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**545/2**

**CHEMISTRY**

**PAPER 2**

**2 HOURS**

**UGANDA CERTIFICATE OF EDUCATION**

**Pre - Registration Examinations 2016**

**CHEMISTRY**

**PAPER TWO**

**TIME: 2 HOURS**

**Instructions;**

* This paper consists of two sections A and B.
* Attempt **all** questions in section A and any **two** in section B.
* Answers to section B must be written in the answer booklet provided.
* You **must** be **neat** and show all your working(s) clearly.

**FOR EXAMINERS USE ONLY**

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | Total |
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**SECTION A: (50 MARKS)**

Attempt **all** questions in this section.

1. Under suitable conditions, Hydrogen peroxide H2O2 can decompose rapidly to produce Oxygen gas.

a. i) Write Equation for the decomposition of Hydrogen peroxide.

(1 ½ marks)

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ii) State any two ways in which the decomposition of Hydrogen Peroxide can be made to occur more rapidly. (1 mark)

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b) Burning Magnesium ribbon was lowered into a jar of Oxygen.

i) State what was observed. (1 mark)

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

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2. A colourless gas G turned Potassium Manganate (VII) solution colourless.

a) Name two gases that are likely to be G. (1 mark)

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b) G also turned a solution of bromine in tetrachloromethane colourless, but did not have any effect on acidified potassium dichromate solution.

i) Identify G. (½ mark)

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ii) Write an equation to show the reaction between G and bromine in tetrachloromethane. (1 mark)

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c) G was burnt in air containing plentiful supply of Oxygen. Write equation for the reaction that took place. (1 ½ marks)

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d) Name two substances that can react to produce G. (1mark)

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3. a) Give on example of a mixture of substances that can be separated by each of the following methods;

i) Sublimation (1 mark)

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ii) Fractional distillation (1 mark)

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b) Air is a mixture of mainly two gases.

i) Name the two gases and give their approximate composition in ordinary air by volume. (2 marks)

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ii) State two reasons why air is considered a mixture and **NOT** a compound.

(2 marks)

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iii) Name the industrial method by which the two major gaseous components of air can be separated. (1 mark)

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4. a) When mixed with a solution containing Copper(II) ions, Zinc granules react with Sulphuric acid at room temperature to produce Hydrogen gas.

i) State the conditions under which Sulphuric acid reacts with the zinc granules. (½ mark)

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ii) Suggest the property of the Sulphuric acid in this reaction. (½ mark)

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iii) What is the role of Copper(II)ions in this reaction? (½ mark)

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iv) Write an ionic equation for the reaction leading to the formation of Hydrogen gas. (1 ½ marks)

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b) Dry Hydrogen gas was passed over a strongly heated Copper (II)oxide in a combustion tube.

i) State what was observed. (1 ½ marks)

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ii) Write down an Equation for the reaction that took place. (1 ½ marks)

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5. Write Equation only to show the reaction that takes place when each of the following substances are strongly heated in air. (1 ½ marks)

a) Sodium metal

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b) Sodium Nitrate.

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c) Sodium Hydrogen Carbonate

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d) Copper (II) Nitrate

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6. 50.0cm3 of a 2M sodium hydroxide solution was accurately measured into a volumetric flask and water added to make one litre of dilute solution. Calculate the volume of the dilute solution that would be required to react completely with 25.0cm3 of 0.04M Copper (II) Nitrate solution. (4 marks)

Hint:

Cu (OH)2(s)

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7. The atomic numbers of the Elements X and Y are 12 and 17 respectively.

a) Write down the electronic configuration of

i) X (½ mark)

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ii) Y (½ mark)

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b) State the

i) Group in the periodic table to which Y belongs. (½ mark)

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ii) Period in the periodic table to which X belongs. (½ mark)

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d) X and Y combine to form a compound Z. Using outermost shell electrons only, show how compound Z is formed. (2 ½ marks)

8. Ammonia can react with Lead (II)Oxide according to the following equation.

3PbO(s)+2NH3(g) 3Pb(s)+N2(g)+3H2O(l)

a) State;

i) the condition(s) under which the reaction takes place. (1 mark)

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ii) the property of ammonia shown in this reaction. (1 mark)

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b) 3.1g of Lead was obtained when ammonia reacted with Lead (II) Oxide. (Pb=201, O=16), 1 mole of a gas at s.t.p occupies 22.4dm3). (2 marks)

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9. a) Dilute solution Copper (II) chloride was electrolyzed between graphite electrodes.

i) State what observed at the Cathode. (1 mark)

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ii) Give a reason for your observation in (i) above. (½ mark)

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iii) Name the product obtained at the Anode. (1 mark)

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b) The electrolysis in (a) was repeated using a concentrated solution of copper(ii) chloride solution, a colourless gas W with a choking smell was evolved and gave dense white fumes with concentrated Ammonia solution. Write an equation of reaction that took place at the anode.

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10. When a mixture of compound m and concentrated sulphuric acid was warmed, a vigourius effervescence took place and a colourless gas W with a choking smell was evolved. W also gave dense white fumes with concentrated Ammonia solution.

a. i) Name W: (1 mark)

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ii) Suggest a possible identity of the anion in M. (1 mark)

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iii) Name one reagent which would be used to confirm the identity of the anion you have suggested in a (ii). (½ mark)

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b) Write down an ionic Equation to show the reaction that can take place between Lead (II) Nitrate solution and an aqueous solution of compound M.

(1 ½ marks)

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**SECTION B: (30 MARKS)**

Attempt only **two** questions from this section.

11. A compound Q consists of 26.7% Carbon and 2.2% Hydrogen by mass, the rest being Oxygen.

a) Calculate the simplest formula of Q. (3 ½ marks)

(C=12, H=1, O=16).

b) An aqueous solution of Q turns moist blue litmus paper red.

i) Suggest how the PH value of a 2M aqueous solution of G would compare with the PH value of 2M Hydrochloric acid. Give a reason for your suggestion. (3 marks)

ii) Predict how Q would react with sodium Hydrogen Carbonate.

(1 mark)

iii) Write down an ionic equation for the reaction that you have predicted in b (i) above. (1 ½ marks)

c) 20.0cm3 of a solution containing 1.125g of Q in 250cm3 of the solution required exactly 25.0cm3 of 0.08M Sodium Hydrogen Carbonate solution for complete reaction. (1 mole of a solution of Q reacts with 2 moles of NaHCO3 solution).

Calculate the;

i) Concentration of the solution of Q in moles per dm3. (3 marks)

ii) Molar mass of Q. (1 ½ marks)

d) Determine the molecular formula of Q. (1 ½ marks)

12. a) With the aid of a labeled diagram, explain the laboratory preparation of a dry sample of Chlorine gas, starting from potassium Manganate (VII).

(No Equation is required).

b) Chlorine was bubbled through a dilute solution of sodium Hydroxide.

i) State what was observed. (1 mark)

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

c) i) Write an equation for the reaction between iron wool and Chlorine gas.

(1 ½ marks)

ii) State the conditions(s) for the reaction in d(i) above. (1 mark)

iii) Give the conditions why the reaction in d(i) is regarded as an Oxidation reaction of iron. (1 mark)

13. Iron (III) Oxide (Haematite) is one of the common ores of iron from which iron can be extracted in a blast furnace.

a) Name

i) One other common Ore of iron other than Haematite. (1 mark)

ii) One major impurity that can be found in the ore you have named in a(i) above. (1 mark)

b) Outline the reactions which occur in the blast furnace during the extraction of iron from iron (III) oxide. (7 marks)

c) i) Name the major components of stainless steel. (1 mark)

ii) State one use of stainless steel. (½ mark)

iii) Give a reason why stainless steel is more used than pure iron.

(1 mark)

d) Most common compounds of iron are either of iron (II) or iron (III). Write down the formula of one compound of

i)Iron(II)

ii)iron (III)

e) Name one reagent that could be used to distinguish between iron(II) and iron(III) ions in solution. In each case, state what was observed when the reagent is treated separately with iron(II)ions and iron(III)ions.

(2 ½ marks)

14. a) Define the term Enthalpy of combustion. (2 marks)

b) With the aid of a labeled diagram, describe an experiment that can be used to determine the Enthalpy of combustion of Propanol, C3H7OH.

(C=12, H=1, O=16). (9 marks)

c) When 0.5g of Propanol was used to heat 200cm3 of water, it rose the temperature of water by 16.8o (Calculate the enthalpy of combustion of Propanol. (Density of water=1gcm-3, specific heat capacity of water=4.2Jg-1K-1).

d) Give a reason why it is important to determine the enthalpy of combustion. (1 mark)

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