

CANDIDATES NAME:.....

INDEX NUMBER							

SIGNATURE:

**545/2
CHEMISTRY
PAPER 2
JUNE/JULY
2 HOURS**

MOCK EXAMINATIONS SET 1 2019

Uganda Certificate of Education

**CHEMISTRY
PAPER 2**

2 HOURS

INSTRUCTIONS TO CANDIDATE:

- ★ *Section A consists of 10 structured questions, attempt all questions in this section*
- ★ *Answers to questions in section A must be written in the spaces provided.*
- ★ *Section B consists of 4 semi structured questions, attempt any two questions from this section.*
- ★ *Answers to these questions must be written in the answer booklet provided.*
- ★ *In both sections all working must be shown clearly.*

SECTION A:

1. Gas W constitutes the largest proportion of air in the atmosphere.

a) Identify W. (1 mark)

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b) Name the method by which W can be produced on industrial scale.

(1 mark)

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c) Ammonium nitrate was heated in a glass tube. Write the equation for the reaction that took place (1 ½ mark)

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d) Write the equation for the reaction between hot magnesium and gaseous product in (c). (1 ½ mark)

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2. The atomic number of element Z is 12.

a) Write:

i) The electronic configuration of Z. (1 mark)

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.....

ii) The formula of the common ion formed by Z. (1 mark)

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iii) The formula of the oxide of Z. (1 mark)

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.....

iv) Give a reason for your answer in c(ii) above. (1 mark)

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3. A hydrocarbon X, molecular mass = 42, contains 85.7% of carbon.

- a) i) Calculate the empirical formula of hydrocarbon X. (H = 1, C = 12)
(2½ marks)

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- ii) Determine the molecular formula of X. (1 mark)

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- b) Write the structural formula of X. (1 mark)

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- c) Bromine solution in tetra chloromethane was added to X.

- i) State what was observed. (1 mark)

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- ii) Give a reason for your answer in c(i). (1 mark)

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4. a) State what is meant by the terms:

- i) Electrolysis. (1 mark)

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ii) Electrodes. (1 mark)

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b) i) Draw a well labelled diagram of the setup of apparatus that can be used to electrolyze lead (II) bromide. (2 marks)

ii) State what was observed at the anode. (1 mark)

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iii) Write the equation for the reaction that would take place at the cathode. (1 ½ mark)

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5. Name one reagent which can be used to distinguish between the following pairs of ions and state what would be observed in each case if each member of the pair was treated separately with the reagent you have named.

a) $\text{Cl}^{-}(\text{aq})$ and $\text{I}^{-}(\text{aq})$

i) Reagent. (1 mark)

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ii) Observation. (1 mark)

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.....

b) $\text{Al}^{3+}(\text{aq})$ and $\text{Zn}^{2+}(\text{aq})$

i) Reagent. (1 mark)

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ii) Observation. (1 mark)

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6. Sulphuric acid is used in the laboratory preparation of both ethene and sulphur dioxide gases.

a) Name one substance that when treated with sulphuric acid can be used in the laboratory preparation of;

i) Ethene gas. ($\frac{1}{2}$ mark)

.....
.....

ii) Sulphur dioxide gas. ($\frac{1}{2}$ mark)

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.....

b) State the property of sulphuric acid shown during the laboratory preparation of:

i) Ethene gas. (1 $\frac{1}{2}$ mark)

.....
.....

ii) Sulphur dioxide gas. ($\frac{1}{2}$ mark)

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.....

c) Write the equation to show the reaction in which sulphuric acid together with the substance that you have named in (a) produce;

i) Ethene gas. (1 mark)

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.....

ii) Sulphuric dioxide gas. (1 mark)

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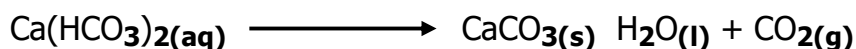
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d) State one industrial use of sulphur dioxide. (½ mark)

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7. Calcium hydrogen carbonate can be converted to calcium carbonate according to the following equation.



a) State:

i) The condition for the reaction. (1 mark)

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ii) One practical application of the reaction. (1 mark)

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- b) Calculate the maximum mass of calcium carbonate that can be obtained from 200cm³ of 0.25M calcium hydrogen carbonate solution.
(Ca = 40, C = 12, O = 16)

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8. A yellow solid M was dissolved in water to form a colourless solution N and bubbles of a colourless gas H that relights a glowing splint was evolved.

a) Name: (1 ½ mark)

i) Yellow solid M.

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ii) Solution N.

.....

iii) Gas H.

b) Write the equation for the reaction between the yellow solid and water.

(1 ½ mark)

c) Gas H was passed over heated copper metal.

i) State what was observed.

(1 mark)

ii) Write the equation for the reaction.

(1 ½ mark)

9. a) Magnesium reacts with dilute sulphuric acid to produce hydrogen gas but copper does not.

i) Write the equation for the reaction between magnesium and dilute hydrochloric acid.

(1 ½ mark)

ii) Explain why copper does not react with dilute sulphuric acid to produce hydrogen gas.

(1 mark)

b) Dry hydrogen gas was passed over heated lead (II) oxide.

i) State what was observed.

(1 mark)

ii) Write the equation for the reaction.

(1 ½ mark)

10. a) When a white solid R, was heated with sodium hydroxide solution, an alkaline gas B was evolved. A solution of R forms a yellow precipitate with lead (II) nitrate solution.

(½ mark)

i) Cation R.

ii) Anion R.

b) Write ionic equation for the reaction leading to the formation of:

i) Gas B in (a). (1 ½ mark)

ii) The yellow precipitate in (b). (1 ½ mark)

c) Chlorine was bubbled through an aqueous solution of R. State what was observed. (1 mark)

SECTION B:

11. a) With the aid of a labelled diagram explain how a dry sample of carbon dioxide is prepared in the laboratory. (6 marks)

b) Explain the following observations.

i) When excess carbon dioxide is bubbled through calcium hydroxide solution a white precipitate is formed which dissolves to form a colourless solution. (3 marks)

ii) Burning magnesium reacts with carbon dioxide to form a white solid and black particles. (2½ marks)

c) Copper (II) carbonate was heated in a dry test tube until there was no further change.

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

ii) Calculate the mass of copper (II) carbonate required to produce 120cm³ of carbon dioxide gas at s.t.p (Cu = 64, C = 12)
(Molar gas volume at s.t.p is 22.4dm³) (3 marks)

12. a) Explain how sulphur can be extracted by Frasch process. (6½ marks)

b) Write the equation to show how sulphur can react with:

i) Oxygen. (1 ½ mark)

ii) Charcoal. (1 ½ mark)

iii) Sulphuric acid. (1 ½ mark)

- c) Concentrated nitric acid was added to sulphur powder in a porcelain dish and the mixture warmed. State what was observed and write the equation for the reaction that took place. (2½ marks)
- d) The mixture in (c) was stirred with some water, filtrate was added to acidified barium chloride solution. Write an ionic equation for the reaction of the filtrate with barium chloride. (1 ½ mark)
13. a) Define the term enthalpy of combustion. (1 mark)
- b) Describe using a well labelled diagram how the enthalpy of combustion of methanol can be determined in the laboratory. (5 marks)
- c) Methanol burns in oxygen according to the equation.

$$\text{CH}_3\text{OH}_{(l)} + \text{O}_{2(g)} \longrightarrow \text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(l)} \quad \text{DH} = -120\text{KJmol}^{-1}$$

When a certain mass of methanol was burnt, the heat evolved raised the temperature of 100g of water from 25.3°C to 45.3°C.
(Specific heat capacity of H₂O = 4.2, density of water = 1g/cm³).
Calculate the mass of methanol burnt. (3 marks)

d) When 40cm³ of a 2M nitric acid was mixed with 40cm³ of a 2M sodium hydroxide solution at initial temperature of 25.0°C, the temperature of the solution rose to T°C. Determine T.
(SH.C of water = 4.2Jg⁻¹K⁻¹, density of water = 1gcm⁻³ and enthalpy of neutralization of nitric acid by sodium hydroxide = 56.5KJmol⁻¹) (4 marks)

e) Explain why enthalpy of neutralization of ethanoic acid is lower than that of hydrochloric acid. (2 marks)

14. a) Define the terms:
i) Acid. (1 mark)
ii) Salt. (1 mark)

b) An aqueous solution of hydrogen chloride formed bubbles of a colourless gas when added to Zinc granules where as a solution of hydrogen chloride in methyl benzene does not. Explain. (4 marks)

c) Describe how a pure dry sample of Zinc sulphate – 7 – water can be prepared from Zinc oxide in the laboratory. (5½ marks)

d) State and explain what would be observed when dilute sodium hydroxide solution was added drop wise until in excess to aqueous solution of Zinc sulphate. (3½ marks)

END