
KENYA NATIONAL EXAMINATION COUNCIL
REVISION MOCK EXAMS 2016
TOP NATIONAL SCHOOLS

BAHATI GIRLS
CHEMISTRY
PAPER 2
TIME: 2 HOURS

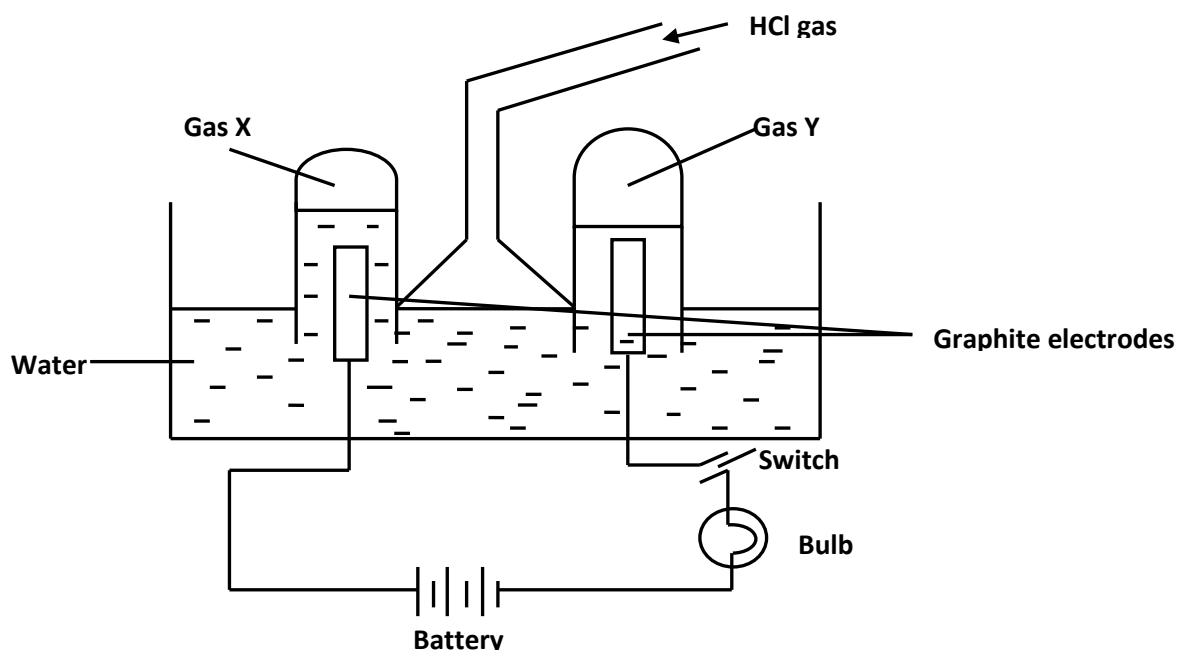
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**BAHATI GIRLS KCSE TRIAL AND
AND PRACTICE EXAM 2016
Paper 2**

1. The table below gives information on four elements by letters A, B, C and D. Study it and answer the questions that follow. The letters do not represent the actual symbols of the elements.

| Element | Electronic arrangement | Atomic radius (nm) | Ionic radius (nm) |
|---------|------------------------|--------------------|-------------------|
| A | 2.8.2 | 0.136 | 0.065 |
| B | 2.8.7 | 0.099 | 0.181 |
| C | 2.8.8.1 | 0.203 | 0.133 |
| D | 2.8.8.2 | 0.174 | 0.099 |

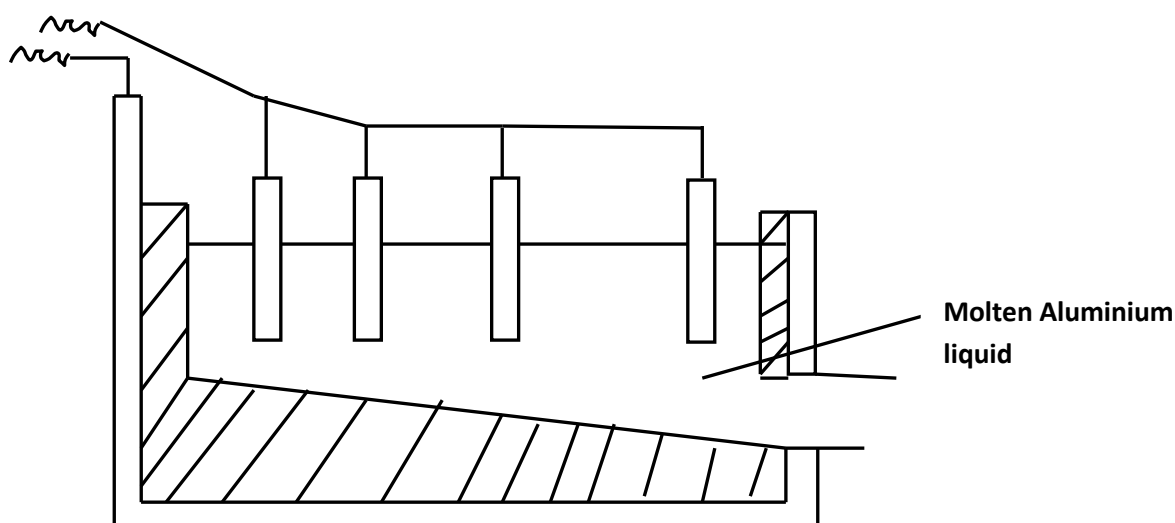
- (a) Which **two** elements have two similar chemical properties? Explain. (2 Marks)
- (b) What is the most likely formula of the oxide of B? (½ Mark)
- (c) Which element is a non-metal? (1 Mark)
- (d) Which one of the elements is the strongest.
- (i) Reducing agent? (1 Mark)
- (ii) Oxidising agent? (1 Mark)
- (e) Explain why ionic radius of D is less than that of C. (1 Mark)
- (f) Explain why the ionic radius of B is bigger than its atomic radius. (1 Mark)
- (g) Give the chemical family to which the element.
- (i) A and D belong (½ Mark)
- (ii) B belong (½ Mark)
- (iii) C belong (½ Mark)
- (h) State any **two** uses of element B. (1 Mark)
2. Study the diagram below and answer the questions that follow.



When some hydrogen gas is allowed into the water and the mixture stirred the bulb lights up and gases X and Y are formed.

- (a) Name gas X Q (½ Mark)
 gas Y (½ Mark)
- (b) Write the chemical equations of how each of the gases is formed.
 Gas X (1 Mark)
 Gas Y (1 Mark)
- (c) State any **two** uses of gas X. (1 Mark)
- (d) Explain why the bulb does not light before the hydrogen chloride gas is let into water. (1 Mark)
- (e) Explain using equations why the volume of gas X is less than that of gas Y. (2 Marks)

3. The extraction of aluminium from its ore takes place in two stages, purification stage and electrolysis stage. The diagram below shows the set up for the electrolysis stage.



- (a) Name the ore from which aluminium is extracted. (½ Mark)
- (b) Name **one** impurity which is removed at purification stage. (½ Mark)
- (c) Label on the diagram each of the following:
 Anode (½ Mark)
 Cathode (½ Mark)
 Region containing the electrolyte (½ Mark)
- (d) The melting point of aluminium oxide is 2054⁰C but electrolysis is done between 800⁰C - 900⁰C.
 (i) Why is the electrolysis not carried out at 2054⁰C.? (1 Mark)
 (ii) What is done to lower the temperature of the electrolysis cell to 800⁰C - 900⁰C? (1 Mark)
 (iii) The aluminium which is produced is tapped off as liquid. What does this imply about its melting point? (1 Mark)
- (e) A typical electrolysis cell uses a current of 40000 amperes. Calculate the mass (in kilograms) of aluminium produced in one hour. (2 Marks)

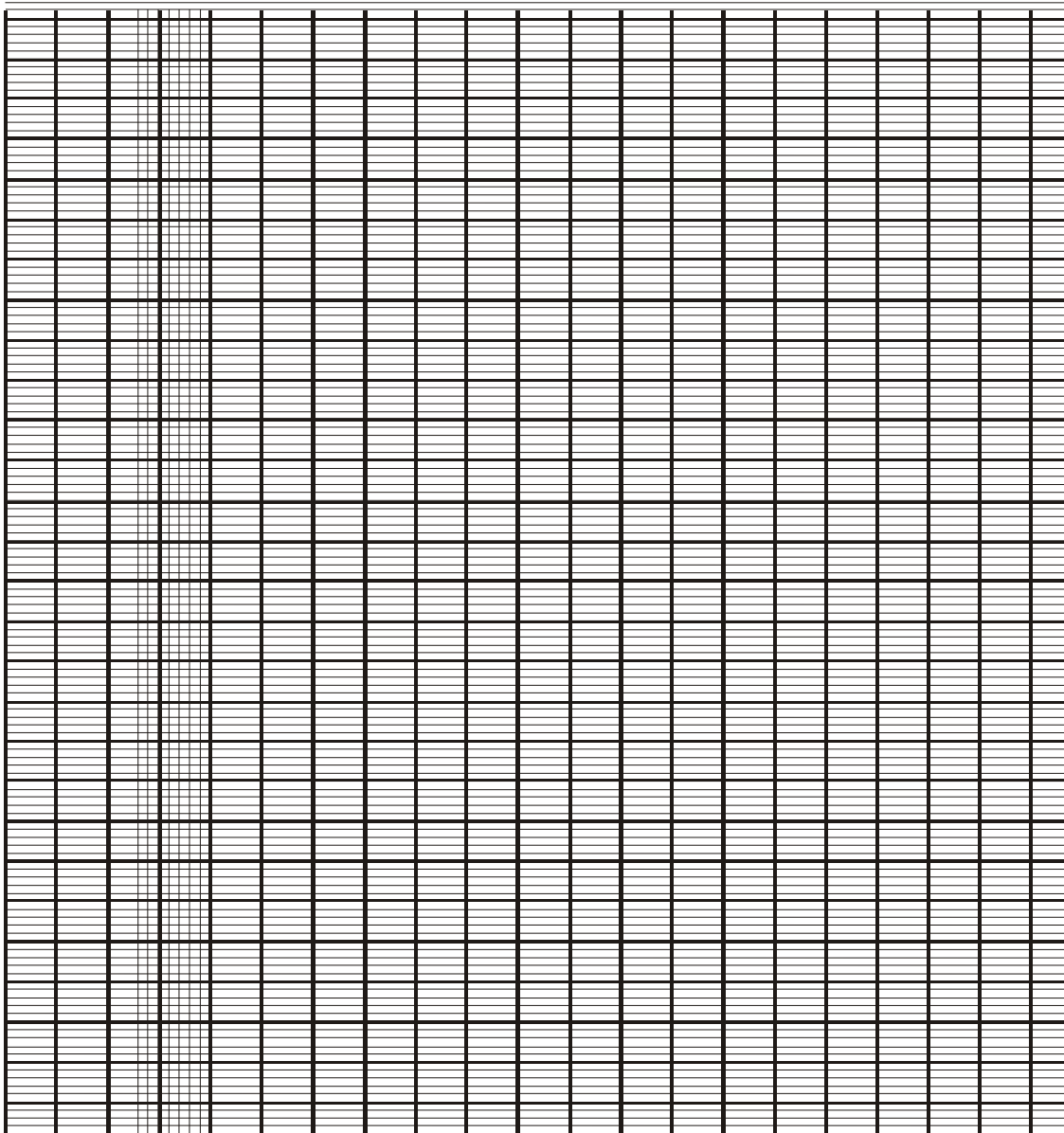
4. The table below gives the volume of the gas provided when different volumes of 2M hydrochloric acid were reacted with 0.6g of magnesium powder at room temperature.

| Volume of 2M hydrochloric acid (cm ³) | Volume of gas (cm ³) |
|---|----------------------------------|
| 0 | 0 |
| 10 | 240 |
| 20 | 480 |

| | |
|----|-----|
| 30 | 600 |
| 40 | 600 |
| 50 | 600 |

(a) Write an equation for the reaction between magnesium and hydrochloric acid, (1 Mark)

(b) On the grid provided, plot a graph of the volume of gas produced (vertical axis) against the volume of acid added (note the reaction comes to completion, the volume of the gas produced directly proportional to the volume of the acid added). (3 Marks)



(c) From the graph determine:

(i) The volume of the gas produced if 12.5cm^3 of 2M hydrochloric acid had been used. (1 Mark)

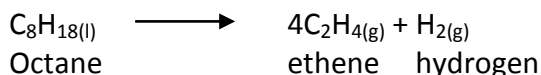
(ii) The volume of 2M hydrochloric acid which when reacted completely with 0.6g of magnesium powder. (1 Mark)

(d) On the same graph paper sketch the curve of the reaction when reacted with,

(i) 0.6 g of magnesium ribbon were used instead of magnesium powder with 2M hydrochloric acid. (1 Mark)

- (ii) 3M hydrochloric acid was used instead of 2M hydrochloric acid. (1 Mark)
- (iii) 0.6g of magnesium powder were used with 2M hydrochloric acid at a lower temperature than the original temperature of the 2M hydrochloric acid in the first case (1 Mark)
- (e) Given that one mole of the gas occupied 24000cm³ at room temperature, calculate the relative atomic mass of magnesium. (2 Marks)
- (f) State and explain the effect on the rate of bubbling of the gas if :
- (i) 0.6g of Magnesium ribbon was used instead of magnesium powder.(1 Mark)
- (ii) 3M hydrochloric acid was used instead of 2M hydrochloric acid. (1 Mark)
- (iii) When 0.6g of magnesium powder is used 2M hydrochloric acid at a lower temperature instead of the temperature of the initial experiment. (1 Mark)

5. Petrol (octane) a long hydrocarbon alkane can be converted to ethene and hydrogen gas mixtures as follows:



- (a) (i) What do we call the process by which the products are obtained from octane? (½ Mark)
- (ii) Give **two** conditions needed in this reaction. (1 Mark)
- (b) Unleaded fuel is now widely used and has to be used in modern cars fitted with catalytic converters.
- (i) State the merits of unleaded petrol over 'leaded' petrol. (1 Mark)
- (ii) What is the role of the catalytic converter? (1 Mark)
- (iii) Why wouldn't the converters work with leaded petrol? (1 Mark)
- (iv) List **four** air pollutants produced by leaded petrol fuel used in automobile engines or any other petrol propelled engine. (2 Mark)

6. A natural element represented by letter Y has two types of atoms. The composition of the particles is as summarised below:

| Type of atom | Nucleons present | % composition |
|------------------------|------------------|---------------|
| ${}^{63}_{29}\text{Y}$ | 29, 34 | 69.1 |
| ${}^{65}_{29}\text{Y}$ | 29, _____ | 30.9 |

- (a) Complete the missing number. (½ Mark)
- (b) What is the name assigned to these two types of atoms? (½ Mark)
- (c) Which atom has the least percentage of abundance? (½ Mark)
- (d) Calculate the relative atomic mass of Y. (2 Marks)
- (e) Explain what is made by nuclear particles giving examples where possible. (1½Marks)
7. a) State graham's law of gas diffusion. (1 Mark)
- b) 60cm³ of oxygen gas diffuses through a porous plug in 50 seconds. How long would it take 60cm³ of sulphur (iv) oxide gas to diffuse through the same plug under the same condition? (S=32, O=16). (2 Marks)
8. Below is a list of potential differences obtained when metals X, Y, Z, K and L are used in the following electrochemical cell.
Metal(s)/metal ion (aq)//copper(ii)ions/copper.

| Metal | E^θ (volts) |
|--------------|--------------------|
| X(Valence 2) | -1.10 |
| Y | -0.46 |
| Z | 0.00 |
| K | +0.45 |
| L(Valence 2) | +1.16 |

- (a) What is metal Z? Explain. (1 Mark)

- (b) Which **two** of the above metals in an electrochemical cell would produce the largest electromotive force across the cell? What is this electromotive force? (2 Marks)
- (c) Write the cell equation of the pair of metals that will produce the largest potential difference. (1 Mark)
- (d) Write the cell equation of the pair of metals that will produce the largest negative potential difference. Determine this voltage. (3 Marks)
9. a) A mass of 56g a saturated solution of salt X at 25^oC yield 14g of the solid when evaporated to dryness. What is the solubility of the salt at 25^oC. (2 Marks)
- b) Bromine reacts with hydrogen to form hydrogen bromide gas as shown below:

$$\text{H}_{2(g)} + \text{Br}_{2(g)} \longrightarrow 2\text{HBr}_{(g)} \quad \Delta H = -128\text{Kj}$$
- (i) Determine the molar heat of the above reaction. (1 Mark)
- (ii) Write the equation for the above case that show the molar heat of formation of hydrogen bromide gas. (½ Mark)
- c) State and explain the effect of the following on the equilibrium of the reaction indicated below.

$$\text{H}_{2(g)} + \text{Cl}_{2(g)} \rightleftharpoons 2\text{HCl}_{(g)} \quad \Delta H = -108\text{KJ.}$$
- (i) Increase in pressure. (1 Mark)
- (ii) Increase in temperature. (1 Mark)
- (iii) Removal of chlorine gas. (1 Mark)
10. a) A sample of mass of X grammes of a radioactive isotope decays to 50 grammes in 100 days. The half life of the isotope is 25days. Calculate the initial mass of the isotope X. (2 Marks)

Study the scheme given below and answer the questions that follow;

- a) Name the reagents used in:
- b) Identify substance:
- c) Draw structural formula for the following substances (½ Mark)
- d) State **one** disadvantage of continued use of substance K. (½ Mark)
11. a) 0.1mole of sodium chloride was dissolved in 100cm³ of water. Calculate the concentration of this aqueous solution in grams per dm³ (Na=23, Cl=35.5). (2Marks)
- b) Draw reaction cycles for the cases shown below. (2Marks)
- $$\text{S}_{(s)} + \frac{1}{2} \text{O}_{2(g)} \longrightarrow \text{SO}_{(g)}$$
- $$\text{SO}_{(g)} + \frac{1}{2} \text{O}_{2(g)} \longrightarrow \text{SO}_{2(g)}$$