Name:..... Index No:.....

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545/2
CHEMISTRY
Paper 2

2 hours

INTERNAL MOCK EXAMINATIONS

Uganda Certificate of Education

CHEMISTRY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES:

*Section A consists of 10 structured questions. Answer **all** questions in this section. Answers to this question(s) **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 booklets provided.*

SECTION A

1. The atomic numbers of elements **Q**, **R** and **T** are 2, 6 and 17 respectively;

(a) State;

(i) The group in the periodic table to which **Q** belongs. *(½ mark)*

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(ii) The period in the periodic table to which **T** belongs. *(½ mark)*

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(b) **Q** is generally unreactive. Give a reason. *(01 mark)*

……..

(c) State one general property of elements in the group to which **T** belongsin the periodic table. *(½ mark)*

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(d) When **R** combines with **T**, the compound formed is a liquid at room temperature and is insoluble in water;

(i) Write the formula of the compound. *(01 mark)*

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(ii) Suggest one reason why the compound is not soluble in water. *(01 mark)*

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2. (a) Zinc carbonate and copper(II) nitrate were separately heated. Write an equation for the reaction that took place.

Zinc carbonate *(1½ marks)*

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Copper(II) nitrate *(1½ marks)*

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(b) Concentrated sulphuric acid was added to copper metal and the mixture heated,

(i) State what was observed. *(1½ marks)*

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(ii) Write an equation for the reaction that took place. *(1½ marks)*

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3. (a) When water was added to solid **X**, a colourless, ordourless gas was evolved that relights a glowing splint.

(i) Name solid **X.** *(01 mark)*

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(ii) Write an equation for the reaction that took place. *(1½ marks)*

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(b) State what would be observed if litmus paper was added to the resultant solution in (a) above. *(01 mark)*

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(c) Name any other substance that evolves a colourless gas in (a) above. *(01 mark)*

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4. (a) An organic compound **M** contains 60% carbon, 13.30% hydrogen, the restbeing oxygen. Determine the empirical formula of **M**. *(03 marks)*

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(b) If the molar mass of **M** is 60g, determine the value of n in the formula $C_nH_{2n+1}OH$. *(02 marks)*

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5. A clean piece of copper foil was dipped into a solution of silver nitrate;

(a) (i) State what was observed. *(02 marks)*

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(ii) Explain your observation in (a) (i) above. *(1½ marks)*

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(b) Write equation for the reaction that took place. *(1½ marks)*

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6. (a) (i) State what would be observed when a gas jar of ammonia was inverted over a gas jar containing hydrogen chloride gas. *(01 mark)*

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(ii) Write equation for the reaction that took place. *(1½ marks)*

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(b) Nitrogen reacts with hydrogen according to the following equation;

$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$

Calculate the volume of ammonia produced at s.t.p when 44.8 dm^3 of hydrogen reacted completely with nitrogen (1 mole of a gas at s.t.p occupies 22.4 dm^3)

(2½ marks)

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7. Chlorine gas was bubbled through cold water until there was no further change.

(a) State what was observed *(01 mark)*

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(b) Few drops of litmus solution were added to a solution of chlorine in water. State what was observed. *(01 mark)*

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(c) Write equation for the reaction;

(i) Between aqueous chlorine and dilute potassium hydroxide solution. *(1½ marks)*

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(ii) That takes place when aqueous chlorine is exposed to sun light. *(1½ marks)*

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8. (a) (i) An acid **Q**, with the formula $H_xC_yO_z.n\ H_2O$ contains 26.7% carbon, 2.2% hydrogen and 71.1% oxygen by mass. Determine the empirical formula of **Q** (H=1, C=12, O=16) *(02 marks)*

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(ii) Determine the values of x, y and z in the formula of **Q**. ($H_xC_yO_z$ = 90)
(1½ marks)

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(b) 20.0cm^3 of a solution containing 6.3g of **Q** per litre required exactly 20.15 cm^3 of a 0.1 M sodium hydroxide solution for complete neutralization.

(i) Calculate the concentration of **Q** in moles per dm^{-3} of the solution.
p *(02 marks)*

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(ii) Deduce the value of **n**. *(1½ marks)*

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9. (a) Write the structural formula of

(i) ethene *(1 mark)*

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(ii) ethane *(1 mark)*

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(b) (i) Name one reagent which can be used to distinguish between ethene and ethane. *(1 mark)*

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(ii) State what would be observed if ethene was treated with the reagent you have named in b (i) above. *(1 mark)*

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(c) Write equation for the polymerization of ethene *(1 mark)*

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10 (a) A dilute solution of copper(II) sulphate was electrolyzed for some time using copper electrodes.

(i) To the anode. *(01 marks)*

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(ii) To the cathode *(01 mark)*

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(b) Write equation for the reaction that took place at the anode. *(1½ marks)*

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(c) State;

(i) What was observed at the cathode?

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(ii) How the resulting solution would affect litmus paper after some time. *(1 mark)*

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SECTION B

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

11. (a) Carbon dioxide can be prepared in the laboratory using calcium carbonate and Substance **T**.

(i) Identify **T** and write equation leading to the formation of carbondioxide. *(2½ marks)*

(ii) With the aid of a labeled diagram, describe how you would prepare a dry sample of carbon dioxide starting from calcium carbonate. *(06 ½ marks)*

(b) When bubbled through calcium hydroxide solution, carbon dioxide reacted to form a white precipitate of calcium carbonate according to the following equation;

$Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O(l)$

Calculate the mass of dry calcium carbonate that would be obtained if $600cm^3$ of carbon dioxide measured at room temperature was bubbled through calcium hydroxide solution. (Ca = 40, C=12, O=16, 1 mole of a gas occupies $24.0dm^3$ at room temperature). *(02 marks)*

(c) More carbon dioxide was bubbled through a mixture. State what was observed and explain the reaction that took place. *(2½ marks)*

(d) Burning magnesium was lowered into a jar of carbon dioxide. Write an equation for the reaction that took place. *(1½ marks)*

12. (a) Describe how you would prepare dry crystals of zinc sulphate in the laboratory.

(06 marks)

(b) Zinc sulphate crystals were dissolved in water and the resultant solutions divided into three portions.

(i) To the first portion was added barium nitrate solution. State what was observed

(ii) Write an equation for the reaction. *(02 marks)*

(iii) To the second portion was added sodium hydroxide solution dropwise until in excess. State what was observed and write equation(s) for the reaction(s) that took place. *(3½ marks)*

(c) To the third portion was added sodium carbonate;

(i) State what was observed. *(01 mark)*

(ii) Write an equation for the reaction *(1½ marks)*

(iii) The product in (c) above was strongly heated. Name the residue formed. *(1 mark)*

13. (a) Describe how nitric acid and can be manufactured using hydrogen and nitrogen as raw materials. (Illustrate your answer with equations) *(10 ½ marks)*

(b) Write equations to show the effect of heat on:

(i) NH_4NO_3 *(1 ½ marks)*

(ii) $Zn(NO_3)_2$ *(1 ½ marks)*

(c) Potassium nitrate was heated with concentrated sulphuric acid.

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

14. (a) (i) Write the names and formulae of the ores from which cast iron can be obtained. *(03 marks)*

(ii) Name the main impurity in the ores. *(01 mark)*

(b) Haematite is mixed with other substances before being introduced in the blast furnace.

(i) Name two substances which are mixed with haematite. *(02 marks)*

(ii) Name the other substance needed in the extraction of iron. *(01 mark)*

(c) Explain the purpose of adding each substance in b (i) above. Write equations for the reactions that take place. *(08 marks)*

END