

NAME: _____ CLASS _____ DATE: _____

SCHOOL _____

CHEMISTRY

FORM 4

PAPER 2

END TERM 1 EXAMS

INSTRUCTIONS TO THE STUDENTS:-

- Write your **Name** and **Admission number** in the spaces provided.
- Answer ***all*** the questions in the spaces provided.
- All working **MUST** be clearly shown where necessary.

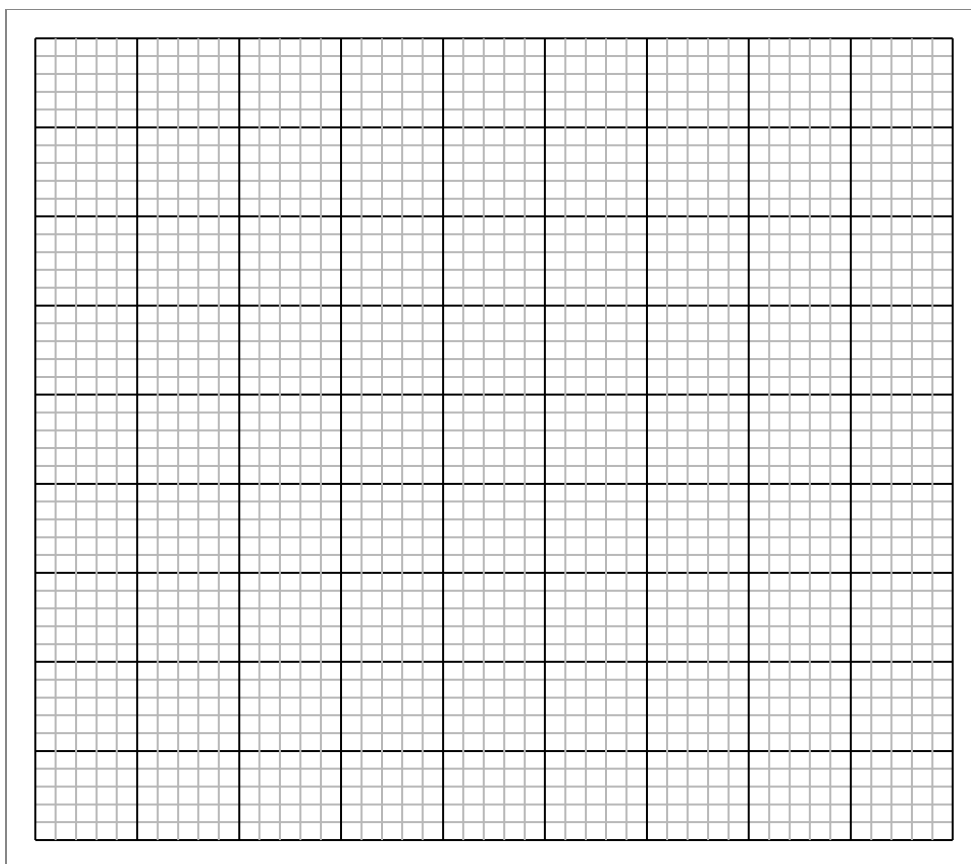
1. a) What is radioactivity? (1 mk)

b) State two differences between chemical and nuclear reactions (2 mk)

c) The table below give the percentages of a radioactive isotope of Bismuth that remains after decaying at different times.

Time (min)	0	3	6	11	19	31	50
Percentage of Bismuth	50	40.5	32.5	24	14.5	6	1.5

i) On the grid provided, plot a graph of the percentage of Bismuth remaining (Vertical axis) against time. (3 mk)



ii) Using the graph, determine the:

I. Half – life of the Bismuth isotope (1 mk)

II. Original mass of the Bismuth isotope given that the mass that remained after 35 minutes was 0.08 g (2 mk)

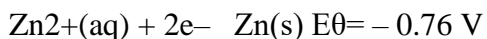
d) Give one use of radioactive isotopes in the following fields;

i) Medicine (1 mk)

ii) Agriculture (1 mk)

iii) Food industry (1 mk)

2..a) The reduction potentials of $\text{Mg(s)} \mid \text{Mg}^{2+}(\text{aq})$ and $\text{Zn(s)} \mid \text{Zn}^{2+}(\text{aq})$ half-cells are:



Using the electrode potentials, answer the following questions.

(i) Write an ionic equation for a cell made by combining the two half cells. (1mk)

(ii) Draw an electrochemical cell made by combining the two half cells above . (3mk)

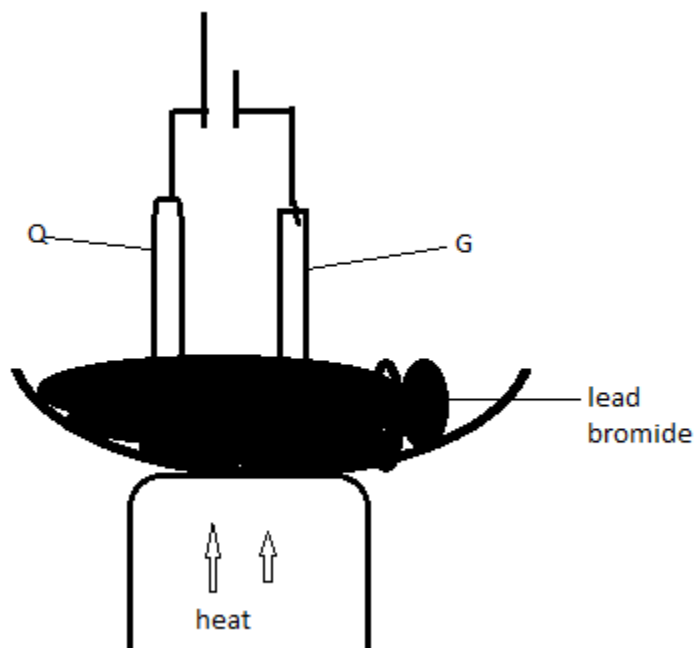
b) Use the cell representation below to answer the question that follows



Given that the E^{θ} value for $\text{Ag}^{+}(\text{aq}) \mid \text{Ag(s)}$ is $+0.80\text{V}$, calculate the E^{θ} value for $\text{Cu(s)} \mid \text{Cu}^{2+}(\text{aq})$. (2mk)

c) In an experiment to electrolyse copper (II) sulphate solution using copper electrodes, 0.2 amperes were passed through the solution for 23 hours. Calculate the mass of copper deposited at cathode. (1 Faraday = 96,500 coulombs, $\text{Cu} = 64$). (3mk)

d) The set-up below was used to electrolyse a bromide of lead. Study it and answer the questions that follow.

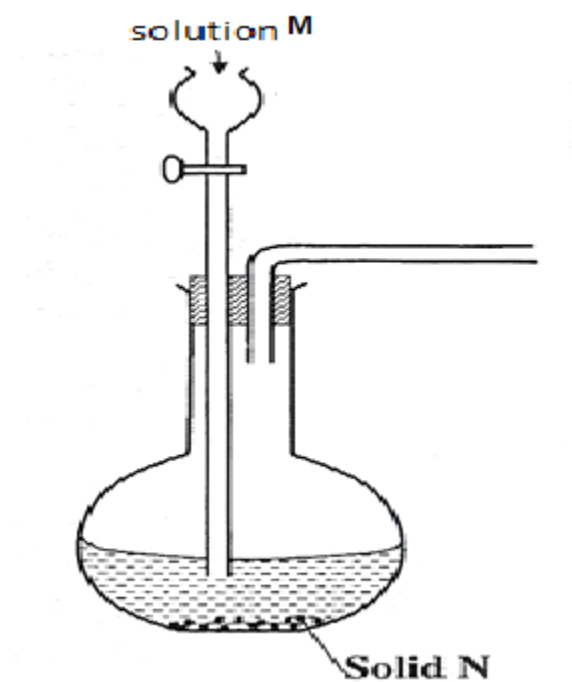


(i) Write the equation for the reaction at electrode G (1 mk)

(ii) State the observation made at electrode Q (1 mk)

e) List any two applications of electrolysis.
(1mk)

3. The set up below can be used to generate a gas without heating. This occurs when substance M reacts with solid N.



- a i) Complete the table below giving the names of Solution M and solid N if the gases generated are chlorine and sulphur (IV) oxide. (2 marks)

	Chlorine	Sulphur (IV) Oxide
Substance M		
Solid N		

- (ii) Complete the diagram above to show how a dry sample of chlorine gas can be collected (3mk)

(b) Write balanced chemical equation to show how chlorine with cold and dilute sodium hydroxide.

(1mk)

(c) 600cm³ of dry chlorine gas were passed over excess heated iron powder in a combustion tube until no further change.

i) State the observations made in the combustion tube.

(1mk)

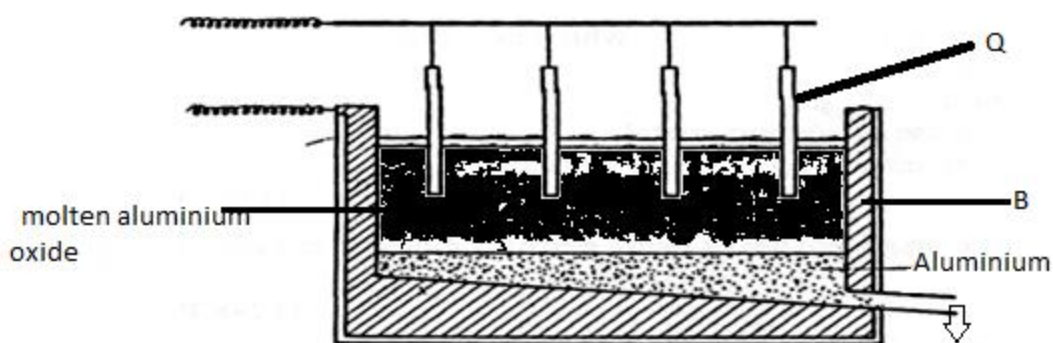
ii) Calculate the mass of the product formed. (MGV= 24dm³, Cl=35.5, Fe= 56)

(3mk)

d) A soil sample was suspected to contain chloride ions. Describe a simple experiment that can be used to confirm the presence of the chloride ions.

(3mk)

4. The extraction of aluminum 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)i) Name the ore from which aluminium is extracted. (1mk)

ii) Outline the stages involved in the purification stage. (2mk)

b)i) Identify the electrode labelled B (1mk)

ii) The melting point of aluminium oxide is 2054°C , but electrolysis is carried out between $800 - 900^{\circ}\text{C}$. What is done to lower the temperatures? (1mk)

iii) The aluminium which is produced is tapped off as liquid. what does this suggest about its melting point? (1mk)

iv) What makes it possible to tap aluminium from the lower side (1mk)

v) Write the half-cell equation for the reaction taking place at electrode Q (1mk)

vi) State two reasons that make aluminium be used to make cooking utensils. (1mk)

vii) Why can't aluminium be extracted through reduction method. (1mk)

5. a) Explain why a solution of hydrogen chloride gas in methylbenzene does not change a blue litmus (1mk)

b) Compare the electrical conductivity of solution J with pH 6 and L pH 2. (2mks)

c) Name the process that takes place when:

i) Sulphur is heated with natural rubber. (1 mk)

ii) Fats or oils are hydrolyzed using an alkali. (1 mk)

d) i) Oxygen is obtained by fractional distillation of liquid air. Name two other gases which are obtained from this process during distillation. (1mk).

ii) Give two industrial uses of oxygen gas. (1mk)

e) Describe the procedure used to obtain oil from groundnuts. (3mk)

6. The following is an extract of the periodic table. Study it and answer the questions that follow. (the letters do not represent the actual symbols of the elements.)

N								
						R	X	
	G			T				F
	W						V	
L								

- a) In which other group can N be placed and why?
(1mk)
- b)i) Write the formulae of the compound formed when elements X and W reacts.
(1mk)
- ii) Comment on the electrical conductivity of the compound formed above.
(2mk)
- c) Choose;
- i) The most unreactive element
(1mk)
- ii) The strongest reducing agent.
(1mk)
- d) State the nature of each of the following;
- i) The chloride of W (1mk)

ii) The oxide of T (1mk)

e) What name is given to the group of elements where G and W belong? (1mk)

f) Use the letter B to show the position of an element that forms a divalent anion with three energy levels in the periodic table (1mk)

g) Describe how a pure and solid sample of lead ii chloride can be separated from its solid mixture with the chloride of G.

(2mks)

7. a) List any two physical tests for water.
(1mk)

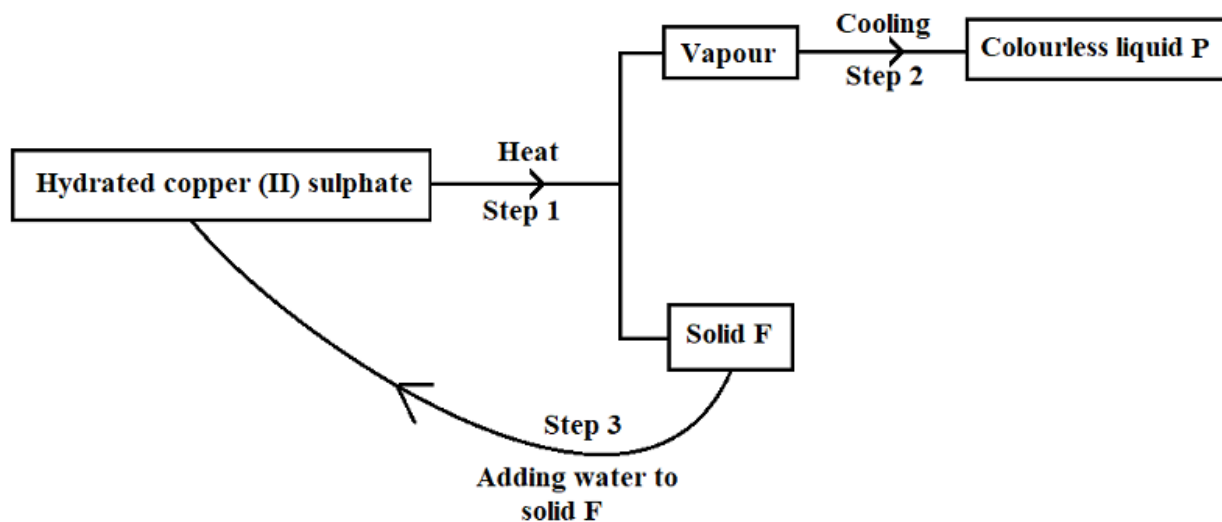
b) A student wanted to prepare hydrogen gas in the lab. He reacted dilute hydrochloric acid with copper metal but no gas was collected.

i) Explain this observation.
(1mk)

ii) What adjustments would have been made in order to collect the gas.
(2mks)

c) Metal E reacts with steam but not with cold water, metal M do not react with dilute acids, metal D reacts with cold water vigorously while metal S reduces the oxide of D. arrange the metals starting with the most reactive.
(2mk)

d) 10. Study the flow chart below and answer the questions that follow



i) Classify the change in step 1 (1 mk)

ii) Name another substance that undergoes a similar change as hydrated copper (II) sulphate when heated. (1 mk)

e) i) Explain why hydrogen is not commonly used as a fuel (1mk)

ii) Apart from rocket fuel, list any other two uses of hydrogen gas (1mk)

THE END

