NAMBA 2025
In pursuit of excellence

THE NAMBA EVALUATION TEST
The Kenya Certificate of Secondary School
JULY 2025

233/2 Chemistry Paper 2 Time: 2 Hours

Name: …… Index No: ……...……

Stream: …….. Signature: ……..... School: …….

233/1 – Chemistry
Tuesday, 15th July, 2025
Mid morning
8.00am-10.00am

INSTRUCTIONS TO CANDIDATES.

a) Write your **NAME** and **INDEX NUMBER** in the space provided above
b) Sign and write the date of examination in the spaces provided above
c) Answer **ALL** the questions in the spaces provided
d) **ALL** working must be clearly shown where necessary.
e) Mathematical tables and silent electronic calculators may be used.
f) This paper consists of 10 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1 – 31	**80**	

1. Explain why luminous flame of a Bunsen burner appears yellow? (2marks)

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2. The empirical formula of a compound is CH_2 and it has a molecular mass of 42.

(a) What is the molecular formula of this compound? (1mark)

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(b) Write the general formula of the homologous series to which the compound belongs. (1mark)

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(c) Draw the structural formula of the third member of this series and give its IUPAC name. (1mark)

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3. The table below shows some elements and their atomic numbers. The letters do not represent the actual symbols of the elements.

Element	X	Y	Z	R	S	Q	T
Atomic Number	11	10	20	13	14	4	8

(a) From the given letters select two elements with the same chemical properties. (1mark)

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(b) Write the formula of a compound formed when element S reacts with element T. (1mark)

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(c) Identify the **most** stable element. (1mark)

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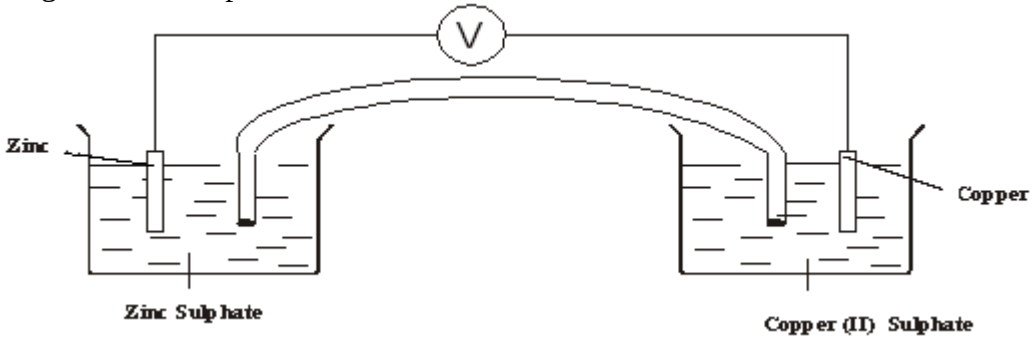
4. The diagram below represents an electrochemical cell.

(a)



(i) On the diagram label the salt bridge. (1mark)

(ii) Show the direction of flow of electrons. (1mark)

(b) Write the overall ionic equation. (1mark)

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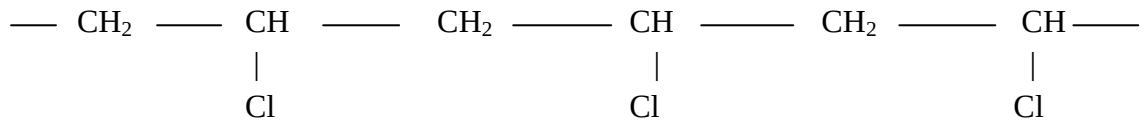
5. Polyvinylchloride has the following structure.



A sample of the polymer was found to have a molecular mass of 6750. Determine the number of monomers in the polymer. (C= 12, H = 1, Cl = 35.5) (3marks)

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6. Describe how a mixture of sodium carbonate and Lead (II) carbonate can be separated. (3marks)

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7. In an experiment to study diffusion of gases, the following set up was used.

Cotton wool soaked in Conc. Ammonia

Cotton wool soaked in Conc. Hydrochloric Acid

i) State and explain observations made in the experiment. (2marks)

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ii) Write an equation for the reaction that occurs in the experiment. (1mark)

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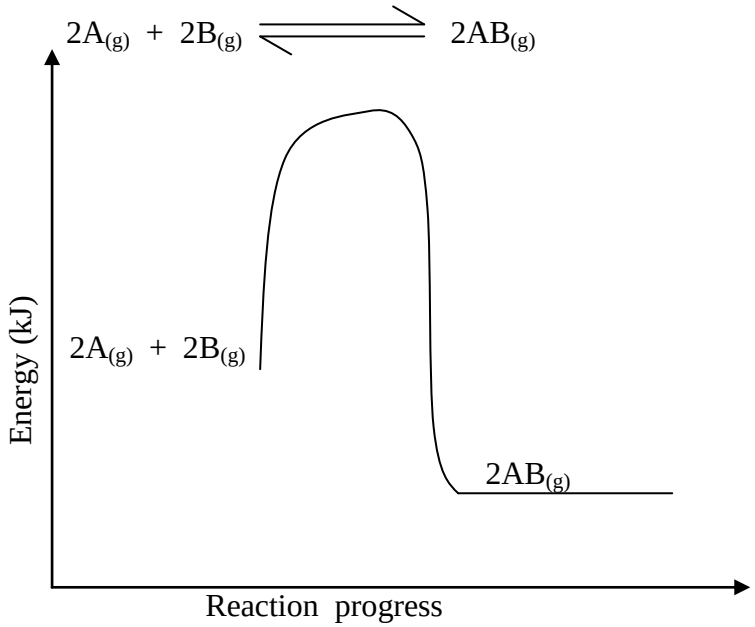
8. The figure below is an energy level diagram for the reaction.



Explain how the following conditions would affect the yield of AB.

(i) Increase in pressure. (2marks)

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(ii) Decrease in temperature. (2marks)

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9. What is the oxidation number of chlorine in ClO_4^- (1mark)

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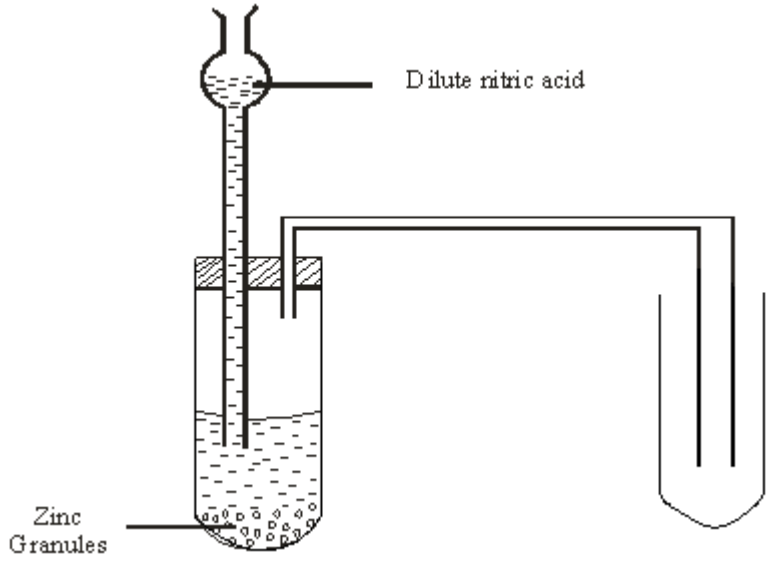
10. Below is a set up used to collect hydrogen gas.



a) Identify with reasons, **two** mistakes in the set up. (2mark)

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b) Explain the role of hydrogen in the manufacture of margarine. (1mark)

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11. Dilute Hydrochloric acid is warmed with sodium sulphide.

a) Write an equation for the reaction that occurs. (1mark)

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b) State a chemical test for the gas evolved. (1mark)

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12. Carbon – 14 represented as $^{14}_{6}C$ which is used for radiocarbon dating decays by beta emission and has a half life of 5730 years.

a) Given an equation for the decay process. (1mark)

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b) A fossil skull has an activity of carbon – 14, which was only 12.5 % of the activity found in living animals. How old is the fossil skull. (2marks)

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13. The table below shows the observations made when an electronic current was passed though two substances A and B.

SUBSTANCE	OBSERVATION
Molten A	Conducts an electric current and a grey substance is deposited at the cathode.
Molten B	Conducts an electric current and is not decomposed.

(a) Name the type of structure in

i) A (1mark)

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ii) B (1mark)

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(b) Name the particles that are responsible for electrical conductivity in

i) A (½ mark)

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ii) B (½ mark)

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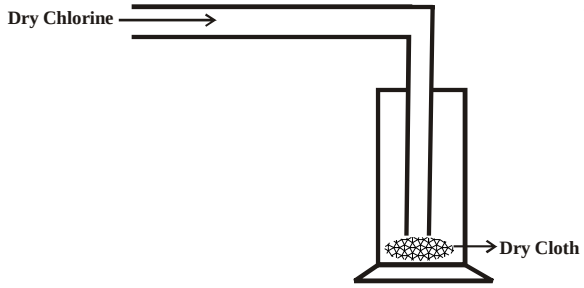
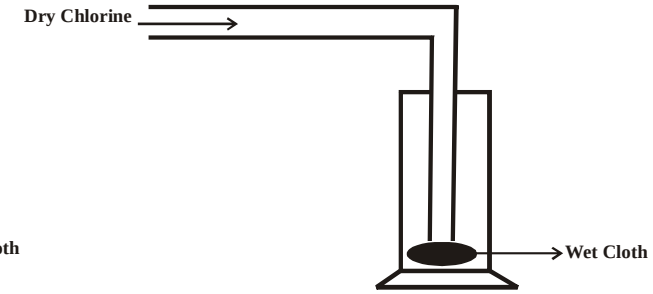
14. Dry chlorine gas was passed through two pieces of colored cotton cloth as shown.





a) State what is observed in each experiment.

Experiment 1 (2mark)

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Experiment 2

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b) Explain your observation using an equation. (1mark)

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15. A compound G reacts with 2 moles of bromine to form another compound whose graphical formula is;

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    H     Br    Br    H
    |     |     |     |
H - C  -  C  -  C  -  C  - H
    |     |     |     |
    H     Br    Br    H
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i) What is the formula and name of compound G (2marks)

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ii) State the observations made when acidified potassium chromate (VI) is added to compound G. (1mark)

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16. During the extraction of Copper and Zinc from their Ores, some of the processes include.

(i) Crushing

(ii) Mixing of the crushed Ore with Oil and water and bubbling air through it.

(a)

i. Name the process (ii) above (1mark)

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ii. What is the purpose of (ii) above? (1mark)

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(b) Bronze is an alloy of copper and another metal. Identify the other metal (1mark)

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17. A white solid K was heated. It produced a brown gas **A** and another gas **B** which relights a glowing splint. The residue left was yellow even after cooling.

a) Identify gases A and B (2marks)

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b) Write a balanced chemical equation for the decomposition of solid K. (1mark)

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18. Study the following changes that took place when the following substances are exposed in air.

(a) $NaOH_{(s)} \xrightarrow{I} NaOH_{(aq)}$

(b) $Na_2CO_3.10H_2O_{(s)} \xrightarrow{II} Na_2CO_{3(s)} + 10H_2O_{(l)}$

(c) $CuSO_{4(s)} + 5H2O_{(l)} \xrightarrow{III} CuSo_4 . 5H_2O_{(s)}$

Name the process

I (1mark)

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II (1mark)

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III (1mark)

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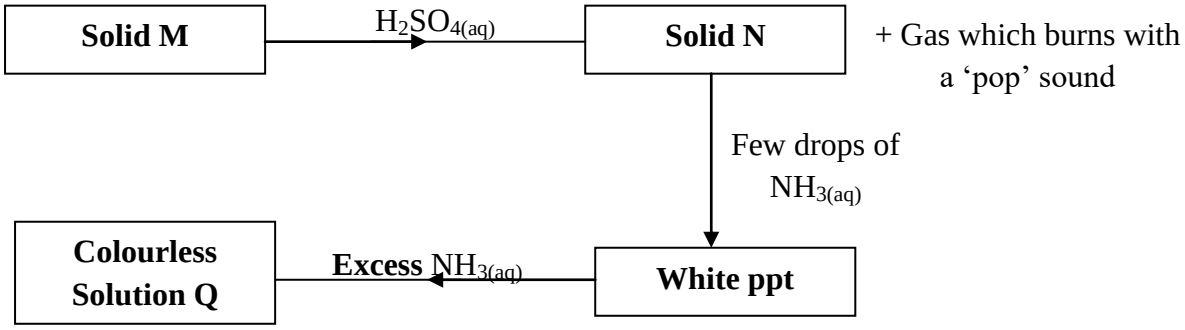
19. The scheme below shows some reaction sequence starting with solid M.



a) Name solid M (1mark)

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b) Write the following of a complex ion present in solution Q (1mark)

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c) Write an ionic equation of the reaction between barium nitrate and solution N. (1mark)

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20. A gas at 27^0C and 750mmHg pressure was found to occupy 36cm^3. Calculate the temperature at which the same mass of gas will occupy twice the volume at a pressure of 100mmHg pressure. (3marks)

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21.

a) What is meant by solubility? (1mark)

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b) In an experiment to determine the solubility of solid Y in water at 30^0C the following results were obtained.

Mass of evaporating dish	=	26.2g
Mass of evaporating + saturated solution	=	42.4g
Mass of evaporating dish + dry solid Y	=	30.4g

Using the information, determine the solubility of solid Y at 30^0C in grams per 100g of water. (2marks)

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22. Oxygen is prepared by using hydrogen peroxide and manganese (IV) oxide.

(a) Write an equation to show how oxygen is produced. (1mark)

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(b) Explain why warm water is preferred for use to cold water in collecting oxygen gas. (1mark)

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(c) Explain why it is important **not** to collect any gas for the first few seconds of the experiment. (1mark)

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23. When a current of 2.5 amperes was passed through a cell containing N^{2+} ions of a metal for 25minutes, the mass of the cathode increased by 0.36g. (1 *faraday = 96500 coulombs)* Determine the relative atomic mass of element N. (3marks)

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24. Compare the electrical conductivity of dilute Sulphuric (VI) acid and concentrated Sulphuric (VI) acid. Explain your answer. (2marks)

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25. Silicon (IV) oxide exists as a solid while sulphur (IV) oxide as a gas at room temperature

a) Write the formula of;

i) Silicon (IV) oxide (½ mark)

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ii) Sulphur (IV) oxide (½ mark)

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b) Explain the difference in their states at r.t.p. (2marks)

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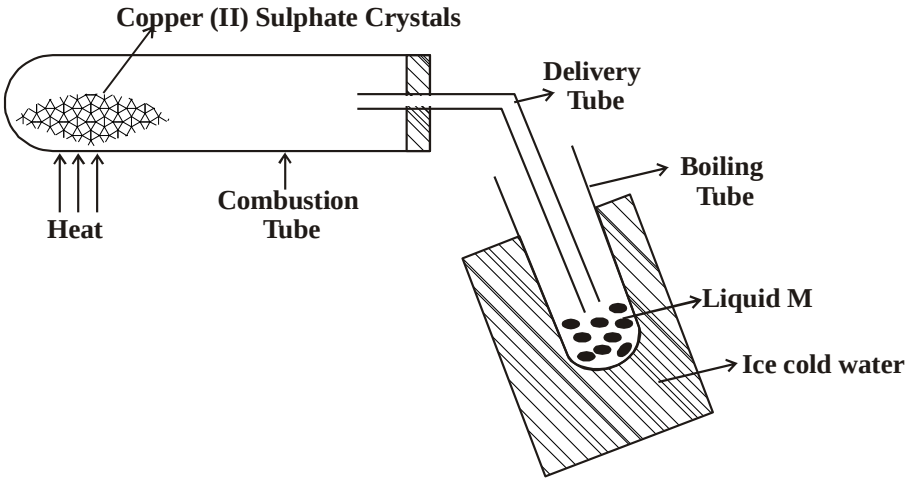
26. The molar heat of formation of carbon (II) oxide is -105kJmol^{-1}, molar heat of combustion of carbon is -393kJmol^{-1}.

By using an energy cycle diagram, determine the molar heat of combustion of carbon (II) oxide.

(3marks)

27. The diagram below was used to study the effect of heat on copper (II) sulphate crystals.



(a) Name liquid M (1mark)

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(b) State and explain the precaution that should be taken before stopping heating. (2marks)

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28. In an experiment, a small amount of charcoal was added into a test tube and 5cm^3 of concentrated nitric (v) acid added, then warmed.

(i) State the observation that was made. (1mark)

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(ii) Explain the observation made in (i) above. (1mark)

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(iii) Write an equation for the reaction that took place. (1mark)

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