

Candidate's Name:

Signature:

Random No.						Personal No.		

(Do not write your school/centre Name or Number Anywhere on this booklet)

545/2

CHEMISTRY

Paper 2

Oct./Nov. 2019

2 hours

UGANDA NATIONAL EXAMINATIONS BOARD

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 section **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 booklet(s) provided.

In both sections **all** working **must** be clearly shown.

Where necessary use;

(H=1, C=12, N=14, O=16, Na=23, S=32; Cl=35.5)

1 mole of a gas occupies 24.0 litres at room temperature.

1 mole of a gas occupies 22.4 litres at s.t.p.

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) Write the chemical name of rust. (01 mark)

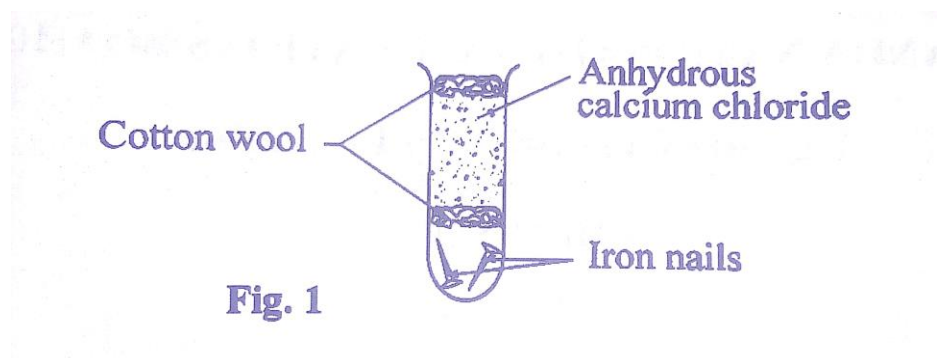
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(b) State the conditions necessary for rusting to take place. (02 marks)

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(c) Figure 1 shows a set –up of apparatus that was used to investigate a condition necessary for iron nails to rust.



State the condition that was being investigated. (01 mark)

.....

(d) State;

(i) **one** disadvantage of rust. (01 mark)

.....

(ii) **one** method of preventing rusting. (01 mark)

.....

2. Table 1 shows the mass numbers and atomic numbers of elements W, X and Y. Study the table and answer the questions that follow it.

Table 1

Element	Mass number	Atomic number
W	24	12
X	14	7
Y	39	19

- (a) State the number of;
- (i) electrons in the atom of element Y. (01 mark)
-
- (ii) neutrons in the atom of element Y. (01 mark)
-
- (b) Write the electronic configuration of the ion that can be formed by the atom of element Y. (01 mark)
-
- (c) Identify the group in the periodic table to which element X belongs. (01 mark)
-
- (d) Element W reacted with element X to form a compound Z. State the type of bond in Z. (01 mark)
-
3. (a) A metallic element T, reacts with nitrogen to form a compound with the formula T_3N_2 .
- (i) State the valency of T. ($\frac{1}{2}$ mark)
-
- (ii) Write the equation for the reaction between T and chlorine. (1½ marks)
-
- (b) 3.2 g of T reacted completely with 600 cm³ of nitrogen at s.t.p. Determine the atomic mass of T
(1 mole of a gas occupies 22.4 dm³; T reacts with nitrogen in the ratio of 3:1)
- (02 marks)
-
-
-
-
-
-

4. Clean zinc granules were added to a solution of copper(II) sulphate.

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

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(b) Explain your observation in (a). (02 marks)

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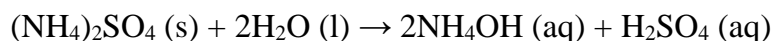
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(c) Write equation to support your answer in (b). (1½ marks)

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.....

5. Ammonium sulphate dissolves in water according to the following equation:



(a) State what would be observed if aqueous sodium hydrogencarbonate was added to the resultant solution. (01 mark)

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(b) Briefly explain your answer in (a) (04 marks)

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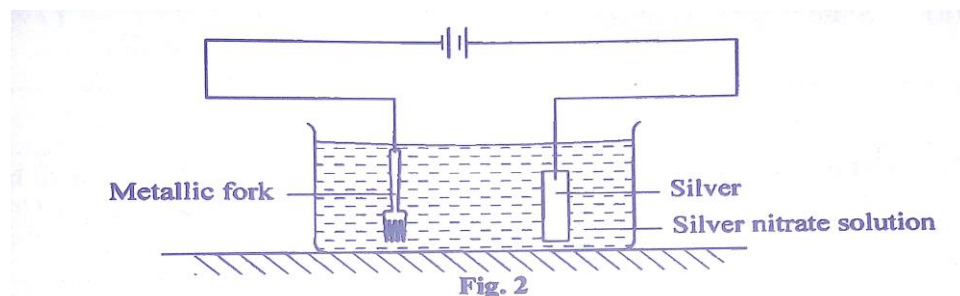
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6. The set-up of the apparatus in figure 2 was used for electrolyzing silver nitrate solution



(a) State what was observed on the;

(i) metallic fork. (01 mark)

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.....

(ii) silver. (01 mark)

.....
.....

(b) Write equation for the reaction that took place at the;

(i) electrode with the fork. (01 mark)

.....
.....

(ii) electrode with silver. (01 mark)

.....
.....

(c) (i) Name the process taking place at the electrode with the fork. (½ mark)

.....
.....

(ii) State **one** use of the process in (c) (i) (½ mark)

.....
.....

7. Lead(II) carbonate was heated until there was no further change.

(a) State what was observed. (1½ marks)

.....
.....

(b) Magnesium powder was added to the residue and the mixture heated strongly.

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

.....
.....

(c) The experiment in (b) was repeated using copper turnings instead of magnesium powder.

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

.....

(ii) Give a reason for your answer in c(i). (01 mark)

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.....

8. When ammonium chloride was mixed with potassium hydroxide and the mixture heated strongly, ammonia was evolved.

(a) Write equation for the reaction leading to the formation of ammonia (1½ marks)

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.....

(b) Ammonia was bubbled through zinc sulphate solution until there was no further change.

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

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(ii) Give reason(s) for your observation(s) in (b) (i). (02 marks)

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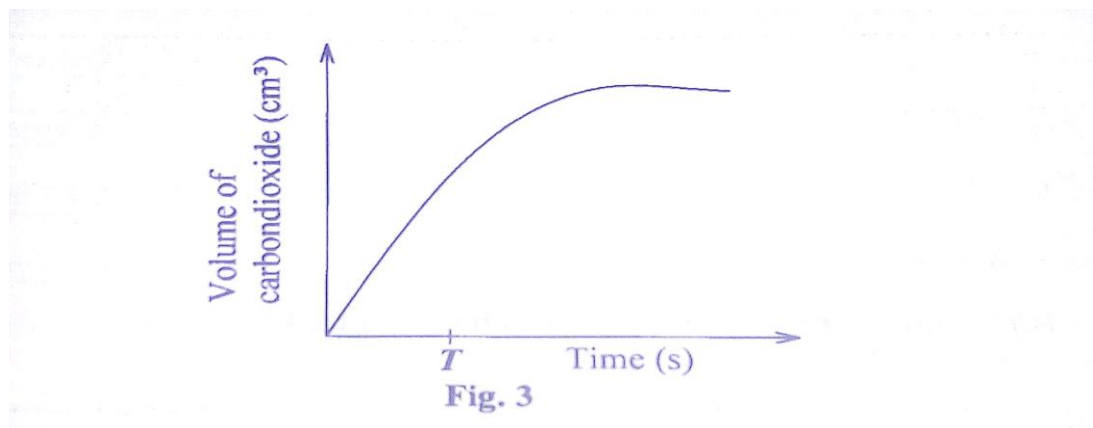
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9. (a) What is meant by the term **rate of reaction**?

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- (b) During an experiment to determine the rate of production of carbon dioxide from calcium carbonate at room temperature, volume of carbon dioxide varied with time as shown in the graph in figure 3



Show how the rate of the reaction at time T can be determined. (02 marks)

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- (c) State two factors other than temperature that can affect the rate of a reaction (02 marks)

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.....

10. (a) Write equation for the complete combustion of carbon. (1½ marks)

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- (b) If 80 kg of charcoal cost UGX. 20,000. Calculate the cost of charcoal required to produce 163,750 kJ of heat energy. (03 marks)

(C=12; The enthalpy of combustion of carbon= -393kJmol^{-1})

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- (c) State **one** use of charcoal other than fuel. (½ mark)

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SECTION B (30 MARKS)

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

Any additional question(s) answered will **not** be marked.

11. (a) Differentiate between miscible and immiscible liquids (02 marks)

- (b) (i) Name **two** compounds that can form a miscible liquid mixture and draw a diagram for the set-up of apparatus that can be used to separate the mixture. (04 marks)

- (ii) State **one** method that can be used to determine the purity of the components of the mixture in (b) (i). (01 mark)

- (c) Table 2 shows variation in temperature with time when solid **X**, was heated to boiling.

Temperature(°C)	25	47	80	80	162	218	218
Time(minutes)	0	1.0	2.5	4.5	7.0	8.7	9.5

- (i) Draw a graph of temperature against time. (04 marks)

- (ii) Explain the shape of the graph. (04 marks)

12. (a) Chlorine can be prepared in the laboratory by oxidation of concentrated hydrochloric acid.

- (i) Name **one** suitable substance that can be used for oxidizing hydrochloric acid. (01 mark)

- (ii) Outline how a pure dry sample of chlorine can be prepared in the laboratory from the above reaction. (Diagram is not required). (06 marks)

- (b) State and write equation(s) to show how phosphorus reacts with chlorine. (04 marks)

- (c) Explain the reaction of chlorine with potassium bromide. (04 marks)

13. (a) (i) State **two** ways by which water bodies can be polluted. (02 marks)

- (ii) Describe how polluted water can be treated on a large scale so that it is safe for use. (Diagram is not required). (6½ marks)

- (b) When soap solution was added to a sample of water, a white precipitate was formed. But when the soap solution was added to another portion of the water that has been boiled, no precipitation took place. Explain. (Your answer should include equation where possible). (6½ marks)
- 14.** (a) Using equations only, outline the process involved in the manufacture of nitric acid. (4½ marks)
- (b) A mixture of concentrated nitric acid and sulphur was warmed.
- (i) State what was observed. (1½ marks)
- (ii) Write equation for the reaction that took place. (1½ marks)
- (c) Ammonium nitrate is among the most widely used fertilisers. Write equation for the reaction leading to the formation of ammonium nitrate from nitric acid. (1½ marks)
- (d) Ammonium nitrate dissolves in water according to the following equation;
- $$\text{NH}_4\text{NO}_3(\text{s}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{HNO}_3(\text{aq}) + \text{NH}_4\text{OH}(\text{aq})$$
- Excessive use of ammonium nitrate as a fertiliser can cause the soil to become acidic. Explain. (2½ marks)
- (e) Write equation to show the effect of heat on;
- (i) silver nitrate. (1½ marks)
- (ii) potassium nitrate (1½ marks)
- (f) State **one** use of nitric acid other than in the manufacture of fertilisers. (½ mark)

END