

KAPSABET HIGH SCHOOL

233/1 -

CHEMISTRY

- Paper 1



2 Hours



NAME.....ADM.....CLASS.....

2022 TRIAL 2 JULY INTERNAL EXAMINATION

Kenya Certificate of Secondary Education (K.C.S.E)

Chemistry

Paper 1

INSTRUCTIONS TO THE CANDIDATES:-

- Write your **name** and **class** in the spaces provided.
- Answer **all** the questions in the spaces provided.
- Mathematical tables and electronic calculators may be used
- All working **MUST** be clearly shown where necessary.

For Examiner's Use Only

Question	Maximum score	Candidate's score
1-29	80	

This paper consists of 14 printed pages. Students should check to ascertain that all pages are printed as indicated and that no questions are missing.

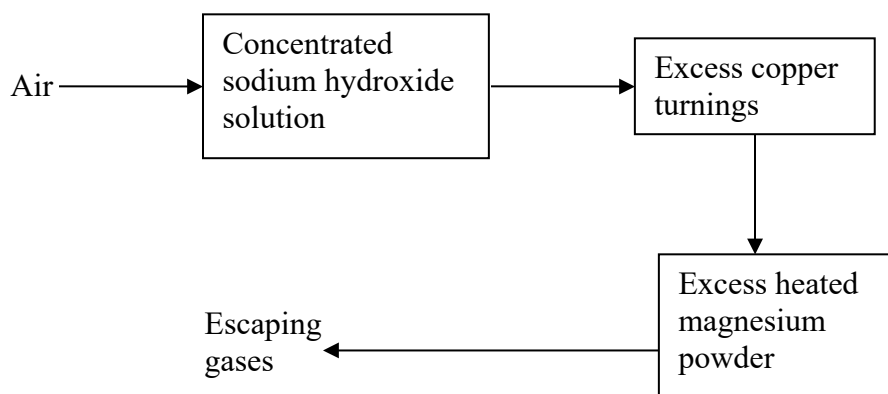
1. Explain why very little Carbon (IV) oxide gas is evolved when dilute sulphuric (VI) acid is added to lead (II) carbonate. (2 marks)

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2. Air was passed through several reagents as shown below:



- (a) Write an equation for the reaction which takes place in the chamber containing magnesium powder. (1 mark)

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- (b) Name **one** gas which escapes from the chamber containing magnesium powder. Give a reason for your answer. (2 marks)

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3. (a) Hydrogen can reduce copper (II) Oxide but not aluminium oxide. Explain. (1 mark)

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(b) When water reacts with potassium metal, the hydrogen produced ignites explosively on the surface of water.

(i) What causes this ignition? (1 mark)

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(ii) Write an equation to show how this ignition occurs. (1 mark)

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4. In an experiment an unknown mass of anhydrous sodium carbonate was dissolved in water and the solution made up to 250 cm³. 25cm³ of this solution neutralized 20 cm³ of 0.25 M nitric acid. Calculate the mass of unknown sodium carbonate used. (3 marks)
(Na = 23.0, C = 12.0, O = 16.0)

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5. Carbon and silicon belong to the same group of the periodic table, yet Carbon (IV) oxide is a gas while silicon (IV) oxide is a solid with a high melting point. Explain this difference (2 marks)

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6. An ion of oxygen is larger than oxygen atom. Explain. (2marks)

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7. (a) What is meant by the term solubility of salts? (1 mark)

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(b) Calculate the solubility of a salt given that 15 g of the salt can saturate 25 cm³ of water.
(1 mark)
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8. (a) State the Graham's law. (1 mark)

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(b) A 100 cm³ of Carbon (IV) oxide gas diffused through a porous partition in 30seconds.
How long would it take 150 cm³ of Nitrogen (IV) oxide to diffuse through the same
partition under the same conditions? (C = 12.0, N = 14.0, O = 16.0) (2 marks)

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9. Given this reaction; $\text{RNH}_2 + \text{H}_2\text{O} \rightleftharpoons \text{RNH}_3^+ + \text{OH}^-$
Identify the acid in the forward reaction. Explain. (2 marks)

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10. The table below shows three isotopes of element neon. Study it and answer the questions that follow;

Mass number of Isotope	Percentage abundance (%)
20	90.9
21	0.3
22	8.8

a) What are isotopes (1mk)

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b) Calculate the relative atomic mass of an atom of neon. (2mks)

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11. A gas occupies 0.4dm^3 at 20°C and $1.0 \times 10^3\text{Pascals}$ what will be the temperature of the gas when the volume and pressure of the gas when the volume and pressure of the gas is 0.1dm^3 and $1.0 \times 10^3\text{Pascals}$ respectively. (3mks)

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12. (i) On complete combustion of a hydrocarbon 0.88g of carbon (iv) oxide and 0.36g of water were formed (i) calculate the molecular formula of the hydrocarbon given that relative molecular mass of the hydrocarbon is 70. (c = 12, H = 1, O = 16) (2mks)

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- ii) Draw the structural formula of the hydrocarbon in (i) above (1mk)

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13. 0.28g of aluminium reacted completely with oxygen gas. Calculate the volume of oxygen used. (molar gas volume is 24000cm³ Al = 2.7) (3mks)

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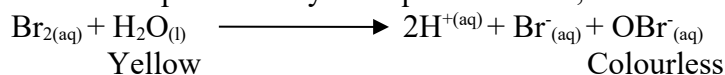
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14. A solution of bromine in water is a chemical reaction in equilibrium. The reaction involved is represented by the equation below;



State and explain the observation made when concentrated sulphuric (IV) acid is added to the mixture at equilibrium. (2mks)

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15. Study the table below and answer the question that follow. The letters do not represent the actual symbols of the element.

Formula of ion	Electron configuration
W ²⁺	2
V ²⁻	2.8
X ³⁺	2.8
U ²⁺	2.8
Y ⁻	2.8.8

a) Select elements found in;
i) the same group (1mk)

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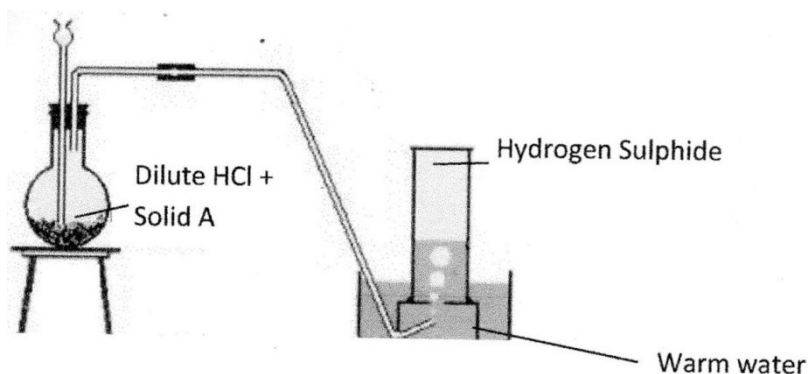
ii) period three (1mk)

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b) What is the family name given the group members to which element Y belongs (1mk)

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16. Study the diagram below and answer questions that follow



a) Identify solid A (1mk)

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b) Give a reason why warm water is used (1mk)

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c) What observation would be made if hydrogen sulphide gas was bubbled into a solution of lead (II) nitrate. (1mk)

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17. Study the table below and answer the questions that follow

Substance	A	B	C	D	E	F
Melting Point (°C)	801	113or 119	-39	5	-101	1356
Boiling Point (°C)	1410	445	457	54	-36	2860
Electrical solid	Poor	Poor	Good	Poor	Poor	Poor
Conducting Liquid	Good	Poor	Good	Poor	Poor	Poor

Identify with reasons the substances that

i). Have a metallic structure (1mk)

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ii). Have a molecular structure (1mk)

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iii). Suggest a reason why substance B has two melting points (1mk)

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18. Sodium Hydrogen carbonate was heated strongly in the laboratory by a student

a) Write a balanced chemical equation for the above equation (1mk)

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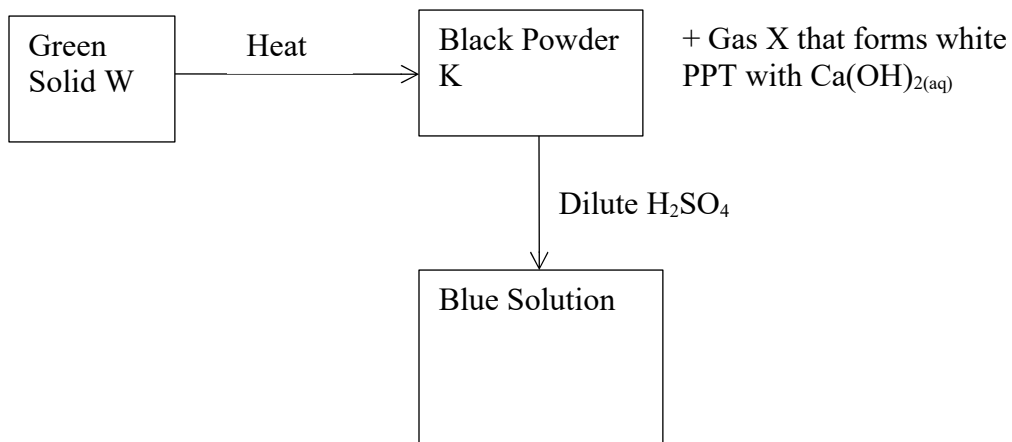
b) Using an equation show how sodium carbonate is used to soften hard water (1mk)

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19. Draw the structural formula and name the possible isomers of organic compounds with the

following molecular formula C_3H_7Br . (2mks)

20. Study the chart below and answer the following questions



a) Name

i). Green solid W (1mk)

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ii). Black powder K (½ mk)

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iii). Gas X (½ mk)

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b) Write the equation for the complete decomposition of the green solid W identified above

(1mk)

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21. The PH values of solutions K, L, M, N and P are as shown below.

Solution	K	L	M	N	P
PH Value	5	2	10	7	14

a) Which solution reacts with zinc carbonate most vigorously to liberate carbon (IV) oxide.

(1mk)

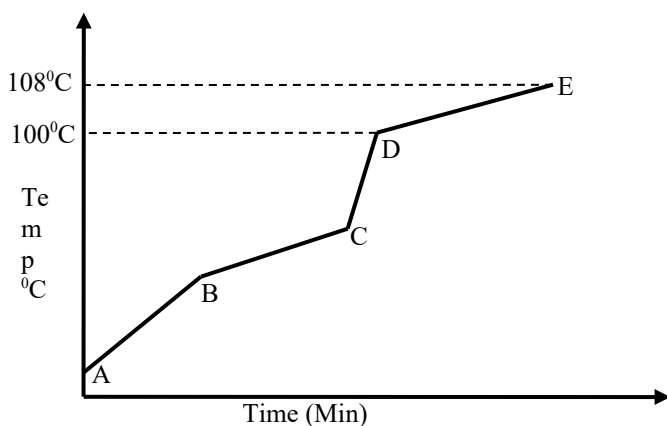
b) Given 2M hydrochloric acid and 2M ethanoic acid, which one is a stronger acid? Explain.

(1mk)

c) What is the purpose of the weak base in the toothpaste?

(1mk)

22. Study the diagram shown below to answer the questions that follow. The curve shows the heating curve of water in the laboratory.



- (i) At what temperature does the water boil? (1 Mark)

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- (ii) Is the curve for a pure water or impure water? Give a reason for your answer (1 Mark)

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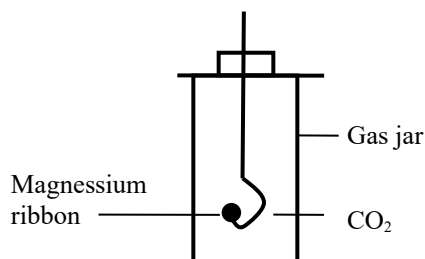
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- (iii) Give the effect of impurities on the boiling point of water (1 Mark)

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23. A student lowered burning magnesium in a gas jar of carbon (IV) oxide as shown in the diagram.



- (a) State and explain the observation made in the gas jar (2 Marks)

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(b) Write the equation of the reaction that takes place in the gas jar (1 Mark)

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24. (a) Using a dot (•) and cross (x) to represent the outer most electrons, draw diagrams to show the bonding in magnesium sulphide. (1½ Marks)

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(b) State the structure of the above compound. (½ Mark)

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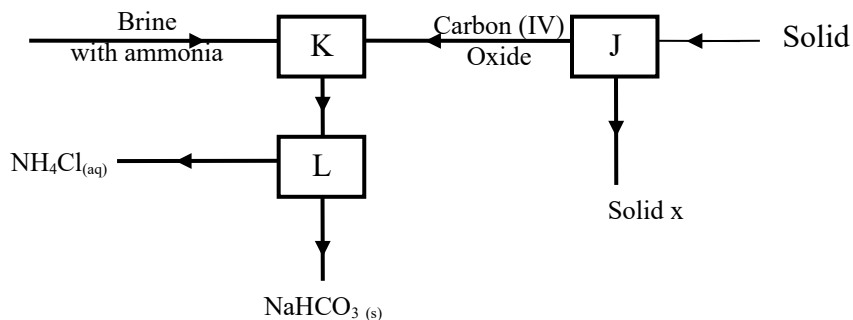
(c) Give two properties of substances with the above structure (1 Mark)

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25. Given sodium carbonate solid, lead (II) nitrate solid and water, explain how you can obtain a solid sample of Lead (II) carbonate. (3 Marks)

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26. The diagram below shows part of Solvay process.



(a) Name solid X (1 Mark)

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(b) State the process taking place in chamber L (1 Mark)

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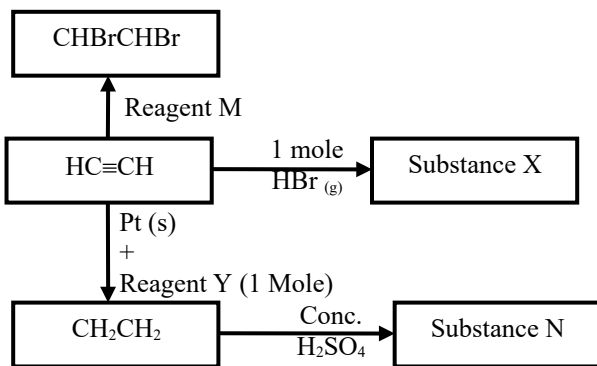
State two uses of sodium carbonate (1 Mark)

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27. The scheme below shows some reactions starting with ethyne. Study it and answer the questions that follow.



(a) name substance (i) X (½ Mark)

(ii) N (½ Mark)

(b) Name reagent M (½ Mark)

(c) Ethene undergoes polymerization to form a polymer. Give an equation for the reaction and name the product. (1½ marks)

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28. A solution of hydrogen chloride gas in water conducts an electric current, while that of hydrogen chloride in methylbenzene does not conduct. Explain. (3 Marks)

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29. A mixture of ammonium chloride and sodium nitrate was heated together in a round bottomed flask to produce gas x.

(i) Identify gas x (½ Mark)

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(ii) Write equations to show how gas x is formed. (2 marks)

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(iii) Why would gas x not be collected over cold water? (½ mark)

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