Name …………………………..…………………………… Index No. ..……………..………..…

School …………………………………………………... Candidates Sign: …………....…..…

Date: ……………………………..

233/1
CHEMISTRY
Paper 1
THEORY
July / August – 2014
Time: 2 Hours

MMS JOINT EXAMINATION - 2014
Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES
- Write your name and index number in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- 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 EXAMINERS USE ONLY

| Questions	Maximum Score	Candidate's Score
1 - 30	80	

This paper consists of 12 printed pages.
Candidates should check the question paper to ensure that all the
Pages are printed as indicated and no questions are missing.

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1. Producer gas and water gas are collectively known as fuel gas. Producer gas is a mixture of carbon II oxide and Nitrogen while water gas is a mixture of carbon II oxide and hydrogen.

a) State one advantage and one disadvantage of using water gas. (2 mks)
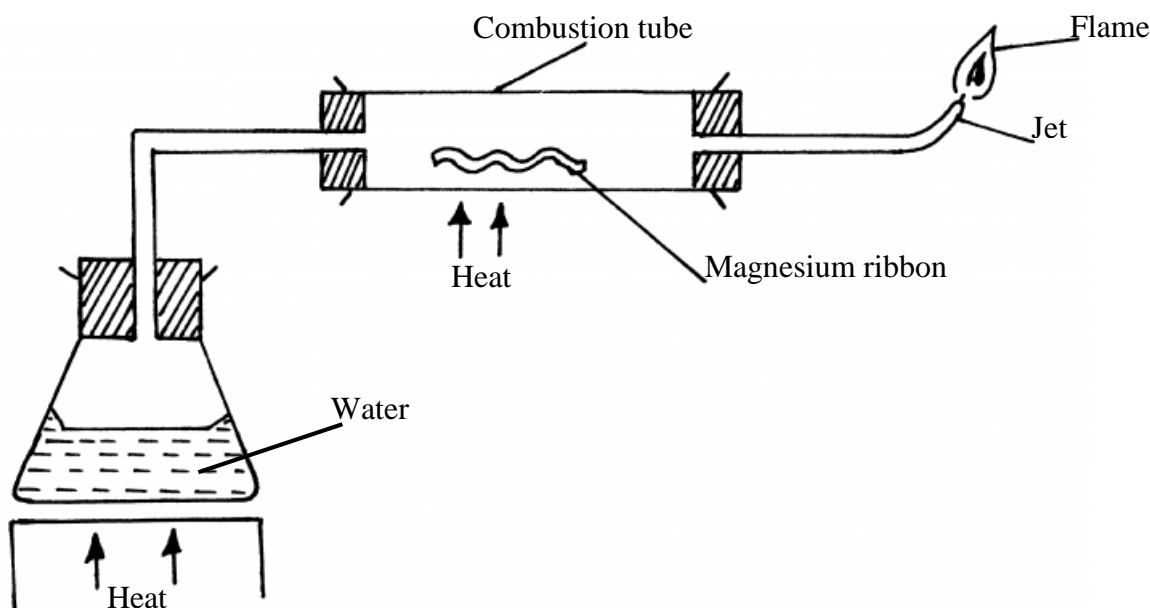
I Advantage

II Disadvantage

2. Hydrogen gas reacts with ethene to form ethane. Calculate the volume of hydrogen required to convert 14g of ethene to ethane at S.T.P. (3 mks)

$C_2H_{2\,(g)} + H_{2\,(g)} \longrightarrow C_2H_6$
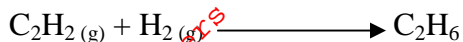
(C = 12, H = 1, molar gas volume at S.T.P. is 22.4 litres)

3. Steam was passed over iron fillings as shown in the diagram below. Study it and answer the questions that follow.


a) State one precaution which should be taken before lighting the gas at the jet. (1 mk)
b) Write a chemical equation for the reaction taking place in the tube.
(i) Combustion tube. (1 mk)
(ii) Jet (burning flame) (1 mk)

4. In an experiment an equal amount of iron fillings and sulphur powder was heated in a test tube. The mixture was left to cool then dilute hydrochloric acid added to it.
a) State the observations that were made;
(i) In the test tube. (1 mk)
(ii) Dilute hydrochloric acid was added to the mixture after cooling. (1 mk)
b) Write an equation for the reaction which occurred in a) (ii) above. (1 mk)

5. a) What is meant by double decomposition? (1 mk)
b) Starting with 1M sodium sulphate solution, describe how you would prepare dry lead II sulphate. (2 mks)

6. A reference book states that the solubility of copper II sulphate in water at 15^0C is 19g/100g of water.
a) What is meant by the term 'solubility' (1 mk)
b) The solubility of copper II sulphate at 75^0C is 55g/100g of water. What mass of crystals of copper II sulphate would be deposited if 52.2g of $CuSO_4$ solution at 75^0C is allowed to cool to 15^0C. (2 mks)

7. When moist coloured flowers are placed in a gas jar containing a gas B, they immediately turned colourless. The solution of gas B formed a white precipitate with silver nitrate solution.
a) Explain what exactly changes the coloured flowers to white. (1 mk)

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b) Write down the equation for the reaction that took place in a) above. (1 mk)

c) Write down the ionic equation responsible for the formation of a white precipitate. (1 mk)

8. Study the following reactions scheme and answer the questions that follow.
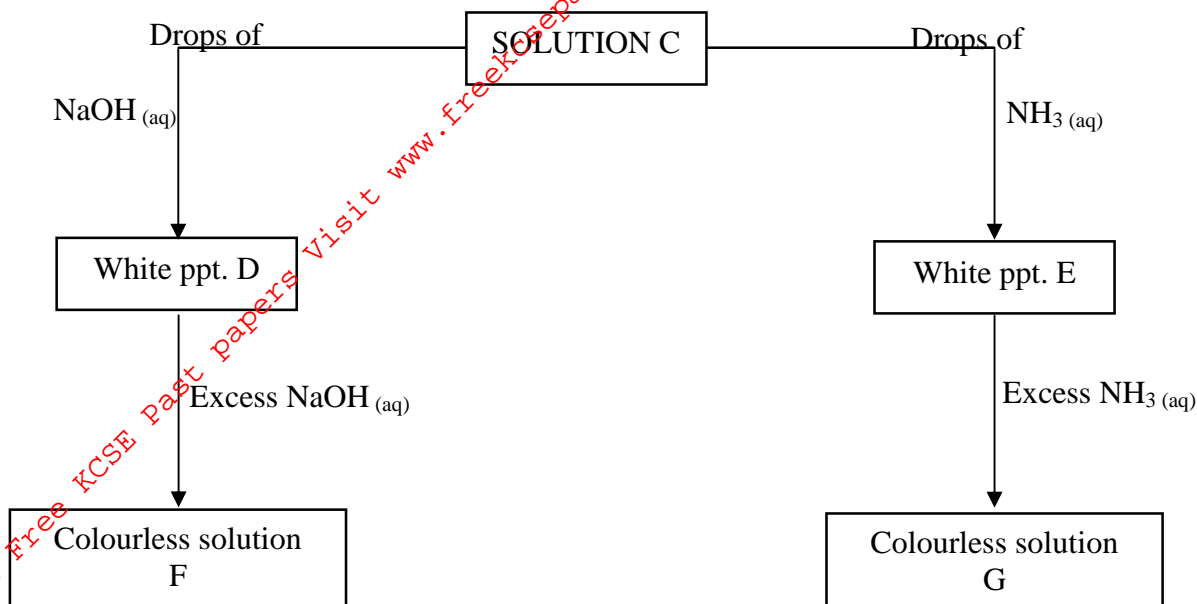
a) Identify

(i) The cations in solution C. (½ mk)

(ii) The white precipitate E. (½ mk)

b) Why does precipitate E dissolve in excess sodium hydroxide solution. (1 mk)

c) Write the formula of the complex ion formed. (1 mk)

9. The set up below was used to investigate the action of heat on copper II carbonate. Study it and answer the question that follows.
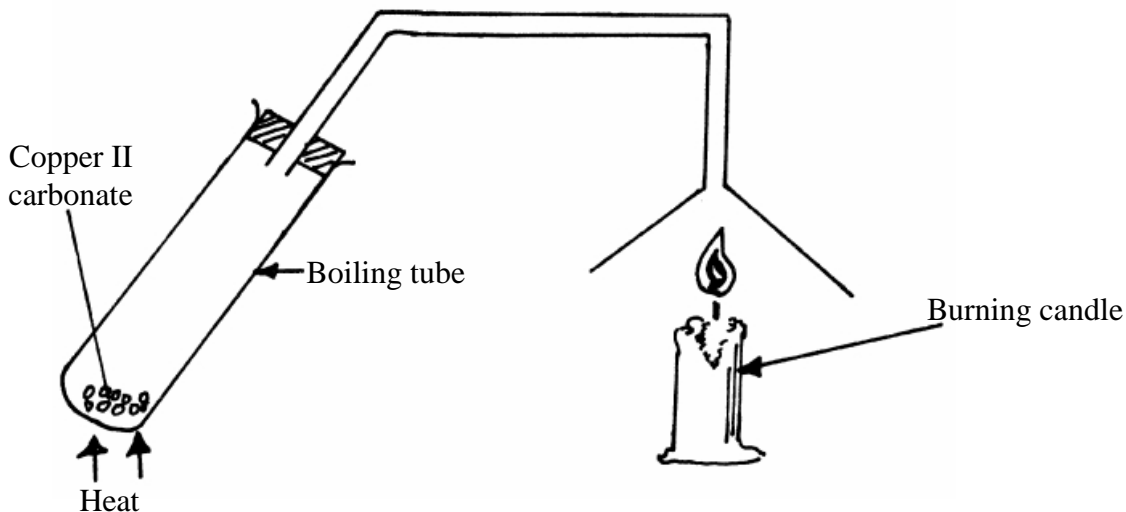
a) State what would happen to the burning candle when the boiling tube is heated. (1 mk)

b) Name the solid formed in the boiling tube after the end of the experiment. (1 mk)

c) Write an equation for the effect of heat on copper II carbonate. (1 mk)

10. a) State Boyle's law (1 mk)

b) 3 litres of oxygen gas at one atmosphere pressure were compressed to two atmospheres at constant temperature. Calculate the volume occupied by the oxygen gas . (2 mks)

11. A student carried out some experiment on the action of sulphuric acid on three carbonates and recorded his results as shown in the table below. Study the table and answer the questions that follow. The carbonates used were of the same mass and same concentration.

Carbonate	Acid	Vol. of CO_2 obtained.
$CaCO_3$	H_2SO_4	8 cm^3

| MgCO$_3$ | H$_2$SO$_4$ | 100 cm^3 |
| ZnCO$_3$ | H$_2$SO$_4$ | 100 cm^3 |

Explain the results in terms of volume of CO$_2$ gas obtained. (2 mks)

12. Name the process that takes place when;

(i) Crystals of iron II sulphate are exposed to air for a long time. (1 mk)

(ii) A mixture of rubber latex and sulphur powder is heated. (1 mk)

13. a) Name the type of the Bunsen burner flame shown below.

Name (1 mk)

b) Explain the formation of soot by luminous flame. (2 mks)

14. In 30 seconds 180cm^3 of oxygen diffused through a porous pot. How long will it take 400cm^3 of carbon IV oxide to diffuse through the same pot. (3 mks)
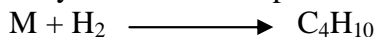
(O = 16, C = 12)

15. a) Give one use of radioactive elements in Agriculture (1 mk)

b) The table below gives the rate of decay for a radioactive element J.

Number of days	Mass (g)
0	384
270	48

Calculate the half - life of the radioactive element J. (2 mks)

16. A hydrocarbon compound M reacts with excess hydrogen gas to form butane

M + H$_2$ $\longrightarrow$ C$_4$H$_{10}$

a) What are the conditions required for the above reaction. (1 mk)

b) Draw the structural formula of M. (1 mk)

c) State one use of compound M. (1 mk)

17. The diagram below is a set up for the laboratory preparation of Nitrogen I oxide.
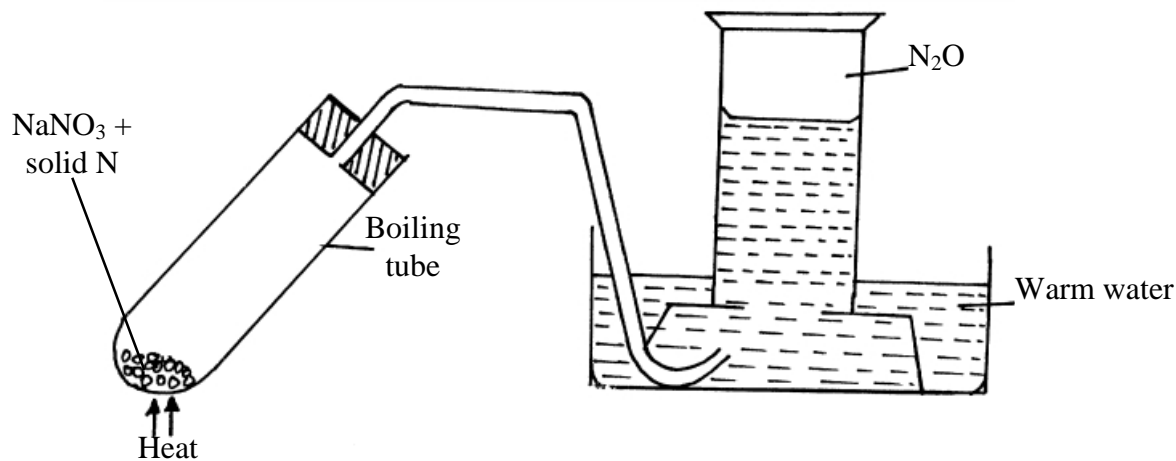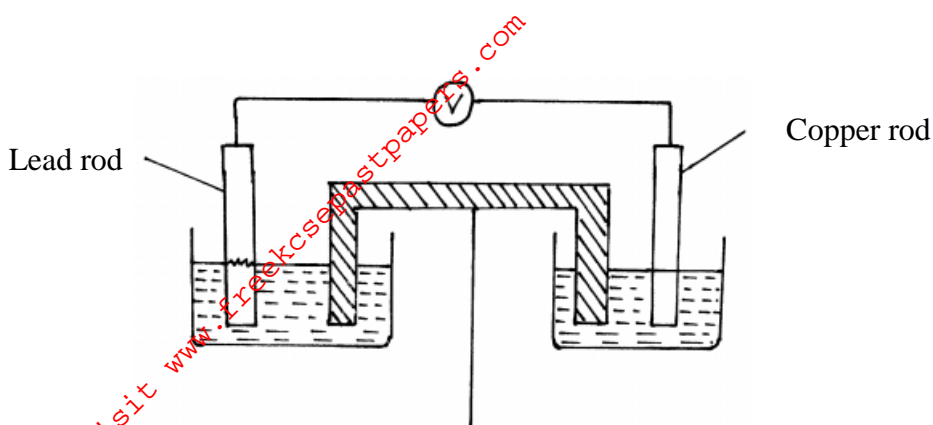

a) Name solid N (1 mk)

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

c) Give one use of nitrogen I oxide. (1 mk)

18. The set up below shows an electrochemical cell.

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a) Write down the overal cell equation.   Salt bridge   (1 mk)

b) Determine the e.m.f. of the cell.   (1 mk)

c) Why would it not be advisable to use saturated solution of sodium chloride in the salt bridge.

                                                                                          (1 mk)

19.   Study the energy cycle diagram below and answer the questions that follow.
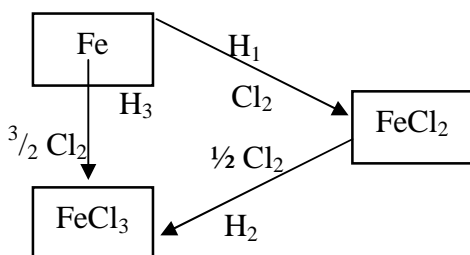
a) What does H_1 represent?   (1 mk)

b) Show the relationship between H_1, H_2 and H_3.   (1 mk)

20.   The table below for electrolysis of lead (ii) chloride represents three metals and their melting
        points and electronic configuration.

Metals	P	Q	R
M.P (^{0}C)	98	650	670
Electronic configuration	2:8:1	2:8:2	2:8:3

a) State the most reactive metal.   (1 mk)

b) Compare the atomic sizes of P and R. Explain.   (2 mks)

21.   Calculate the amount of Magnesium carbonate that would remain if 12.6g of Magnesium
        carbonate were treated with 0.2 moles of hydrochloric acid. The equation for the reaction is

        $MgCO_{3 (s)} + 2HCl_{(aq)} \longrightarrow MgCl_{2 (aq)} + H_2O_{(l)} + CO_{2 (g)}$ (3 mks)

22.   Carbon (II) oxide reacts with hydrogen gas and establishes an equilibrium represented by the
        equation below.

        $CO_{(g)} + 2H_{2 (g)} \rightleftharpoons CH_3OH_{(g)}$ H = +ve

        a) Explain how the yield of the product will be affected if the pressure of the system is reduced.

                                                                                          (1 mk)

        b) What variation of temperature would lead to a higher yield of the product.   (1 mk)

23.   Use the set up below for electrolysis of lead (ii) chloride to answer the questions that follow.

Carbon electrodes

Molten PbI$_2$ (l)

Crucible

HEAT
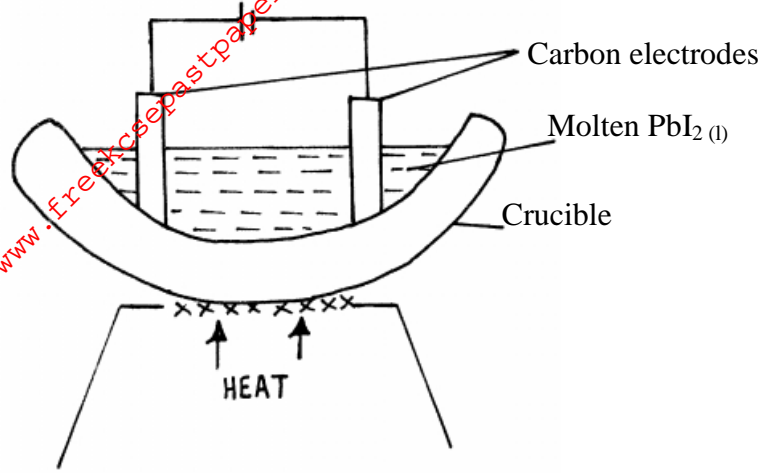
State and explain any two observations made during the experiment.

(i)   (1 mk)

(ii)   (1 mk)

24. a) Describe the froth-flotation process.   (2 mks)

b) Give the name for the main ore of zinc   (1 mk)

25. A polymer has the following structure

- CH$_2$ – CH -   CH$_2$ -   CH –

        C$_6$H$_5$ C$_6$H$_5$

A sample of this polymer is found to have a molecular mass of 10,400. Determine the number of monomers in the polymer (C = 12, H = 1)   (3 mks)

26. Name the best method which can be used to separate the following mixtures.

a) Paraffin and water   (1 mk)

b) Constituents of crude oil   (1 mk)

c) Constituents of green extract from a leaf of a plant.   (1 mk)

27. The table below shows the pH values of solutions T to X.

Solution	T	U	V	W	X
pH	5	13	2	10	7

Which solution:-

(i) Contains the highest concentration of hydroxide ions.   (1 mk)

(ii) Is likely to be a solution of ethanoic acid.   (1 mk)

28. a) What is an alloy?   (1 mk)

b) Give two advantages of using an alloy over pure metal.   (2 mks)

29. Given the bond energies as shown.

Bond	Bond energies KJmol^{-1}
H - H	435
Br- Br	224
H - Br	336

Calculate the energy change for the reaction.

H$_2$ (g) + Br$_2$ (g) ⟶ 2HBr (g)   (2 mks)
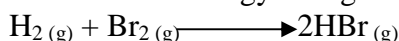
30. Complete the table below   (1 mk)

Species	Neutrons	Electrons
$^{23}_{11}Na$		