NAME ……..…….. **DATE** ……

INDEX NO. ……..……..……..…..… **SIGNATURE** ……...……..

233/1
CHEMISTRY
PAPER 1
(THEORY)
JULY/AUGUST 2014
TIME: 2 HOURS.

MBOONI WEST SUB - COUNTY JOINT EVALUATION TEST, 2014

Kenya Certificate of Secondary Education.

233/1
CHEMISTRY
PAPER 1
(THEORY)
TIME: 2 HOURS.

INSTRUCTIONS TO CANDIDATES.

a) Write your **NAME** and **INDEX NUMBER** in the spaces 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 J 27	80	
Total score	80	

1. Describe the non-luminous flame of a Bunsen burner and give a reason why it's preferred when heating substances in the laboratory. (3 Marks)

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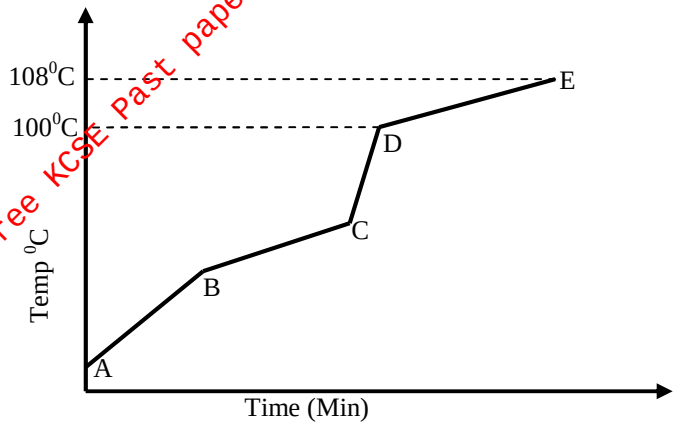
2. Study the diagram shown below to answer the questions that follow. The curve shows the heating curve of water in the laboratory.



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

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3. Calcium carbonate reacts with dilute sulphuric acid to form some products.

(i) Write an equation for the above reaction (1 Mark)

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(ii) Why would the above reactants not be suitable for preparation of the above gas? Give a reason (2 Marks)

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4. Excess magnesium ribbon sample was heated in equal volumes of:-

(i) Pure oxygen gas

(ii) Air

(a) Why was the mass of the resulting product in (ii) more than in (i)? (1 Mark)

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(b) Write the equations for the reactions in part (ii) (2 Marks)

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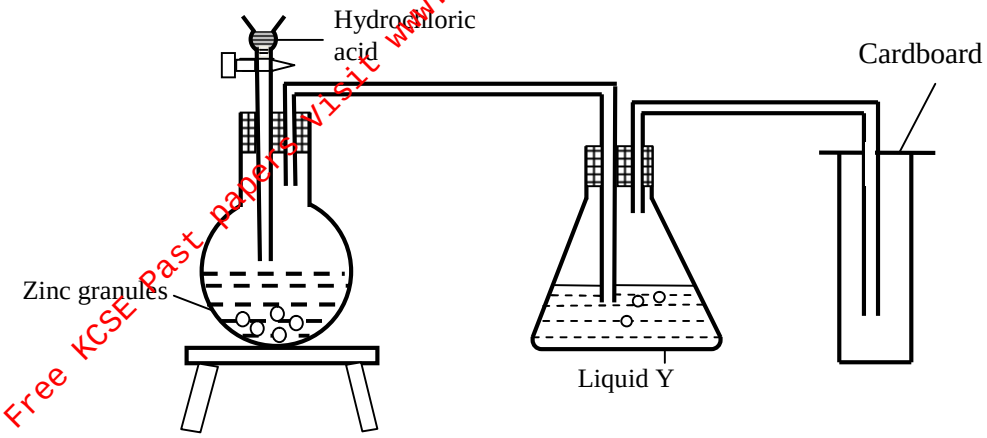
5. The set up below was used to prepare dry hydrogen gas. Study it and answer the questions that follow.



(i) Is the method of collecting the gas correct? Give a reason. (1 Mark)

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(ii) What would be liquid Y? (1 Mark)

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(iii) Give two physical properties of hydrogen gas (1 Mark)

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6. Study the information tabulated below to answer the questions that follow

Melting point	Element	Atomic number
97.8	**P**	**11**
1441	**Q**	**14**
-42	**X**	**17**
64	**Y**	**19**

(a) Write the electron arrangement of the

(i) Atom of Y (½ Mark)

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(ii) Ion of X (½ Mark)

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(b) Compare the ionic radius of Y with its atomic radius (2 Marks)

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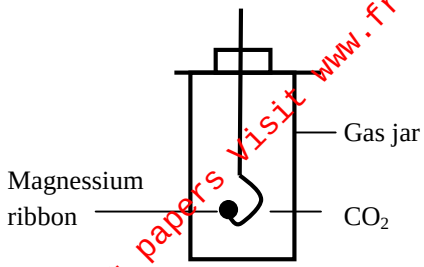
7. A student lowered burning magnesium in a gas jar of carbon (IV) oxide as shown in the diagram.



(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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8. (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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9. 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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10. An element x has relative atomic mass of 88. When a current of 0.5 amperes was passed through the fused chloride of x for 32 minutes 10 seconds, 0.44g of X was deposited at the cathode (1 F = 96500C)
(a) Calculate the number of Faradays needed to liberate 1 mole of x (2 Marks)

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(b) Write the formula of the chloride of x (1 Mark)

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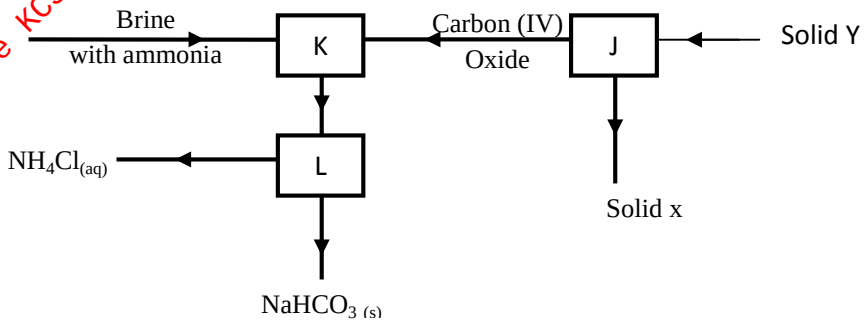
11. The diagram below shows part of Solvay process.



(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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(c) State two uses of sodium carbonate (1 Mark)

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12. $100cm^3$ of methane gas diffused through a porous partition in 40 seconds. How long would it take $90\ cm^3$ of ozone gas to diffuse through the same partition. C = 12, H = 1, O = 16 (3 Marks)

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13. Calculate the volume of oxygen produced when 10g of silver nitrate was completely decomposed by heating at (s.t.p) (Ag = 108, N = 14, O = 16) Molar gas volume at s.t.p = $22.4dm^3$) (3 Marks)

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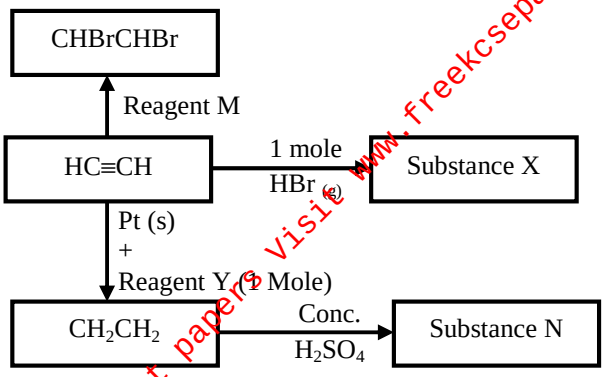
14. The scheme below shows some reactions starting with ethyne. Study it and answer the questions that follow.



(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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15. Hydrogen sulphide gas was bubbled through a solution of zinc nitrate for sometime.

(i) State the observation made (1 Mark)

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(ii) Where should the experiment be carried out and why? (1 Mark)

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(iii) Write the equation of the reaction that occurs (1 Mark)

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16. A solution of hydrogen chloride gas in water conducts an electric current, while that of hydrogen chloride in methylbenzene does not conduct. Explain. (2 Marks)

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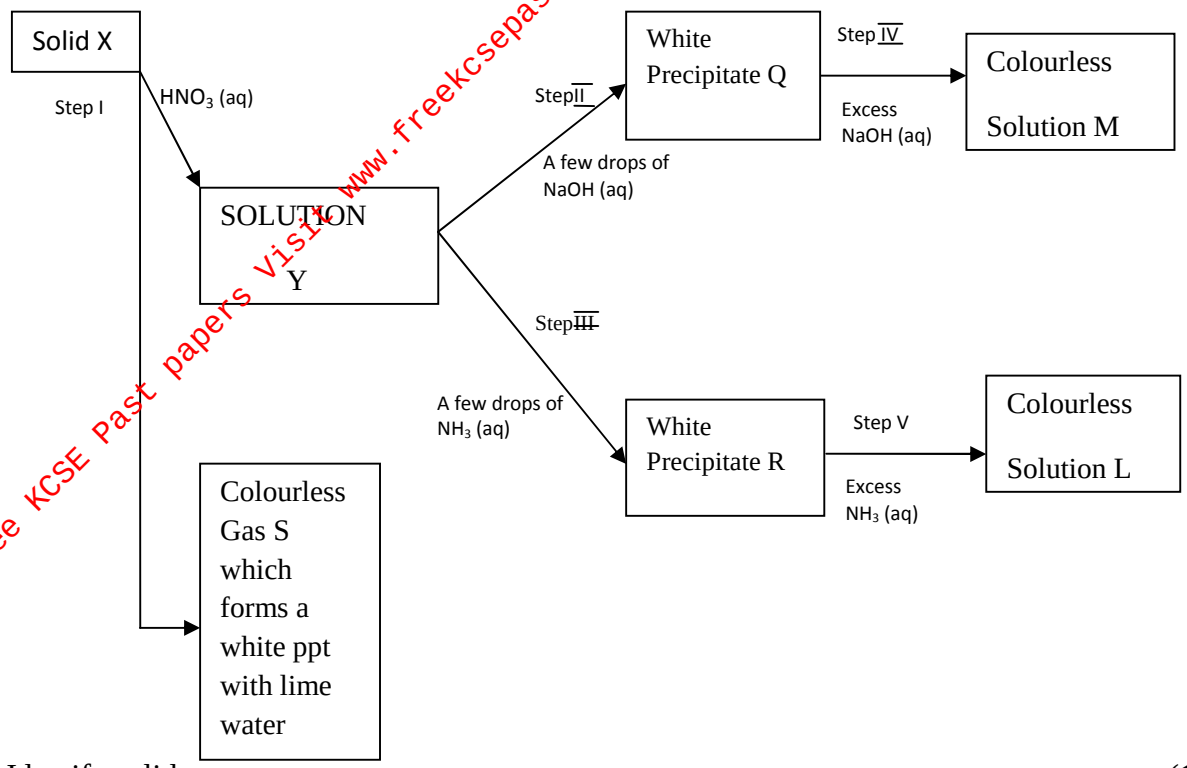
17. The scheme below represents reactions starting with solid x



(i) Identify solid x (1 Mark)

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(ii) Write an ionic equation to show formation of white precipitate (1 Mark)

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(iii) Why would gas S not form a white precipitate with a solution of sodium hydroxide (1 Mark)

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18. The following results were obtained when trying to determine the solubility of copper (II) sulphate in water at 40^0C. Mass of empty dish 16.8g, mass of dish + saturated solution at 40^0C = 26.9g, mass of dish + solid $CuSO_4$ after evaporation to dryness = 17.8g. Calculate the mass of saturated solution containing 70g of water at 40^0C. (3 Marks)

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19. When 16g of ammonium nitrate was dissolved in 100cm^3 of water at 25^0C, the temperature of the solution drops to 19^0C.

(a) Calculate the molar enthalpy of solution of ammonium nitrate (3 Marks)
(N = 14, O = 16, H = 1 Specify heat capacity of water = 4.2$kJkg^{-1}k^{-1}$)

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(b) Is the enthalpy change endothermic or exothermic? Give a reason (1 Mark)

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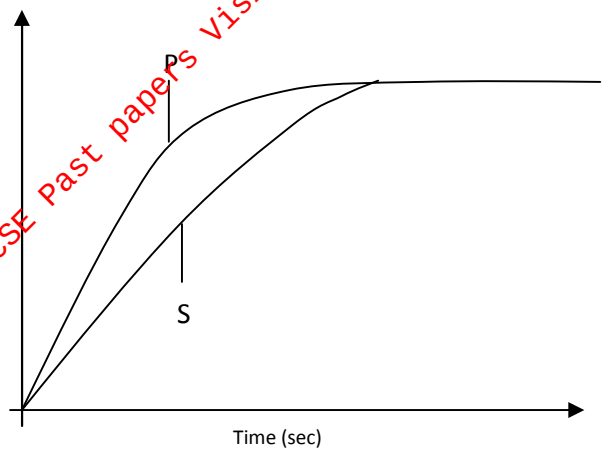
20. The curves below represent the volume of carbon (IV) oxide gas evolved once 2M (concentrated) hydrochloric acid was reacted with 100g of powdered calcium carbonate and also when 1M concentrated hydrochloric acid was reacted with the same quantity of carbonate.



(i) Which of the two curves represents the reaction of (2M) concentrated HCl with powdered calcium carbonate. Give a reason (2 Marks)

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(ii) Why do the two curves flatten at the same level of production of CO_2 (1 Mark)

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21. You are provided with the data below.

$Al^{3+}_{(aq)} + 3e^- \longrightarrow Al_{(s)}$ $\quad E^\theta = -1.66$

$Fe^{2+}_{(aq)} + 2e^- \longrightarrow Fe_{(s)}$ $\quad E^\theta = -0.44$

(i) Give the ionic equation for the above cell generated once the two half cells are connected. (1 Mark)

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(ii) Calculate the E^θ value of the above cell (1 Mark)

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(iii) Give the reducing species (1 Mark)

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22. (a) Name the following compounds

(i) $CH_3CH_2CH_2C(=O)OH$ (½ Mark

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(ii) $CH_3COOCH_2CH_2CH_3$ (½ Mark)

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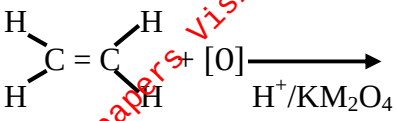
(b)  (1 Mark)

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23. A radioactive substance underwent decay as shown below.

$$^{230}_{92}X \longrightarrow {}^{230}_{94}P + 2\,{}^{x}_{y}S$$

(i) Identify substance S. (1 Mark)

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(ii) Give two properties of substance S (2 Marks)

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24. 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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25. (a) State two ores from which sodium metal can be extracted from (1 Mark)

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(b) During the extraction, calcium chloride solid is added into the sodium chloride solid.
Why is calcium chloride added to the sodium chloride? (1 Mark)

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(c) State two uses of sodium metal (1 Mark)

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26. Study the following equilibrium equation.

$2X_2(g) + Y_{2(g)} \rightleftharpoons 2X_2Y_{(g)}$ $\Delta H = -197Kj/mol$

(a) Suggest two ways of increasing the yield of X_2Y. (1 Mark)

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(b) Draw the energy level diagram for the forward reaction. (2 Marks)

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27. 5.0g of calcium carbonate were allowed to react with $25cm^3$ of 1.0M hydrochloric acid until there was no further reaction. Calculate the mass of calcium carbonate that remained unreacted. (3 Marks)
(Ca = 40, C = 12, O = 16)

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