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545/2
CHEMISTRY
(Theory)
Paper 2
July/August 2019
2 hours

ASSHU – RWENZORI REGION ACADEMIC BOARD (ARRAB)

Uganda Certificate of Education

MOCK EXAMINATIONS

CHEMISTRY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES

This paper consists of two (2) sections A and B.

Answer all questions in section A. Answers to section A should be written in the spaces provided.

Answer only **two (2)** questions in section B. Answers to section B should be written in the answer sheets provided.

In both sections all working must be shown clearly.

1 mole of a gas occupies 22,400cm³ at s.t.p.

1 mole of a gas occupies 24,400cm³ at room temperature.

Use the following where necessary.

H = 1, C = 12, O = 16, Mg = 24, Fe = 56, Pb = 207, S = 32

For Examiners use only

1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

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SECTION A (40 MARKS)

1. (a) A mixture of hydrogen gas and gas Q was passed over heated Iron wire under pressure. A colourless gas R that formed dense white forms with concentrated hydrochloric acid was formed.

(i) Identify gases Q and R. (01 mark)

Q .....

R .....

(ii) Write an equation for the reaction between hydrogen gas and gas Q. (1½ mark

.....

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(b) R was passed over heated copper (II) oxide.

(i) State what was observed. (01 mark

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(ii) Write an equation for the reaction. (1½ mark

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2. (a) Ethanol can be prepared from glucose. Write an equation for the reaction. (1½ mark

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(b) When ethanol is heated with concentrated sulphuric acid at 170°C, a hydrocarbon formed.

(i) Name the hydrocarbon P. (0½ mark

.....

(ii) Write the structural formula of P. (01 mark

.....

.....

(iii) Name the other substances formed in (b) above. (0½ m

.....

(c) Write an equation for the complete combustion of P. (1½ marks

.....

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3. (a) A mixture of ammonium sulphate and sodium sulphate was heated.
(i) State what was observed. (01 mark)

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.....

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

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.....

(b) A part from applying the above method to separate the two salts, state one method how the above mixture can be separated and state a reason for that method. (1½ marks)

Method: .....

Reason: .....

4. 3.0g of a hydrocarbon **S** was completely burnt in oxygen and 4.8dm^3 of carbondioxide was collected at room temperature.
(a)(i) Determine the mass of carbon and hydrogen in the 3.0g of hydrocarbon **S**.
(2½ marks)

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(ii) Calculate the empirical formula of **S**. (02 marks)

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(b)(i) The molecular mass of S is 30. Determine the molecular formula of **S**. (01 mark)

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(ii) Name the hydrocarbon **S**. 0½ mark)

.....

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Turn over

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5. (a) An atom of element **Z** has 12 neutrons and a mass number of 23. Write the formula of the oxide of **Z**. (0½ mark)

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(b) The oxide of **Z** was dissolved in water and the aqueous solution was tested with litmus paper.

(i) State what was observed. (0½ mark)

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.....

(ii) Write an equation for the reaction that took place in (b) above. (1½ marks)

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(c) **Z** was heated in excess air.

(i) State what was observed. (0½ mark)

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.....

(ii) Write an equation for the reaction between **Z** and chlorine gas. (1½ marks)

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.....

6. A mixture of salt **A** and concentrated sulphuric acid was heated. A colourless gas **B** which fumed in moist air was formed.

(a) (i) Name gas **B**. (0½ mark)

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(ii) Write an equation for the reaction in a(ii) above. (1½ marks)

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(b) Gas **B** passed over heated iron fillings.

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

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(ii) Write the equation for the reaction in b(i) above. (1½ marks)

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7. When a solid **X** is heated, reddish brown fumes are given off. An aqueous solution of X forms a yellow precipitate when potassium iodide solution is added to it.

(a)(i) Identify the cation and anion in salt **X**. (01 mark)

Cation: .....

Anion: .....

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(ii) Write an equation for the reaction which takes place when X is heated. (1½ marks)

.....

.....

(b) Sodium hydroxide solution was added to an aqueous solution of X drop wise until in excess;

(i) State what was observed. (0½ mark)

.....

.....

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

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. When potassium chlorate was heated; a colourless gas was evolved;

(a)(i) Name the colourless gas. (½ mark)

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

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(b) The same colourless gas in (a) was evolved when water was added to solid M.

(i) Identify solid M. (0 ½ mark)

.....

(ii) Write an equation for the reaction between M and water. (1½ marks)

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.....

(iii) State the approximate composition of the colourless gas in the atmosphere. (0½ mark)

.....

(iv) State **one** use of the colourless gas. (0½ mark)

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9. (a) 3.0g of a mixture of lead carbonate and lead sulphate was dissolved in excess dilute nitric acid.

(i) Name the gas evolved. (0½ mark)

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(ii) Write an equation for the reaction that took place in (a) above. (1½ marks)

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(b) If 240 cm^3 of the gas in (a) above was measured at room temperature.

Calculate the mass of lead sulphate in the mixture. (03 marks)

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10. (a) Carbon dioxide gas is prepared by reacting calcium carbonate (make chips) with dilute hydrochloric acid.

(i) Write an equation for the reaction that takes place. (1½ marks)

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(ii) Give a reason why dilute sulphuric acid is not used in the preparation of carbondioxide with marble chips. (01 mark)

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(b)(i) State what would be observed if calcium carbonate powder was used instead of marble chips. (01 mark)

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(ii) Sketch a graph of volume of carbon dioxide given off against time and label the curves when marble chips and calcium carbonate powder are separately used. (1½ marks)

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SECTION B: (30 MARKS)

Answer **two** *questions from this section*

11. (a) A hydrate salt R contains 20.2% Iron, 11.55% sulphur, 23% oxygen and the rest being water of crystallization. The molecular mass of R is 278. Determine

(i) Empirical formula of R. (02 marks)

(ii) Molecular formula of R. (01 mark)

(b) R was heated gently then strongly until no further change.

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

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

(c) Describe how R can be prepared in the laboratory. (07 marks)

12. (a) Concentrated nitric acid was added to copper turnings and the mixture warmed gently.

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

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

(iii) State what would be observed if ammonia solution is added to the product in (a) drop wise until in excess. (01 mark)

(b) Name a reagent which can be used to distinguish between the following chemical species. In each case state what would be observed and write equation(s) for the reaction(s) which take(s) place.

(i) $Pb^{2+}(aq)$ and Cu^{2+}(aq) (05 marks)

(ii) $Cl^{-}(aq)$and $CO_3^{2-}(aq)$ (03 marks)

(iii) Ethene and ethane (03 marks)

13. (a) Starting with air, describe how one would obtain ammonia gas on large scale. Write equations for the reactions which take place. (10 marks)

(b) Dry air was passed over heated magnesium metal.

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

(ii) Write equation(s) for the reaction(s) which takes place. (03 marks)

(c) State what would be observed if water is added to the product in (b). (01 mark)

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14. (a)(i) A part from spathic Iron ore, write the names and formulae of **two** ores from which iron can be obtained. (02 marks)

(ii) Name the main impurity in iron ore. (01 mark)

(b) Spathic Iron ore is first roasted in air and then mixed with other substances before being introduced in the blast furnance.

(i) Name the **two** substances which are mixed with spathic iron ore. (01 mark)

(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. (10 marks)

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