**CHEMISTRY PAPER 2**

**FORM 3 EXAMS**

**END OF TERM II EXAM**

**YEAR 2024**

**TIME: 2 HOURS**

MAME………………………………………………….…………………...ADM NO………………

* *Answer* ***all*** *the questions in the spaces provided.*
* *Write your* ***name*** *and* ***index number*** *in the spaces provided above.*
* *Mathematical tables and electronic calculators may be used for calculations.*
* *All workings* ***must*** *be clearly shown where necessary*

**For Examiner’s Use only:**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| 1 – 8 | **80** |  |

1. Study the table below and answer the questions that follow (The letters do not represent the actual Symbols)

|  |  |  |
| --- | --- | --- |
| element | Atomic number | Boiling point (oC) |
| R | 13 | 2400 |
| S | 20 | 850 |
| T | 15 | 31 |
| U | 12 | 650 |
| V | 10 | -249 |

1. Which elements belong to the same group, give a reason. (2marks)
2. Write the electron arrangement for the following ions

 U 2+  (1 mark)

 T3- (1mark)

1. Which element is a gas at room temperature? Explain. (2marks)
2. Write the formula of the compound formed when element **R** reacts with oxygen (1mark)

1. Define the term Octet state; select an element from the table that shows octet state. (2marks)

1. Explain the difference in the boiling points of elements **R** and **S**. (2 marks)

1. A form three student wanted to prepare carbon (IV) oxide gas. The diagram below is part of the set up.



1. Identify one mistake and correct it. (2 marks)



1. Complete the set up showing how a sample of dry carbon (IV) oxide can be collected. (3marks)
2. Write an equation for the above reaction (after making the collection). (1mark)

1. (a) (i) Name two allotropes of sulphur. (2marks)

 (ii) During extraction of sulphur super-heated water is used. State its two functions (2 marks)

(iV). Write an equation for the reaction of sulphur (IV) oxide and oxygen gas (1mark)

(b). The flow diagram below show some of the process involved in production of sulphuric (vi) acid . Use it to answer the questions that follow.



1. Name substance A. 1mk
2. Write an equation for the reaction that takes place in the absorption chamber. 1mk
3. Vanadium V oxide is commonly used catalyst in contact process.Name another catalyst which can be used for this process.1mk
4. Give two reasons why vanadium (v) Oxide is the commonly used catalyst.2mks
5. Explain the reason why sulphur (vi) oxide is not dissolved directly in water during manufacture of sulphuric (vi) acid. 2mks
6. Give three uses four use of sulphuric (vi) acid. 3mks
7. The set up below is used to prepare nitric acid in the laboratory.

**Glass cork**

**Mixture X**

**Red brown fumes**

1. Name the reagents in mixture **X** (2mk)
2. Write an equation for the reaction which takes place in the glass retort (1mk)
3. All the apparatus above must be made of glass give reason. 1mk
4. Which property makes it possible to separate nitric (V) acid using sulphuric (VI) acid? 1mk
5. Nitric (V) acid is colourless, but the one obtained in the above setup was yellow. Explain. 2mks
6. How can the yellow colour from the acid be removed. 1mk
7. State thee uses of nitric acid. 3mks

1. . Study the information below and answer the questions that follow:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Formula of the chloride | NaCl | MgCl2 | AlCl2 | SiCl4 | PCl3 | SCl2 |  |
| M.P(0C) | 801 | 714 | - | -70 | -91 | -80 |  |
| Formula of the oxide | Na2O | MgO | Al2O3 | SiO2 | P4O10 | SO2 | Cl2O7 |
| M.P(0C) | 1190 | 3080 | 2050 | 1730 | 560 | -73 | -90 |

1. Aluminium chloride AlCl3, has an unexpected bond type and structure.

State the type of bond and the structure in AlCl3

1. Bond type ( 1 mk)
2. Structure ( 1 mk)
3. What type of bonding would AlCl2 be expected to have why? (1mk)
4. Why is the melting point of AlCl3 not indicated in the table above? (1mk)
5. A piece of blue litmus paper is placed in a solution of sodium chloride and a solution of aluminium chloride. Explain what would be observed in each case.
6. Sodium chloride solution (1mk)
7. Aluminium chloride solution (2mks)
8. Explain the large difference in the melting point of the compound of formula MgO and P4O10 (2mks)
9. Write down the equations for the reaction between the compounds of formula Na2O and water. (1mk)

1. The following diagram below shows a series of steps followed in the manufacture of sodium carbonate.



1. Name substances A and B. (2mks)

 A

 B

b) Write equations for the reactions taking place in:

 i) The Solvay tower. (2mks)

 ii) Chamber E. (1mk)

c) i) Identify substance G. (1mk)

ii) State one laboratory use of substance G.

 I. Laboratory use (1mk)

d) Name two important industrial use of sodium carbonate. (2mks)

1. In an experiment dry chlorine gas was reacted with aluminum as shown in the diagram below.



i) Name substance A. (1mk)

ii). which property makes it possible to collect A as shown in the diagram. (1mk)

iii) Write an equation for the reaction that took place in the combustion tube. (1mk)

iv) 0.84g of aluminium reacted completely with chlorine gas. Calculate the volume of chlorine gas used. (Molar gas volume is 24dm³ Al = 27). (3mks)

v). what is the purpose of calcium chloride. 1mk

1. Air was passed through several reagents as shown in the flow chart below.

 Gas P

Concentrated Sodium Hydroxide

Electrostatic

Precipitation

 Air

Excess heated Magnesium Powder

Excess heated Copper turnings

Compressor

Fractionating column

C (-1830C)

Argon (-1860C)

Nitrogen (-1960C)

1. Name the major component of air. (1mks)
2. Write an equation for the reaction which takes place in the chamber with:
3. Concentrated sodium hydroxide. (1mk)
4. Excess heated copper turnings. (1mk)
5. Excess heated magnesium powder. (1mk)

1. Name **one** gas which escapes from the chamber containing magnesium powder. Give a reason for your answer. (2mks)
2. Name the substance that was eliminated by electrostatic precipitation. (1mk)
3. Name a reagent that can be used in place of concentrated sodium hydroxide.(1mk)
4. State **three** uses of gas C. (3mks)