Name: …… **Index No.** ……

School: …… **Candidate's Sign.** ……

Date: ……

233/1
CHEMISTRY
PAPER 1
MAY/JUNE 2014
TIME: 2 HOURS

CROSS COUNTRY EXAM 2014

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

Chemistry
Paper 1

INSTRUCTIONS TO CANDIDATES:-

- *Write you **name** and **index number** in the spaces provided above.*
- *Answer **all** the questions in the spaces provided.*
- *Mathematical tables and electronic calculators may be used form calculations.*
- *All working **MUST** be clearly shown where necessary.*

Question	Maximum score	Candidate's score
1-26	80	

This paper consists of 10 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing

1. The table below gives some properties of gases D and E

GASES	Density	Effect of $H_2SO_{4(aq)}$	Effect of $NaOH_{(aq)}$
D	Lighter than air	Reacts to form a salt	dissolves without reacting
E	Heavier than air	Not affected	Not affected

(a) Describe how one would obtain a sample of gas E from a mixture of gases **D** and **E** (2mks)

……

(b) Suggest a possible identity of gas **D** (1mk)

……

2. Iron roofing sheets are coated with zinc as sacrificial metal;

(i) What is meant by the term 'sacrificial'? (1mk)

……

……

(ii) Give the name given to the process by which iron sheets are coated with zinc. (1mk)

……

(iii) Zinc is higher than iron in reactivity series yet it does not corrode as fast as iron.

Explain (1mk)

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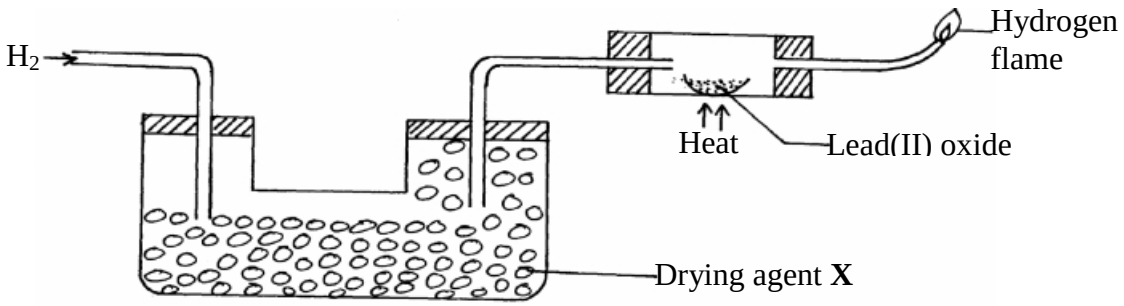
……

3. The set-up below was used to investigate the properties of hydrogen gas.



(i) Write an equation for the reaction that takes place in the combustion tube. (1mk)

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……

(ii) Suggest a possible drying agent **X**. (½mk)

……

(iii) What would happen if the hydrogen gas at the end is not burnt? (1mk)

……

……

4. The table below shows pH values of solutions A to E

Solution	A	B	C	D	E
pH	3	14	7	6	9

Which solution;

(a) Contains the largest concentration of hydroxyl ions? (1mk)

……

(b) Contains the largest concentration of hydrogen ions (1mk)

……

(c) is likely to be a solution of sodium chloride (1mk)

……

5. Potassium is isotopic and has a relative atomic mass (R.A.M) of 39.5, work out the percentage abundance of each isotope. The three isotopes are, ^{39}K, ^{40}K and ^{38}K (0.01%) (3mks)

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6. An ion of element Q can be represented as $^{32}_{16}Q^{2-}$

(a) Draw the structure of the ion (2mks)

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……

……

(b) How does its ionic radius compare with its atomic radius (1mk)

……

……

7. The electronic configuration for elements represented by letters A, B, C and D are **A** 2.8.6, **B** 2.8.2, **C** 2.8.1, **D** 2.8.8

(a) Select the element which forms;

(i) A double charged cation (1mk)

……

(ii) a soluble carbonate (1mk)

……

(b) Which element has the shortest atomic radius (1mk)

……

8. When concentrated hydrochloric acid was electrolysed for a longtime. Two gases were obtained at the anode ;

(i) Name the **two** gases (1mk)

……

……

(ii) Explain why the gases were obtained. (2mks)

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9. Using dots (•) and crosses (X) to represent electrons, draw diagrams to show bonding in;

(a) C_2H_4 (C=12 H=1) (2mks)

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……

(b) Hydro-oxonium ion H_3O^+ (H=1 O=8) (2mks)

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10. A student reacted Silver Nitrate and Barium Chloride solutions to prepare two salts.

(i) Write an equation for the reaction that took place (1mk)

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……

(ii) Write the ionic equation for the reaction (1mk)

……

……

(iii) Name the method above use din preparing salts mentioned. (1mk)

……

11. Give the name and formula of;

(i) A complex cation containing a transition metal (1mk)

……

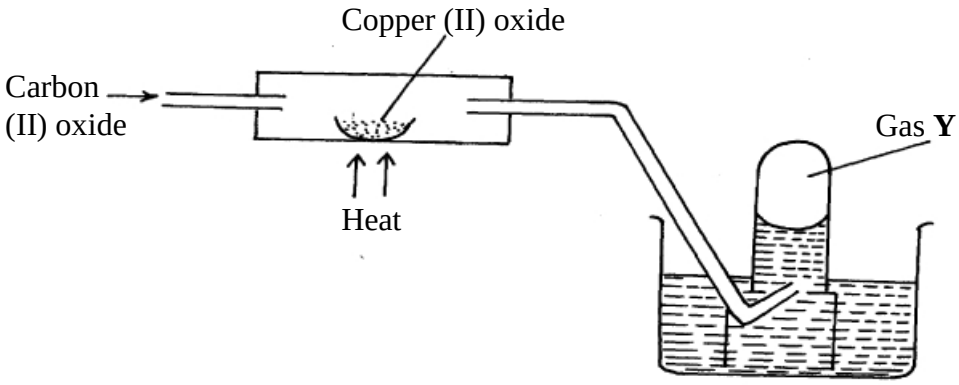
……

(ii) A complex anion containing a transition metal (1mk)

……

……

12. Use the diagram below to answer the questions below:



(i) Identify gas **Y** (1mk)

……

(ii) Write an equation for the reaction taking place in the combustion tube. (1mk)

……

……

(iii) Which is the best place for carrying out the above experiment (1mk)

……

13. 400cm^3 of Nitrogen gas diffuses through a porous plug in 70seconds. How long would it take the same volume of Carbon (IV) oxide to diffuse through the same porous pot? (C=12, O=16, N=14) (3mks)

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14. 20.0cm^3 of NaOH solution containing 8.0gdm^{-3} were required for complete neutralization of 0.118g of a dibasic acid. Calculate the Relative Molecular Mass (R.M.M) of the acid. (Na=23, O=16, H=1) (3mks)

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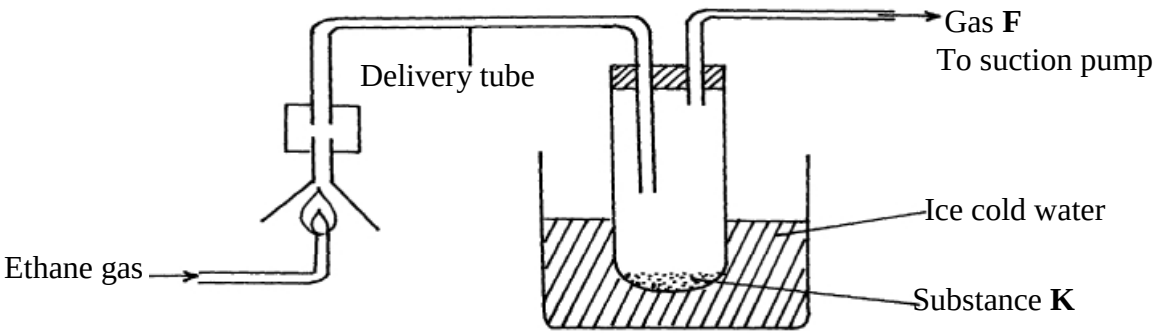
15. The diagram below shows the combustion of ethane gas. Study it and answer the questions about it:



(a) Identify substance **K** (1mk)

……

(b) Write an equation for the complete combustion of ethane gas. (1mk)

……

……

(c) The pH of substance **K** is found to be less than 7. Explain this observation (1mk)

……

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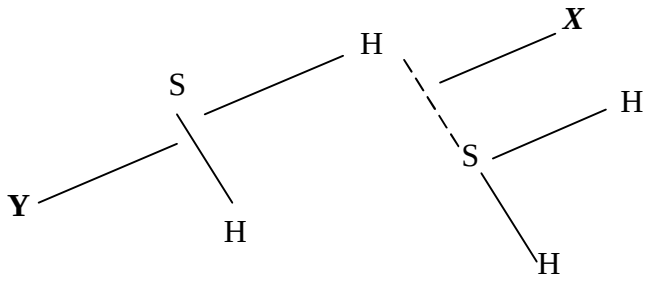
16. The structure of hydrogen sulphide can be represented as shown below:



(a) Name the bond type represented by letters **X** and **Y** (2mks)

X…….

Y…….

(b) Give a chemical test for hydrogen sulphide gas (1mk)

……

……

17. In the Haber process, the industrial manufacture of ammonia is given by the following equation ;

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)} \Delta H = -97 KJmol^{-1}$$

(i) Name **one** source of hydrogen used in the process (1mk)

……

(ii) Name the catalyst used in the above reaction (1mk)

……

(ii) What is the effect of increasing temperature on yield of ammonia? Explain (1mk)

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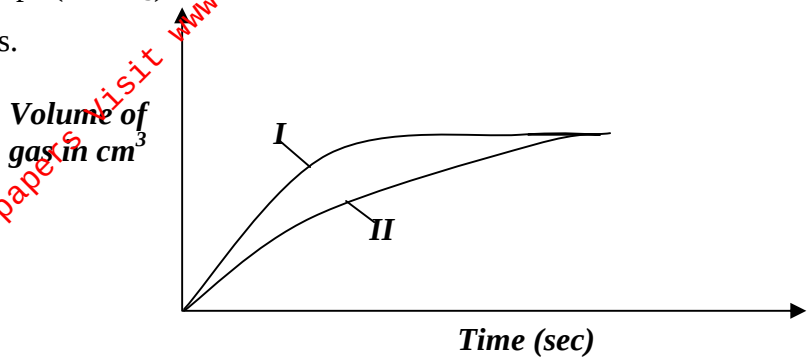
……

18. The curves below were obtained when equal volumes of 2M HCl were reacted with 3.0g of marble chips ($CaCO_3$). In one of the reactions, the acid was warmed before adding the marble chips.



(a) Write the equation for the reaction (1mk)

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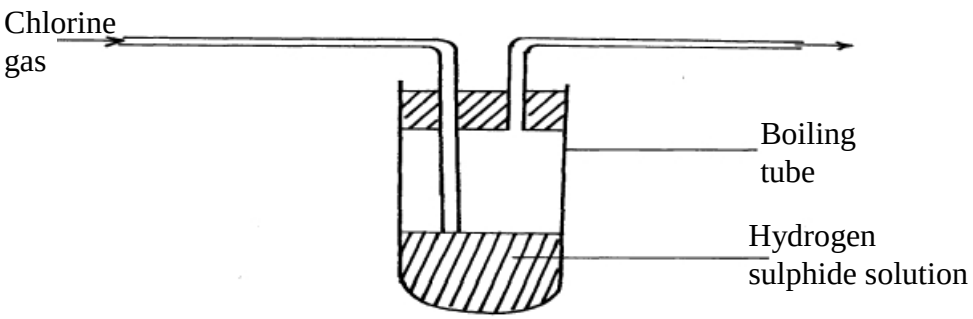
……

(b) Identify the curve representing the reaction where the acid was warmed. (1mk)

……

19. Chlorine gas bubbled into a solution of hydrogen sulphide as shown below:



(i) Explain the observation made in boiling tube. (2mks)

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(ii) What precautions should be taken in the experiment (1mk)

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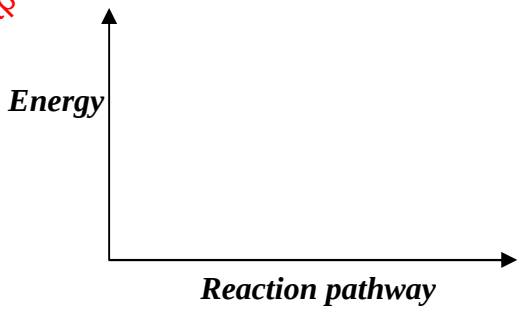
20. Hydrogen fluorine reacts according to the equation,

$$H_{2(g)} + F_{2(g)} \rightleftharpoons 2HF_{(g)} \quad \Delta H = -538KJ$$

(a) On the grid provided below, sketch the energy level diagram for the forward reaction (2mks)



(b) Calculate the molar heat of formation of HF (1mk)

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……

……

(c) What will happen to the yield of HF when the temperature of the above system is increased? (1mk)

……

……

21. Study the physical properties of Magnesium and Beryllium. Use it to answer the questions that follow:

Element	Be	Mg
Mp°C	1280	650
Bp °C	2450	1110
Atomic number	4	12
Atomic radius (nm)	0.086	0.136

(a) Explain why Be has a higher m.p than Magnesium (2mks)

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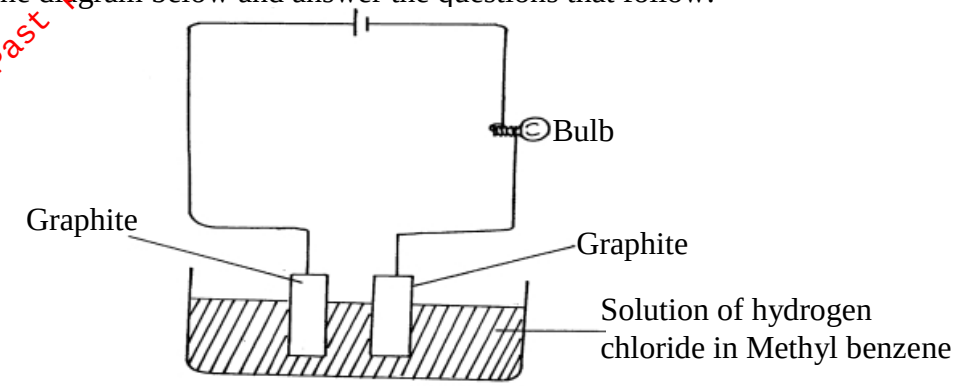
(b) Write the electron arrangement of Magnesium in the following compound; $Mg_3(PO_4)_2$ (1mk)

……

……

……

22. Study the diagram below and answer the questions that follow:



(i)What observation was made during the experiment. Explain? (1½mks)

……

……

……

(ii) What observation would be made if the solution of hydrogen in methylbenzene was replaced with solution of hydrogen chloride in water? Explain (1½mks)

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23. Explain how you would prepare Aluminium hydroxide, staring with Aluminium sulphate. (3mks)

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24. 0.28g of iron burns in air to form Iron (II) oxide. Calculate the mass of Iron(II) oxide formed (O=16, Fe=56) (3mks)

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25. The table below gives the solubilities of Potassium Bromine and Potassium Sulphate at 0^oC and at 40^oC;

Substance	**Solubility /100g water**	
	0^oC	40^oC
Potassium Bromide	55	75
Potassium Sulphate	10	12

When aqueous mixture containing 60g of KB and 7g of K_2SO_4 in 100g water at 80^oC was cooled to 0^oC, some crystals were formed;

(i) Identify the crystals (1mk)

……

(ii) Determine the mass of the crystals formed (1mk)

……

……

(iii) Name the method used to obtain the crystals (1mk)

……

(iv) Suggest **one** industrial application of the method named in (iii) above (1mk)

……

26. State **two** environmental problems likely to be found in an area where Sulphur (IV) oxide is Manufactured. (2mks)

……

……

27. Give **two** advantages of hard water (2mks)

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