**Name: …………………………………………..………… Adm No.: ………… Class: ………**

**233/1**

**CHEMISTRY PAPER 1**

**FORM FOUR**

**MID-TERM EXAM**

**TERM 2 - 2024**

**TIME: 2 HOURS**

1. (a) Excess magnesium ribbon was burnt in air to form a white solid mixture. Write two equations to show the formation of the white solid mixture. (2mks)

(b) When water was added to the white solid mixture effervescence took place and a colourless gas with characteristic chocking pungent smell produced.

1. Identify the gas. (1mk)
2. State one use of the gas identified in (b) (i) above. (1mk)
3. State two laboratory rules that should be followed to avoid contamination and wastage of chemicals. (2mks)
4. (a) 200g of radioactive isotope A reduce to 25g in 75 minutes. Determine the half-life of A. (2mks)

(b) Define half-life. (1mk)

1. Calculate the enthalpy of formation of ethanol given the enthalpies of;

Combustion of ethanol = -1369 Kjmol-1

Combustion of carbon = -394 Kjmol-1

Combustion of hydrogen = -286 Kjmol-1 (3mks)

1. A substance containing only carbon and hydrogen has 80% by mass of carbon. It is also given that 1dm3 of the compound has a mass of 1.35g. Determine the molecular formula of the compound. (C=12, H=1,MGV at s.t.p=22.4dm3) (3mks)
2. The formula given below represents part of polymer.

H H H H

C C C C

O H O H n

1. Name the polymer (1mk)
2. Draw the structure of the monomer used to manufacture the polymer. (1mk)
3. Name the process that take place when:
4. Natural fats or oils are hydrolysed using alkalis. (1mk)
5. Sulphur is added to natural rubber and heated to form cross links. (1mk)
6. (a) State Charle’s law. (1mk)

(b) The capacity of a balloon to hold a gas at 5oC is 1dm3 before it bursts due to expansion. Show very clearly whether it will or will not burst at 25oC. (Pressure remains constant.) (2mks)

1. Dry carbon (II) oxide gas reacts with heated lead (II) oxide as shown in the equation below:

 PbO(s) + CO(g) → Pb(s) + CO2(g)

1. Name the process undergone by lead (II) oxide. (1mk)
2. Give a reason for your answer in (a) above. (1mk)
3. Name another gas that can be used in place of carbon (II) oxide in the above reaction. (1mk)
4. The structure below represents a type of a cleansing agent.

R

1. Identify the cleansing agent. (1mk)
2. Describe how the cleansing agent removes grease from a piece of cloth. (3mks)
3. The table below shows the number of valence electrons of elements P, Q and R.

|  |  |  |  |
| --- | --- | --- | --- |
| Element  | P | Q | R |
| Number of valence electrons | 3 | 5 | 2 |

1. Explain why P and R would not be expected to form a compound. (1mk)
2. Write an equation to show the effect of heat on the carbonate of R. (1mk)
3. What is the formula for the most stable ion of Q. (1mk)
4. The flow chart below represents an industrial process for the manufacture of bleaching powder.

Z

Bleaching powder

Chlorine gas

1. Name substance Z. (1mk)
2. Write a formula of bleaching powder. (1mk)
3. Explain why a lot of soap is used during washing with water containing bleaching powder. (1mk)
4. Give one test by which you could differentiate between solution of lead (II) nitrate and zinc nitrate. (2mks)
5. Given the element
6. To which chemical family does R belong? (1mk)
7. Write the electron arrangement of the atom. (1mk)
8. Draw the structure of its ion. (1mk)

1. An element consist of two isotopes with atomic masses 59 and 61 in the ratio of 3:2 respectively. Calculate its relative atomic mass. (2mks)
2. You are given the following half-equations:
3. Obtain an equation of the cell reaction. (1mk)
4. Calculate the e.m.f of the cell. (1mk)
5. Give the oxidizing species. (1mk)
6. State one function of the salt bridge in electrochemical cells. (1mk)
7. (a) When extinguishing fire caused by burning kerosene, carbon (IV) oxide is preferred to water. Explain. (2mks)

(b) Write the formula of the oxide of carbon which is ‘silent killer’ (1mk)

1. (a) Complete the table below. (3mks)

|  |  |  |  |
| --- | --- | --- | --- |
| Metal  | Aluminium  | Lead  | Sodium  |
| Chief ore | Bauxite  | Galena  | …………………… |
| Chemical name | …………………….. | ………………………. | Sodium chloride |
| Method of extraction  | ……………………... | ………………… | …………………. |

 (b) State two uses of aluminium metal. (2mks)

1. Manganese sulphide reacts with acids according to the following equation.
2. State, giving a reason what would happen to the equilibrium if:
3. Water is added to the equilibrium mixture. (1 ½ mk)
4. Hydrogen chloride is bubbled into the equilibrium mixture. (1 ½ mk)
5. Using dots (.) and crosses (x) to represent outermost electrons, draw diagrams showing bonding in:
6. Aluminium oxide. (1 ½ mk)
7. Hydroxonium ion. (1 ½ mk)
8. The diagram below represents a set up used for the large scale manufacture of hydrochloric acid.



1. Name substance x. (1mk)
2. What is the purpose of the glass beads? (1mk)
3. Give one use of hydrochloric acid. (1mk)
4. A volume of 20 litres of hydrogen chloride (HCl) was completely decomposed to its constituent elements (hydrogen and chlorine) what are the volumes of the constituent elements? (2mks)
5. Study the diagram below and answer the questions that follow.



Molten Magnesium Chloride

1. On the diagram label the anode and cathode. (1mks)
2. Write the equation at the anode. (1mk)
3. State a reason why heating is necessary in the set up. (1mk)
4. An element E has relative atomic mass 88. When a current of 0.5 amperes was passed through a solution of a chloride of E for 32 minutes and 10 seconds, 0.44g of E were deposited at the cathode. What is the charge on the ion of E? (1 Faraday = 96500C) (3mks)
5. State one applications of chromatography. (1mk)
6. In an experiment, two 3cm long magnesium ribbons are separately placed in 3cm3 of 2M HCl and 3 cm3 of 2M ethanoic acid respectively. State and explain what is observed. (3mks)
7. Explain a test for hydrogen gas. (1mk)
8. Name one apparatus that can be used to measure approximately 80cm3 of dilute hydrochloric acid. (1mk)
9. Explain why dilute nitric (V) acid is not used in hydrogen gas preparation. (1mk)
10. State and explain what you would observe if concentrated Sulphuric (VI) acid is added to cane sugar. (2mks)