and its contents was read every twenty seconds and the loss of mass recorded as shown in the table below.

Time (s)	0	20	40	60	80	100	120	140	160
Loss of mass(g)	0.00	0.24	0.46	0.65	0.80	0.89	0.94	0.97	0.97

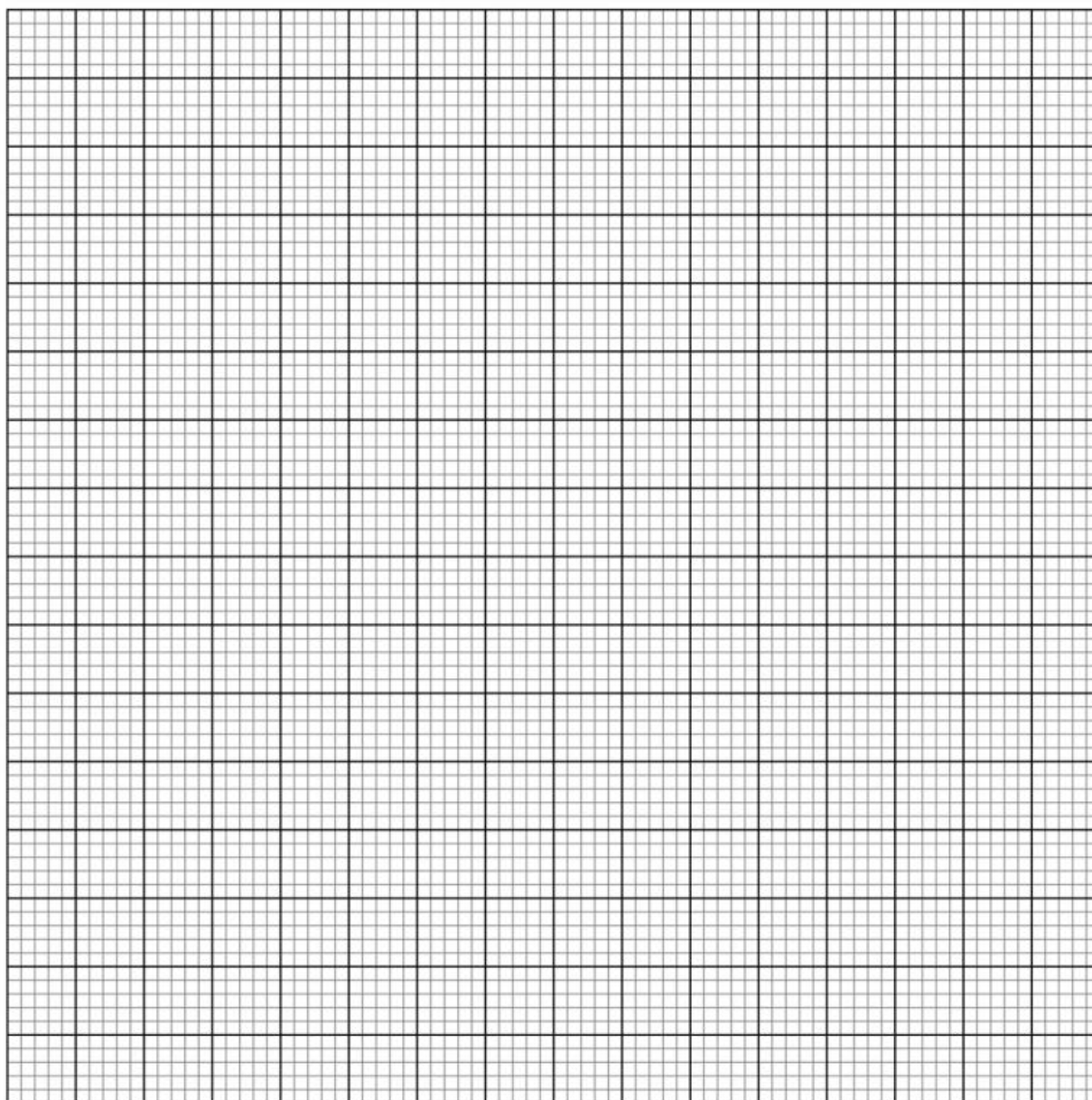
(a) Why is there a continuous loss of mass as the reaction progresses. (1 mk

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(b) Write an equation for the reaction taking place, hence determine the mass of calcium carbonate used in the experiment. (Ca=40, C=12, O=16) (2 mks)

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(c) i) Plot a graph of loss of mass(g) against time(s) in the grid provided. (3mks)



(iii) Determine the rate of reaction at 100 seconds. (1 mk)

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(iv) On the same grid sketch the curve that would be obtained if an equal mass of marble powder was used instead of marble chips. Comment on your answer. (2 mks)

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d) (i) State the observation that would be made if a few drops of silver nitrate solution were added to 1 cm³ of the resulting solution in a test tube. (1 mk)

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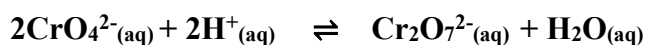
(ii) Write the ionic equation for the reaction that occurs. (1 mk)

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II. (a) State Le Chatelier's principle. (1mk)

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(b) The equation below represents the chromate (VI) – dichromate (VI) equilibrium.



Yellow

Orange

State and explain the observation made when sodium hydroxide is added to the system at equilibrium. (2 mks)

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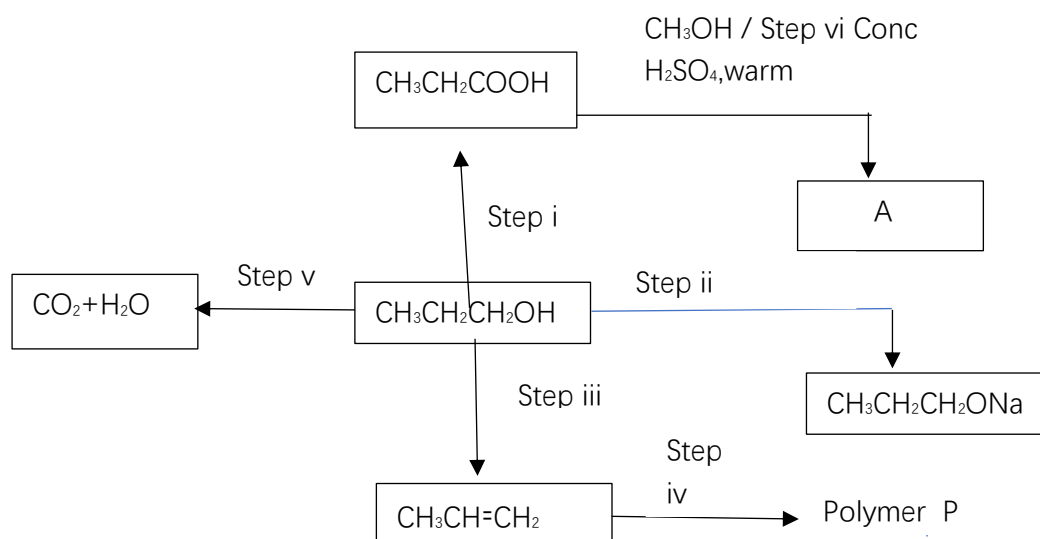
5 a) Draw the structural formula for all the isomers of $\text{C}_2\text{H}_3\text{Cl}_3$.

(2 mks)

b) Describe one physical test that can be used to distinguish between ethene and ethane.

(1 mk)

c) Study the flow chart below and use it to answer the questions that follow:



i) Name the reagents required in;

Step i

(½ mk)

Step ii

(½ mk)

ii) Give the **IUPAC** name of polymer **P**. State its one use.

(2 mks)

iii) Name the type of reaction represented by;

Step v

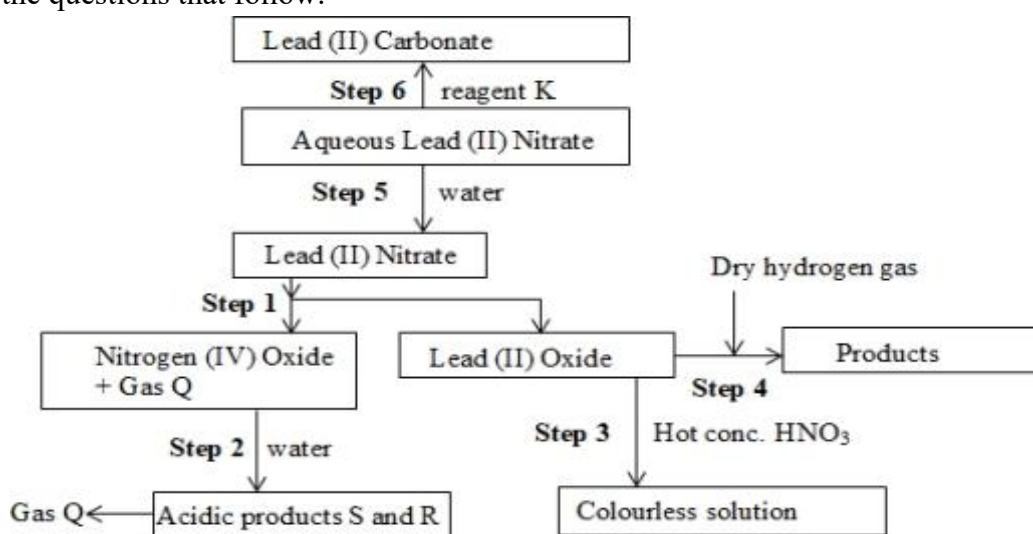
(1 mk)

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iv) Draw the structural formula of compound A

(1 mk)

6. The flow chart below shows some reactions starting with lead (II) nitrate. Study it and answer the questions that follow.



a) (i) Name the process and state two observations made in step 1.

(2 mks)

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(ii) Identify ;

(2 mks)

Reagent

K.....

Gas Q.....

Product S and R

(iii) Write balanced chemical equations for the reactions in;

(3 mks)

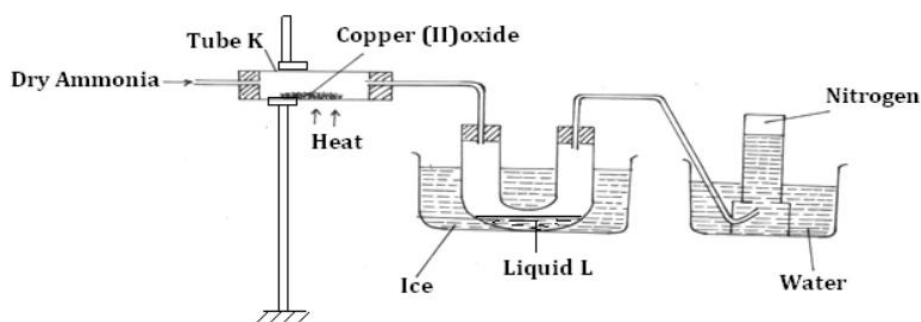
Step 1

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Step 3

Step 4

b) The diagram below shows a set up that can be used to obtain Nitrogen gas in an experiment.



i) Name liquid L.....
(1 mk)

ii) State the observations made in the tube K after heating for some time? (1 mk)

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iii) Write an equation for the reaction that took place in tube K. (1 mk)

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iv) 120cm^3 of ammonia gas reacted completely with copper (II) oxide during the experiment. Calculate

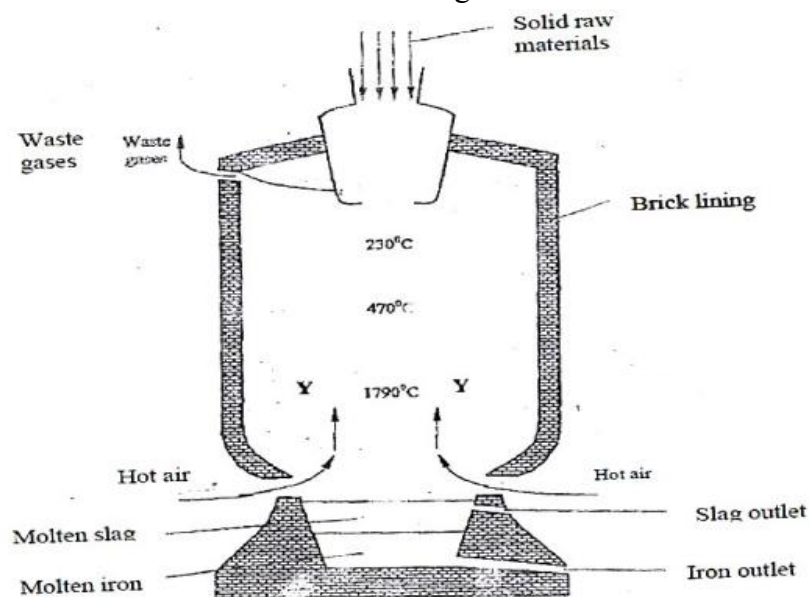
I. Volume of nitrogen gas produced. (1 mk)

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II. The mass of copper (II) oxide that reacted. (Cu = 63.5, O = 16.0, molar gas volume at r.t.p = 24dm^3) (2 mks)

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7. Iron is obtained from haematite using a blast furnace shown below.



a) Describe how the presence of iron in an ore could be established. (3 mks)

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b) Name the chief ore from which iron is extracted. (1 mk)

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c) Four raw materials are required for the production of iron. Three of these are iron ore, hot air and coke. Give the name of the fourth raw material. (1 mk)

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d) Explain the role of the fourth raw material named in (b) above. (2 mks)

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e) Explain why the temperature in the region marked Y is higher than of the incoming hot air. (1 mk)

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g) Describe how iron is formed in the above process using chemical equations. (3 mks)

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