PRESIDENT'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT KAGERA REGION

FORM FOUR MOCK EXAMINATIONS -2023 CHEMISTRY 1- MARKING SCHEME

YEAR 2023

SECTION A (15 Marks)

1.

032/1

| i | ii | iii | Iv | V | Vi | Vii | viii | ix | X |
|---|----|-----|----|---|----|-----|------|----|---|
| A | D | В | Е | В | C | A | D | D | A |

1@10=10 Marks

2. Matching items

ems (06 marks @01mark)

i. B

ii. C

iii. A

iv. D

v. G

vi. E

3. a) i. Problem identification

ii. Asking questions

iii. Hypothesis formulation

iv. Experimentation

(05 mark @ I mark)

v. Drawing conclusion

b) (i) Physical change

(ii) Chemical change

(iii) Physical change

(iv) Chemical change (4 marks @ 1 mark)

4. ⇒Faraday's first law of Electrolysis state that "The mass of a substance deposited or Liberated during electrolysis is directly proportional to the quantity of electricity passed though the electrolyte" (1.5 Mark)

⇒Faraday's second law of electrolysis state that "When the same quantity of electricity is passed though solutions of different electrolytes, the mass of the substance liberated or deposited at the electrodes are directly proportional to the chemical equivalents of the substances" (1.5 Mark)

(b) Soln.

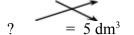
Data given.

Volume of chlorine gas produced during electrolysis = 5dm³

Discharging equation of Cl.

$$2Cl^{-}Cl_{2} + 2e^{-}$$

 $2F \text{ of } Cl_2 = 22.4 \text{dm}^3 \text{ at STP}$



$$=\frac{2 F \times 5 dm^3}{22.4 dm^3}$$

= 0.4464F(02 Mark)

Required:

(i) Volume of O₂

Discharge equation of Oxygen

$$40H_{(ag)}^{-}2H_{2}O + O_{2(g)} + 4 e^{-} \text{ (Liberated at Anode)}$$

$$4F = 22.4 \text{ dm}^{3} \text{ of } O_{2} \text{ At STP}$$

$$0.4464F = ?$$

$$= \frac{0.4464 F \times 22.4 dm^3}{4 F}$$

$$= 2.49984 dm^3$$

$$= 2.5 dm^3 (02 Mark)$$

The volume of O_2 produced = 2.5 dm²

(ii) Mass of Cu
Discharge equation of Cu
$$Cu^{2+} + 2e \qquad Cu$$

$$2F \qquad = 64g \text{ of } Cu$$

$$0.4464F \qquad = ?$$

$$= \frac{0.4464 F \times 64g}{2 F}$$

$$= 14.28 g \qquad (02 \text{ Mark})$$

Mass of Copper = 14.28g

- 5.(a) i) The loss of mass was due to loss of CO2 to the surroundings.(1marks)
 - ii) $CaCO_3(S) + 2HCl(aq) \frac{CaCl_{2(aq)} + H_2O_{(l)}}{2} + CO_{2(g)}(2 \text{ marks})$
 - mass remained constant because the reaction ended since the marble was finished. (1 marks)
- (b) i) Water cycle
 - (ii) Steam engines
 - (iii) Refrigeration / Air condition
 - (iv) Refinery
 - (v) Drying of materials
 - (vi) Metallurgy any 5 points (1 @ marks)

- 6. (i) Ammonia gas(2 marks)
 - (ii) $NH_4Cl(s) + Ca(OH)_2(s)$ heat $\rightarrow CaCl_2(aq) + 2H_2O(l) + 2NH_3(g)(2 \text{ marks})$
 - (iii) Because is soluble in water(1 marks)
 - (iv) When a glass rod is dipped in concentrated Hydrochloric acid is placed at the mouth of a gas jar Containing Ammonia dense white fumes of Ammonium chloride are formed (2 marks)
- $NH_3(g) + HCl(g)$ NH₄Cl (s) (White fumes)
 - (v) When ammonia gas is passed over heated copper (II) oxide the gas is oxidized to Nitrogen while the copper (II) Oxide is reduced to copper.

$$3CuO(s) + 2NH_3(g)$$
 ------3 $Cu(s) + 3H_2O(l) + N_2(g)(2 \text{ marks})$

7. (a) i) The brand of Uhai is more hard(1 mark)

Because; it contains high amount of Ca²⁺ions, Mg²⁺ ions and SO₄²⁻ ions(1 mark)

- ii) Calcium makes the teeth and bones hard(1 mark)
- iii) Chlorine(I mark)

(b)

| Symbol | Mn | О |
|-------------------------------------|------------------------|---------------------------|
| % Composition by mass | 49.5 | 50.5 |
| Its relative atomic mass | 55 | 16 |
| Dividing % composition by its R.A.M | $\frac{49.5}{55}$ =0.9 | $\frac{50.5}{16}$ = 3.156 |
| Dividing by smallest value | $\frac{0.9}{0.9} = 1$ | $\frac{3.156}{0.9}$ =3.5 |
| Converting to whole cumber | 1x2=2 | 3.5x2=7 |

The empirical ratio of Mn: O is 2:7

Therefore, the empirical formula is $Mn_2O_7(5 \text{ marks})$

- 8. (a) (i) Because when sodium is exposed in air react vigorously with water and air. (I mark)
 - (ii) Because is slightly soluble in water / less denser than air.(I mark)
 - (b) (i) solution

Data given

Mass of FeCl₃ = 16.25g

Molar mass of FeCl₃

Given Fe = 56 Cl = 35.5

Molar mass of FeCl₃ =
$$(56 + 35.5 \times 3)$$

= $(56 + 106.5)$ g/mol
= 162.5 g/mol

Number of molesFeCl_{3-Mass} =
$$\frac{16.2g}{162.5g/mol}$$

 $= 0.1 \text{ molof FeCl}_3$

Then
$$FeCl_3$$
 Fe³⁺ +3Cl-

Number of ions = (1 + 3) = 4

1 mole of $FeCl_3 = 4$ mol of Ions 0.1 mol of $FeCl_3 = ?$

$$0.1 \text{ mol of FeCl}_3 = ?$$

$$=\frac{4moles\ of lon\times 0.1\ mol}{1\ mol}$$

$$=0.4\ mol\ of\ ions$$

$$L_A=6.02\ x\ 10^{23}$$
Number of particles
$$=n\ x\ L_A$$

$$=0.4\ mol\ x\ 6.02\ x\ 10^{23}$$

$$=2.408\ x\ 10^{23}\ ions (3.5\ mark)$$

$$\frac{Number\ of\ ions\ present}{=2.408\ x\ 10^{23}\ ions}$$
(ii) Solution
$$Mass\ of\ H_2O=1.8g$$

$$Molar\ mass\ of\ H_2O=?$$

$$Given\ H=1\ O=16$$

$$Molar\ mass\ of\ H_2O=1\ x\ 2+16$$

$$=2+16$$

$$=2+16$$

$$=18g/mol$$

$$=1.8g/mol$$
Number of moles $H_2O=\frac{Mass}{Molar\ mass}=\frac{1.8g}{18g/mol}$

$$=0.1\ mol$$

$$L_A=6.02\ x\ 10^{23}$$
Number of particles (molecules)
$$=n\ x\ L_A$$

Number of molecules present = 6.02×10^{22} molecules

9. (a) The type of pollution shown in the figure is water pollution. (2 marks)

 $= 0.602 \times 10^{23}$ molecules

 $= 0.1 \text{ mol } \times 6.02 \times 10^{23} \text{molecules}$

- (b) Causes of this type of pollution.
 - i. Pesticides
 - ii. Fertilizer
 - iii. Oil spills
 - iv. Mining

Any four (4) points (1@=4marks)

(3.5 mark)

- v. Sediments
- vi. Industrial processes
- vii. Sewage
- viii. Poisonous gases and metals
- ix. Marine debris
- (c) The effects of this type of pollution.
 - i. Spread of water born disease
 - ii. Eutrophication due to nutrient pollution
- iii. Death of underwater organisms
- iv. Loss of quality of water.
- v. Exposure to oil or its constituent chemicals can alter the ecology of aquatic habitats and physiology of marine organisms
- vi. Mercury has serious effects on human health, especially young children and unborn babies Any three (3) points (1.5 @ = 4.5 marks)
- (d) Measures that should be taken to prevent this type of pollution
 - i. Reducing the use of fertilizers and pesticides
 - ii. Treating sewage and industrial waste

- iii. Stopping deforestation
- iv. Controlling coastal development
- v. Reducing pollution from oil spills
- vi. Reducing the use of mercury
- vii. Cleaning up existing and abandoned mines
- viii. Cleaning up pollutants.

Any three (3) points (1.5 @ = 4.5 marks)

- 10. (a) stages in the extraction of less reactive metals includes: $(1.5\omega = 6 \text{ marks})$
 - i. Mining and concentration of ore
 - ii. Roasting the ore in air
 - iii. Reduction
 - iv. Purification
 - (b) The ores that are commonly used in the extraction of iron metals include: (0.5@=02marks)
 - i. Haematite (Fe₂O₃)
 - ii. Magnetite (Fe₃O₄)
 - iii. Spatic iron (FeS)
 - iv. Iron pyrite (FeCO₃)
 - (c) i) Two reducing agents in the blast furnace include;
 - -Carbon monoxide (CO)
 - Carbon (coke)(01@=02 marks)
 - Step 1: $C + O_2 CO_2$

It is of great importance because it leads to production of carbon dioxide which later combines with carbon to form carbon monoxide, which the acts as a reducing agent.

Step 2:
$$CO_2 + C$$
 \longrightarrow 2CO

It is important since it leads to production of CO (carbon monoxide) which later reduces Fe_20_3 to form Fe.

It is important since carbon acts as a reducing agent where it reacts with Fe₂O₃ to form iron(03 marks)

- iii. Substance L is Limestone (CaCO₃)(1 mark)
- iv. $CaCO_3CaO \longrightarrow CO_2CaO + SiO_2CaSiO_3$ (Slag)(1 mark) =
- 11. Introduction
 - ✓ Good introduction by giving out the meaning of plant nutrients, the nutrients that are required in large quantity(2 marks)
 - ✓ Maize plant may lose its nutrients from the soil in any of the following ways;
 - i. Soil erosion
 - ii. Monocropping
 - iii. Overgrazing and overstocking
 - iv. Deforestation
 - v. Burning of vegetation
 - vi. Leaching
 - vii. Poor farming methods

Six point with good explanations (12 @ 2 marks)

✓ Any good conclusion (1 mark)