NAME..Signature:...............................

545/2

Chemistry

Paper 2

2 Hours

Uganda Certificate of Education

Chemistry

Paper 2

2 Hours

INSTRUCTIONS

*Section **A** consists of **10** structured questions. Answer all questions in this section.*

Answers to these questions must be written in the spaces provided.

*Section **B** consists of 4 semi – structured questions. Answer any **two** questions from this section. Answers to the questions **must** be written in the answer sheets provided.*

*In both sections , all working **must** be clearly shown and must be in blue or black ink.*

*Any work done in pencil will **not** be marked except drawings.*

Mathematical tables and silent non – programmable calculators may be used.

FOR EXAMINERS' USE ONLY														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A (50 MARKS)

*Answer **all** Questions in this Section*

1. (a) Name **one** process by which the components of the following mixtures can be separated   (01mark)
    (i)   **three** water-soluble dyes

    ....

    (ii)   **two** miscible liquids with boiling points of 78^0c and 100^0c (01mark)

    ....

    (iii)   water containing an insoluble solid   (01mark)

    ....

    (iv)   water containing a dissolved solid   (01mark)

    ....

    (b) State the principle behind the process named in (a)(i)   (01mark)

    ....

    ....

2. **Y** is the ion of an element **X**. **Y** contains 13 protons, 14neutrons and 10 electrons.
    (a) State the ;
    (i)   electronic configuration of **X**   (½ mark)

    ....

    (ii)   nucleon number of **Y**   (½ mark)

    ....

    (b) Predict the formula of the compound that contains **Y** and the oxide ion .(01mark)

    ....

    (c) State with the reason whether the compound formed in (b) would conduct electricity in molten state or not   (1 ½ marks)

    ....

    ....
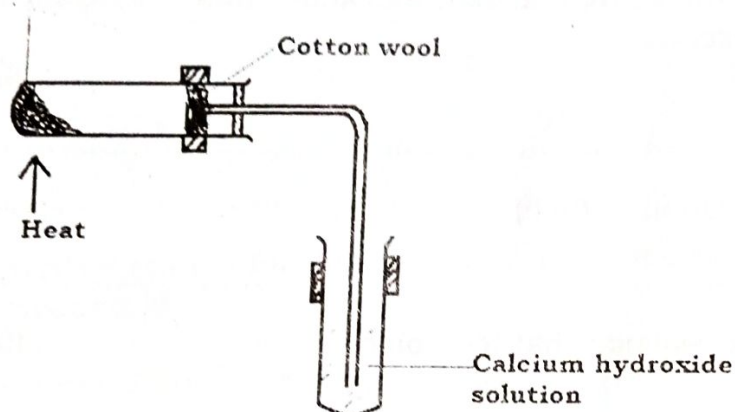
(d) In the space below draw the structure adopted by atom **W** atomic number 11 and atom **T** atomic number 17 (1½marks)

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3. The figure below was set to show the reaction between Copper(II) oxide with carbon when strongly heated.

Mixture of copper (II) oxide and ground charcoal

Cotton wool

Heat

Calcium hydroxide solution

(a) State what was observed;

(i)   in the test tube containing the mixture (01mark)

....

(ii)   in the test tube containing calcium hydroxide solution (½ mark)

....

(b) Explain your observation in (a)(i) above (01mark)

....

(c) Write the equation for the reaction taking place in the test tube containing calcium hydroxide solution (1½marks)

....

(d) Identify the; (½ mark)
(i)   Oxidizing agent

....

(½ mark)

(ii)   Reducing agent

....

4. A student reacted hydrochloric acid with iron filings. A gas **X** was evolved during the reaction. (½ mark)
    (a) (i) name gas **X**

....

(ii) Write down the ionic equation for the reaction that took place (1½marks)

....

(b) To the resultant solution of the above reaction, was added dilute aqueous ammonia solution dropwise until in excess.
    (i)   State what was observed. (01mark)

....

(ii)   Explain the above observation in (b) (i) (½ mark)

....

(iii)   write an equation for the reaction that took place (01mark)

....

(c) State **one** large scale use of gas **X** (½ mark)

....

5. When a mixture of liquid **Y** and Lead(II) oxide was heated, a greenish-yellow gas **W** was evolved.
    (a) Identify;
    (i)   liquid **Y**

(½ mark)

....

(ii)   gas **W**

(½ mark)

....

(b) Write the equation for the reaction leading to the formation of gas **W**   (1½ marks)

....

(b) What is the charge on the terminals **A** and **B**? (01mark)

A. ....

B. ....

(c) What is the name given to potassium chloride solution? (01mark)

....

(d) Give the name of this cell set-up? (01mark)

....

9. A compound **L**, when heated melts and decomposes to form brown fumes that relights a glowing splint and a white residue, **M** on cooling. **M** dissolves in dilute Sulphuric acid on warming to form a colourless solution, **N.** when sodium hydroxide solution was added dropwise until in excess to a portion of **N**, a white precipitate **Q** soluble in excess ammonia solution to form a colourless solution, **R** was observed.

(a) Identify;

(i) compound **L** (½ mark)

....

(ii) solution **N** (½ mark)

....

(b) (i) Write equation for the reaction that takes place when magnesium is heated with compound **M** (01mark)

....

(ii) State why the reaction in (b) (i) cannot take place when silver is used instead of magnesium (½ mark)

....

(c) Briefly explain the reaction that convert **N** to **Q** to **R** (2 ½ marks)

....
....
....
....
....

10. (a) Write,

(i) the molecular formula of butane (01mark)

....
....

(ii)   equation for the complete combustion of butane   (1 ½ marks)

....

....

(b) Calculate the amount of heat that would be evolved if 840cm³ of butane gas was completely burnt in air, at room temperature and pressure
(Enthalpy of combustion of butane is -3062.5kjmol⁻¹)   (2 ½ marks)

....

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....

....

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SECTION B (30MARKS)

*Answer any **two** questions from this Section*

11.   A hot liquid **X** was allowed to cool in air. The temperature was measured every five seconds. The table below shows variation in temperature with time when liquid **X** was allowed to cool.

Temperature (^{0}c)	70	50	50	23	23
Time (s)	0	5	15	25	30

(a) (i) Plot a graph of temperature against time   (4 ½ marks)
    (ii) Explain the shape of the graph   (4 ½ marks)
    (iii) What is the melting point of substance **X**   (½ marks)

(b) **X** has a boiling point of 128^{0}c. explain, in terms of the kinetic particle theory, what happens to the particle of **X** as it is heated from 100^{0}c to 150^{0}c.

(c) Sketch a graph of temperature against time for substance **X** being heated from 30^{0}c to 140^{0}c   (02marks)

12. Air was passed through two wash bottles one containing calcium hydroxide and the other containing concentrated sulphuric acid, then the combustion tube containing heated copper.

(a) (i) State what was observed in the bottle that contained calcium hydroxide solution. (01mark)

(ii) Write equation(s) for the reaction(s) that took place (03marks)

(iii) State what was observed in the bottle that contained concentrated sulphuric acid. (01mark)

(iv) State the purpose of passing air through a wash bottle containing concentrated sulphuric acid. (01mark)

(v) State the property of sulphuric acid being investigated. (½ marks)

(b) (i) State what was observed in the combustion tube. (01mark)

(ii) Write an equation for the reaction that took place in the combustion tube. (1 ½ mark)

(iii) Name the gas that comes out of the tube. (01mark)

(c) Burning magnesium was plunged into a gas jar of the gas in (b) (iii).

(i) State what was observed (01mark)

(ii) Write an equation for the reaction that took place (1 ½ marks)

(iii) State what would be observed and write equation for the reaction when the product in (c) above is shaken with water and resultant solution tested with litmus paper. (2 ½ marks)

13. (a) Describe how a pure dry sample of ammonia gas can be prepared in the laboratory. (No diagram is required) (5 ½ marks)

(b) With the help of equation, give the reasons why ammonia gas cannot be dried using concentrated sulphuric acid and fused calcium chloride. (05marks)

(c) Ammonia is prepared on large scale by the Haber process in the presence of catalyst **P**.

(i) Identify the catalyst **P** (½ mark)

(ii) Write an equation leading to the formation of ammonia in the Haber process. (1 ½ marks)

(d) Write down the equation for the reaction;

(i) When lead(II) oxide is treated with ammonia (1 ½ marks)

(ii) Between ammonia and oxygen in the presence of hot platinum foil (1 ½ marks)

14. (a) Describe briefly how sodium can be obtained from a named ore.
    (No diagram is required) (07marks)

   (b) A piece of sodium was heated and dropped into a jar of chlorine.
   (i) State what was observed (01mark)
   (ii) Write equation for the reaction that took place (01mark)

   (c) Name a place in Uganda where a plant for the extraction of sodium can be constructed. Give a reason for your answer. (01mark)

   (d) Chlorine can be prepared by the action of potassium manganate(VII) Crystals on hydrochloric acid according to the following equation.
   $$2KMnO_{4(s)} + 16HCl_{(aq)} \longrightarrow 2KCl_{(aq)} + 2MnCl_{2(aq)} + 8H_2O_{(l)} + 5Cl_{2\ (g)}$$

   State ;
   (i) the condition(s) for the reaction (01mark)
   (ii) how the gas produced can be purified (½ mark)

   (e) Describe briefly how chlorine in (d) can be tested in the laboratory. (01mark)

   (f) A sample of chlorine from the reaction in (d) was collected and bubbled through 8cm³ of distilled water in a boiling tube. To the resultant solution was added 2cm long magnesium ribbon.
   (i) State what was observed (½ mark)
   (ii) Write an ionic equation for the reaction that took place (01mark)

   (g) Calculate the mass of potassium manganate (VII) that would be required to react with hydrochloric acid to produce 112.0cm³ of chlorine, measured at s.t.p.
   (1 mole of potassium manganate weighs 158g, 1 mole of gas occupies 22.4dm³ at s.tp) (02marks)

END BY TR. GUIDE N.H.S