28th-07-2022

Name..... Signature.....

School..... Index No. 0750-732031
0760-954033

545/2
CHEMISTRY
Paper 2
July/August
2 hours

WAKISSHA JOINT 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 these questions **must** *be written in the spaces provided.*

- *Section* **B** *consists of* **4** *semi – structured questions. Answer any* **two** *questions from this section.*

- *Answers to section* **B** *must be written in the answer booklet/sheets provided and stapled at the back of the question paper.*

- *Show all your working clearly in both sections.*
  Where necessary use;
  [Ca = 40, K=39, C = 12, O = 16, H = 1, Molar gas volume at s.t.p = 22.4dm^3]

For examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A

*Answer **all** questions in this section.*

1. Impure Aluminium is light and soft but can be strengthened by alloying.

(a) What is meant by the term alloy? (1 mark)

An alloy is a uniform mixture of one metal with one or more other substance, usually metals or carbon. 01

Reject: A mixture of two or more metals

(b) State the elements that make up the following alloys,

(i) Duralumin. (1½marks)

Magnesium, Aluminium, Copper. 01½

(ii) Brass. (1 mark)

Copper, Zinc. 01

(c) (i) Identify the element that is common in both brass and duralumin. (1 mark)

Copper 01

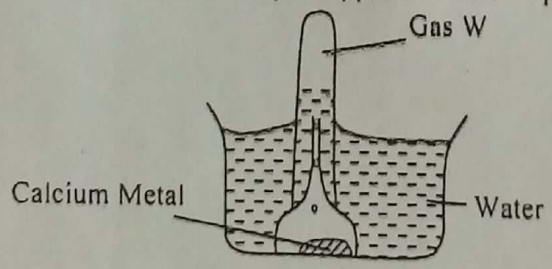
(ii) State **one** use of duralumin. (½mark)

- Manufacture of aircraft bodies 0½

Accept any other alternative:
- Bicycle parts.
- Moving parts of machines eg Piston, window frames, door - window frames.

05

2. The diagram below shows a setup of apparatus used to prepare gas W.



(a) State how gas W can be identified in the laboratory. (1½marks)

By inserting a glowing splint in a gas jar of W. 01½

Observations: The glowing splint is extinguished with a "pop" sound

(b) Write equation of reaction leading to the formation of gas W (1½marks)

$Ca_{(s)} + 2H_2O_{(l)} \longrightarrow Ca(OH)_{2(s)} + H_{2(g)}$

01½

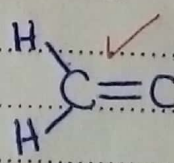
(c) State **one** use of gas W in the food industry. (1mark)

Hardening of oils forming margarine. 01

3. (a) An organic compound X has a molecular formula C_2H_4.

(i) Write the name and structure formula of X. (2 marks)

Ethene



02

Accept: $H_2C=CH_2$

Check the order: Name : structure

C=

(b) Compound X was bubbled through bromine liquid.

(i) Write the structure of the compound. (1 mark)

CH_2BrCH_2Br ✓ 01

Accept; $CH_2(Br)-CH_2(Br)$

(ii) What is the role of bromine liquid in the experiment? (1 mark)

To break the Unsaturation (test for) in compound X: 01

Accept; To break the Carbon = Carbon double bond in compound X.

(iii) Name one other compound can be used instead of bromine liquid. (1 mark)

Bromine water ✓ 01

Accept any other alternative; Acidified potassium manganate(VII) solution / Alkaline potassium manganate(VII) solution

4. When strongly heated magnesium ribbon was treated with dry nitrogen gas, solid W was formed

(a) (i) Determine the empirical formula of solid W given that 0.72g of magnesium produce 1.0g of solid W (Mg = 24 N=14) (2½ marks)

Mass of Nitrogen = 1.0 − 0.72 = 0.28g ✓

Elements	Mg	N
Composition	0.72	0.28
Moles	$\frac{0.72}{24}$ = 0.03	$\frac{0.28}{14}$ = 0.02 ✓
Mole ratio	$\frac{0.03}{0.02}$ = 1.5 × 2 = 3	$\frac{0.02}{0.02}$ = 1 × 2 = 2 ✓

02½

∴ Empirical formula of W is Mg_3N_2 ✓

(ii) Write equation for reaction between magnesium and nitrogen. (1½marks)

$3Mg_{(s)} + N_{2(g)} \longrightarrow Mg_3N_{2(s)}$ ✓✓ 01½

(b) Solid W when reacted with water produced gas Y and Solid X.

(i) State how the gaseous product in (b) can be identified in the laboratory. (1½marks)

Y forms dense white fumes with Concentrated hydrochloric acid. ✓✓ 01½

(ii) Identify solid X. (1½marks)

Magnesium hydroxide ✓ 01½

5. A boiling tube was filled with Chlorine water and then inverted over a beaker containing a similar solution. The set up was then exposed to sunlight.

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

Bubbles of a colourless gas and the pale yellow solution turns to a colourless solution. ✓✓ 01

(ii) Write equation for the reaction that took place in the boiling tube. (1½mark)

$2HOCl_{(aq)} \longrightarrow 2HCl_{(aq)} + O_{2(g)}$ ✓✓ 01½

Accept; ⇌

(b) The resultant solution in (a) was added to a beaker containing Marble chips.

(i) State what was observed in the beaker. (1 mark)

Bubbles of a colourless gas. 01

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

$CO_3^{2-}(s) + 2H^+(aq) \longrightarrow CO_2(g) + H_2O(l)$ 01½

Accept; $CaCO_3(s) + 2H^+(aq) \longrightarrow Ca^{2+}(aq) + CO_2(g) + H_2O(l)$.

6. (a) Name **two** compounds that can be used to prepare sulphur dioxide in the laboratory. (2marks)

Sodium sulphite and Dilute sulphuric acid / Dilute hydrochloric acid 02

Accept; Sodium sulphite and sulphuric acid / hydrochloric acid.
Copper and Concentrated sulphuric acid.

(b) (i) Write equation of reaction that takes place when a mixture of the two compounds named in (a) above is heated. (1½marks)

−½ for wrong or missing state symbol.
−No mark for unbalanced equation.

$Na_2SO_3(s) + H_2SO_4(aq) \longrightarrow Na_2SO_4(aq) + SO_2(g) + H_2O(l)$ 01½

Accept ionic equation; $SO_3^{2-}(s) + 2H^+(aq) \longrightarrow SO_2(g) + H_2O(l)$

(ii) State how the gas can be dried in the laboratory. (1 mark)

By passing the gas through Concentrated sulphuric acid. 01

7. Water can be transformed from one state to another through the water cycle.

(a) (i) Name **two** processes involved in the water cycle. (2 marks)

Evaporation ✓ 02
Condensation ✓ Accept; Precipitation

~~Evapo~~ Transpiration and Evapotranspiration

(ii) Write equation to show how hydrogen reacts with oxygen to form water. (1½marks)

$2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$ 01½

(b) Drops of water were added to anhydrous copper (II) Sulphate in a test tube. State what was observed after adding 3-4 drops of water. (1 mark)

white powder turns to blue crystals. 01

(c) When Sodium Chloride Crystals were placed on a petri dish and exposed for two days, they appeared wet.

(i) Which word describes the behavior of the Sodium Chloride Crystals? (1 mark)

Hygroscopy. 01

(ii) Name **one** other substance that can behave like sodium chloride when exposed. (½marks)

Accepting alternative;
- Calcium oxide
- Concentrated sulphuric acid
- Ethanol
- Silicon dioxide

8. (a) What is meant by the term **rate of chemical reaction?** (1 mark)

Is amount of products formed per unit time. ✓ 01

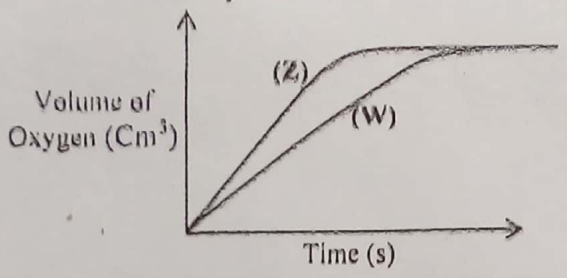
OR Is the amount of reactants used up per unit time.

(b) State **two** factors that can affect the rate of chemical reaction. (2 marks)

- Surface area of reactants (Particle size) 02
- Concentration of reactants
- Temperature

Accept alternative } any 2 Reject } – Pressure – Light – Catalyst

(c) Hydrogen peroxide was decomposed under different conditions as shown in the figure below.



(i) Which curve represents a reaction to which Manganese (IV) oxide was added? (1 mark)

Curve Z ✓ 01

(ii) State the role manganese (IV) oxide in above reaction. (1 mark)

To speed up the rate of decomposition of hydrogen peroxide ✓ 01

9. Rusting is an exothermic reaction that weakens garden tools when stored in places that are moist.

(a) (i) State what is meant by the term exothermic reaction. (1 mark)

Is one in which heat is released (evolved, liberated) to the surroundings. ✓ 01

(ii) State **one** domestic application of exothermic reactions. (1 mark)

fuel combustions. ✓ 01

(b) (i) State **one** other factor apart from moisture that supports rusting. (1 mark)

Oxygen ✓ 01 Reject; Air.

(c) Galvanizing is one of the methods used to prevent rusting.

(i) Name the metal used to galvanize iron. (1 mark)

Zinc ✓ 01

(ii) State the principle behind the use you have named in c(i) above.

Accept; Zinc is more reactive than Iron. 01

Zinc has a higher affinity for oxygen than Iron. ✓ (1 mark)

10. During the electrolysis of molten sodium chloride in the Down's cell, a calcium salt X is added to the electrolyte.

(a) State the role of salt X in the process. (1 mark)

To lower the melting point ✓ 01 of sodium chloride (from 800°C to 600°C)

(b) Name the substances used as the anode and give a reason for your answer.

(i) Substance used as a node. (1 mark)

Graphite ✓ 01

(ii) Reason for your answer in b (i) above. (1 mark)

Graphite (Carbon) doesnot react with chlorine gas. 01

(c) Write the equation of reaction that takes place at the anode. (1½ marks)

$2Cl^-_{(l)} \longrightarrow Cl_{2(g)} + 2e$ 01½

SECTION II

Answer any two questions from this section.

11. When hard water is treated with soap, scum is formed.

(a) State the chemical names for;

(i) Soap. (1 mark)

(ii) Scum. (1 mark)

(b) (i) Identify two ions that lead to the formation of scum when soap is used to clean fabric. (2 marks)

(ii) Write equation of reaction leading to the formation of scum. (1½marks)

(c) (i) Identify one compound that can be used to break the hardness in water. (1 mark)

(ii) Write equation to show how the compound named in (c) (i) breaks down the hardness in water. (1½marks)

(d) Describe the cleaning action of soap on fabric stained with clease. (5 marks)

(c) State one;

(i) Advantage. (1 mark)

(ii) Disadvantage of using hard water. (1 mark)

12. (a) Describe the industrial manufacture of ammonia gas. (5½marks)

(b) Ammonia burns in a plentiful supply of oxygen,

(i) Draw a setup of apparatus that can be used to burn ammonia. (3 marks)

(ii) Write equation for the combustion of ammonia. (1½ marks)

(c) You are provided with copper (II) sulphate Crystals, briefly describe how you can test for the presence of copper (II) and sulphate ions. (5 marks)

13. (a) Define the term **heat of neutralization**. (1 mark)

(b) The table below shows results of an experiment in which seven portions of 25cm^3 of 2M sodium hydroxide were reacted with various quantities of hydroxide acid. The heat change in each case was calculated and results recorded.

Experiment No	1	2	3	4	5	6	7
Volume of NaOH(cm^3)	50	50	50	50	50	50	50
Volume of HCL(cm^3)	10	20	30	40	50	60	70
Heat evolved (KJ)	1.1	2.2	3.4	4.5	5.6	5.6	5.6