Name: …… **Index No.** ……

School: …… **Candidate's Sign.** …….....

Date: …….....

233/1
CHEMISTRY
PAPER 1
JULY /AUGUST 2011
TIME: 2 HOURS

BUSIA DISTRICT JOINT EVALUATION TEST

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

Chemistry
Paper 1

INSTRUCTIONS TO THE CANDIDATES:-

- Write you **name** and **index number** 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
1-30	80	

This paper consists of 11 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing

1. Ethanol and pentane are miscible liquids. Explain how water can be used to separate a mixture of ethanol and pentane. (2mks)

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2. A warm red phosphorous was lowered to a gas jar of chlorine using a deflagrating spoon.
   (i) State **one** observation made in the experiment.

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(ii) Identify the substance formed in the above reaction. (1mk)

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3 (a) Give the structural formula of 3, 3-dimethly pent-l-yne (1mk)

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(b) Name the following compounds using the IUPAC system.

(i) $CH_3CH_2CH_2OOCCH_3$ (1mk)

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(ii) $CH_3\,CH_2\,CH\,C{=}\,CH_2$ (1mk)
$\qquad\qquad\quad\;\;|\quad\;|$
$\qquad\qquad\quad\;\;Br\quad CH_3$

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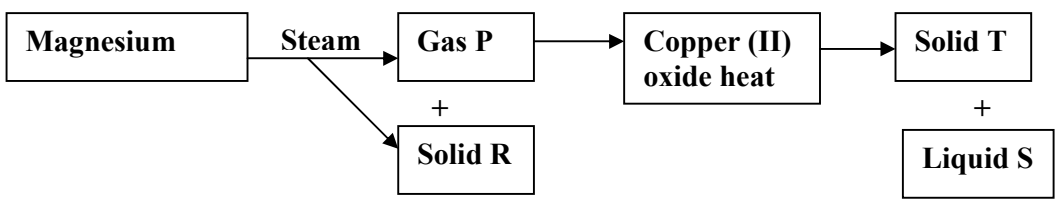
4. Use the chart below to answer the questions that follow.



Identify:

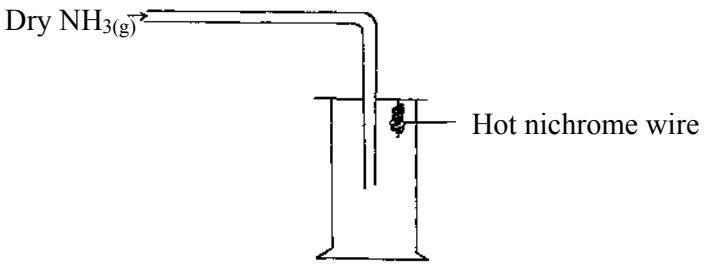
Gas **P** ……. (½ mk)

Solid **R** ……. (½ mk)

Solid **T** ……. (½ mk)

Liquid **S** ……. (½ mk)

5. The apparatus below was a set up to show the catalytic oxidation of ammonia. Study the diagram and answer the questions that follow.



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

(ii) Why is it necessary to have a hot nichrome wire in the gas jar. (1mk)

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(iii) Write the formular of the complex ion formed when excess ammonia gas is passed through a solution containing Zn^{2+} ions (1mk)

6. Calculate the solubility of sugar in water at 40^{o}C from the following information. (2mks)

Mass of evaporating dish = 23.0g

Mass of evaporating dish + sample of saturated solution = 192.0g

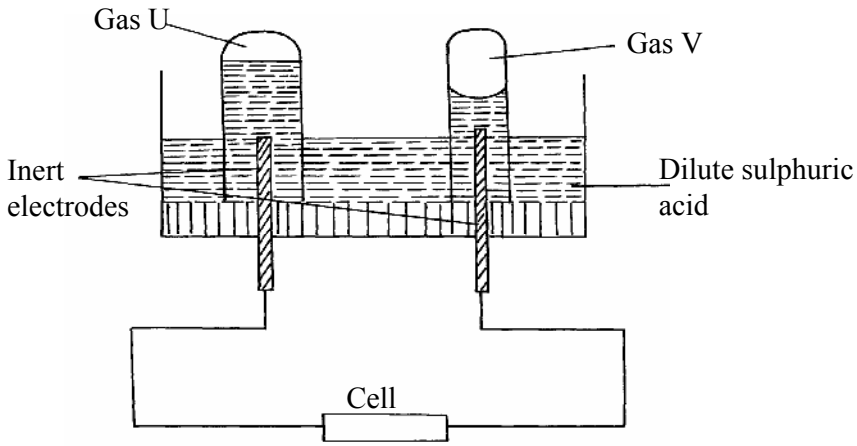
Mass of evaporation dish + solid after evaporating of solution + 142.0g

7. Use the bond energy value given below for the question that follows

Bond	bond energy ($kJmol^{-1}$)
H – H	432
C = C	610
C – C	346
C – H	413

Determine the enthalpy change for the conversion of butene to butane by hydrogen. (3mks)

8. The figure below shows the electrolysis of dilute sulphuric acid.



(i) On the diagram, label the cathode and the anode. (1mk)

(ii) Name the gases (1mk)

U……

V……

(iii) Write the half cell equation for the reaction taking place at the anode. (1mk)

9. Given the equation for reaction $2Al_{(s)} + 3Cl_{2(g)} \longrightarrow 2AlCl_{3(s)}$ Calculate

(i) Volume of chlorine at (r.t.p) required to react with 3g of Aluminium (Molar gas volume at r.t.p = 24litres, Al = 27, Cl = 35.5) (1½ mks)

(ii) Mass of Aluminium chloride formed. (1½ mks)

10. Consider the Zinc nuclide below

$$^{65}_{30}Zn$$

Determine the number of protons and neutrons in the nuclide. (2mks)

11. Using reagents provided only, explain by means of balanced chemical equations how you could prepare a salt of Zinc carbonate solid. (3mks)
    - Zinc powder
    - Nitric (V) acid (dilute)
    - Water
    - Solid sodium carbonate

12. Below is part of the Thorium decay series.

$$^{232}_{90}Th \xrightarrow{(i)} {}^{228}_{88}Ra \xrightarrow{(ii)} {}^{228}_{89}Ac \xrightarrow{(iii)} {}^{228}_{90}Th \xrightarrow{(iv)} {}^{224}_{88}Ra$$

(i) Write an overall nuclear equation for the conversion of $^{232}_{90}Th$ to $^{224}_{88}Ra$ (1mk)

(ii) Give any **two** commercial uses of radio isotopes (2mks)

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13. Explain the following observations.

(a) When lead (II) carbonate reacts with dilute hydrolic acid, very little carbon (iv) oxide is produced (2mks)

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(b) When hydrogen chloride gas is dissolved in water the solution formed turns blue litmus paper red but there is no effect on blue litmus paper when the gas is dissolved in carbon tetra chloride. (Ccl_4) (2mks)

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14. Element A has atomic mass 23 and element **B** atomic mass 7 and also have 12 neutrons and 4 neutrons respectively.

a) Write the electron arrangement of **A** and **B** (2mks)

A……

B……

b) Which element has higher ionization energy? Explain (2mks)

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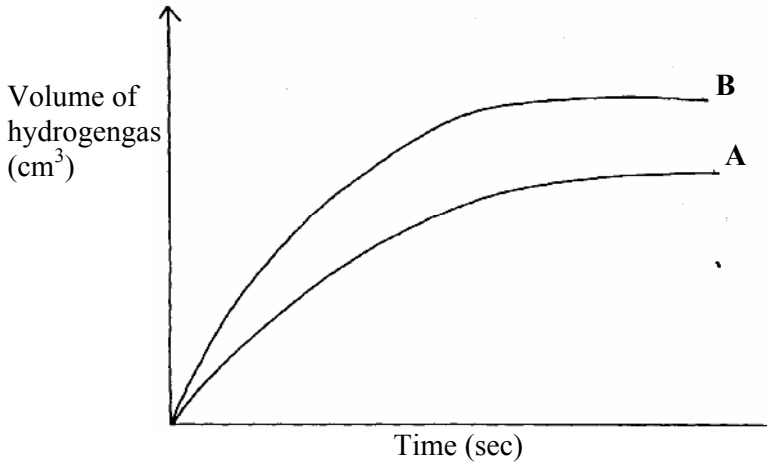
15. Two experiments were carried out as follows and the volume of hydrogen gas evolved measured at intervals of 10seconds for 100 seconds.

(i) 8 cm of magnesium ribbon was added to 1M hydrochloric acid.

(ii) 8cm of magnesium ribbon was added to 0.5M hydrochloric acid.

Graphs of volume of hydrogen gas evolved against time were plotted.



a) Which of the graphs was obtained for reaction (i) ? Explain (2mks)

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b) Explain the general shape of the graphs. (1mk)

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16. D grams of potassium hydroxide were dissolved in distilled water to make $100cm^3$ of solution $50cm^3$ of the solution required $50cm^3$ of 2.0M nitric acid for complete neutralization.
Calculate the mass D of potassium hydroxide.
$KOH_{(aq)} + HNO_{3(l)} \longrightarrow KNO_{3(aq)} + H_2O_{(l)}$ (relative formula of KOH=56) (3mks)

17. Painting, Oiling, galvanizing and or tin plating are methods of rust prevention.

a) Explain the similarity of these methods in the ways they prevent rusting. (1mk)

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b) Explain why galvanized iron objects are better protected even when scratched. (1mk)

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18 . Study the following equilibrium reaction

$2A_{2(g)} + B_{2(g)} \rightleftharpoons 2\ A_2\ B_{(g)}\ \Delta H = -197kJmol^{-1}$

Suggest **two** ways of increasing the yield of A_2B (2mks)

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19. Solutions can be classified as acids bases or neutral. The table below shows solutions and their pH values.

Solution	pH values
K	1.5
L	7.0
M	14.0

(i) Select any pair that would react to form a solution of pH 7 (1mk)

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(ii) Identify **two** solutions that would react with Aluminium hydroxide. Explain. (2mks)

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20 An element Q has a relative atomic mass of 88. When a current of 0.5 amperes was passed through the fused chloride of Q for 32 minutes and 10secodns, 0.44g of Q were deposited at the cathode. Determine the charge on an ion of Q (1Faraday = 96500C) (3mks)

21. State **two** uses of Argon. (1mk)

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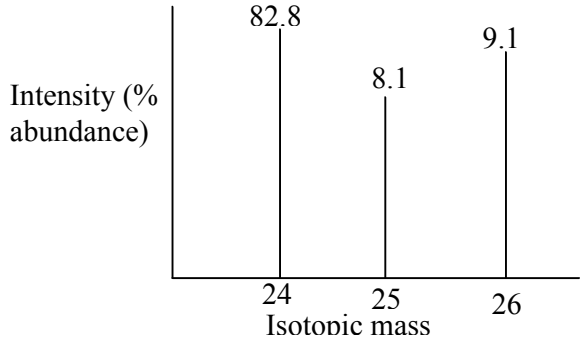
22. The peaks below show the mass spectrum of element X



Calculate the relative atomic mass of X (2mks)

23. The chemical equations below are the main reactions in large scale manufacture of sodium carbonate.

$NH_{3(g)} + CO_{2(g)} + H_2O_{(l)} \longrightarrow NH_4HCO_{3\ (aq)}$

$NH_4HCO_{3\ (aq)} + NaCl_{(aq)} \longrightarrow NaHCO_{3(s)} + NH_4Cl_{(aq)}$

a) Explain how the **two** products, $NaHCO_3$ and NH_4Cl are separated. (1mk)

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b) (i) How is sodium carbonate finally obtained? (1mk)

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(ii) Explain how ammonia is recovered and recycled? (1mk)

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24. Name **two** allotropes of sulphur. (2mks)

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25. Study the information below and answer the following questions. A mixture contains three solid A,B and C. the solubility of these solids in different liquids is as shown below

	Water	Alcohol	Ether
A	Soluble	Insoluble	Insoluble
B	Insoluble	Soluble	Very Soluble
C	Soluble	Soluble	Insoluble

Explain how you will obtain sample C from the mixture. (3mks)

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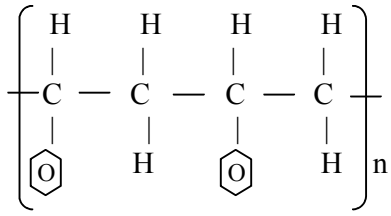
26. $20cm^3$ of an unknown gas Q takes 12.6 seconds to pass through small orifice.$10cm^3$ of oxygen gas takes 11.2 seconds to diffuse through the same orifice under the same conditions of temperature and pressure .Calculate the molecular mass of unknown gas Q (O=16) (3mks)

27. Using dot (•) and cross (**x**) diagram, show the bonding in the compound phosphonium ion PH^+_4 (P=15.0, H=1.0). (2mks)

28. The formula given below represents a portion of polymer



a) Give the name of the polymer (1mk)

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b) Draw the structure of the monomer used to manufacture the polymer. (1mk)

29. A compound of carbon, hydrogen and oxygen contains 71.12 by mass of oxygen, 2.2 hydrogen and the rest is carbon. It has relative molecular mass of 90.

a) Determine the empirical formula of the compound. (2mks)

b) Determine the molecular formula of the compound. (2mks)

30. The diagram below shows an incomplete set up of the laboratory preparation of carbon (IV) oxide gas. Complete it.

(3mks)