

CHEMISTRY MS

Soy

1. SECTION A (16 marks).

@ 1 mark = 10 marks

i	ii	iii	iv	v	vi	vii	viii	ix	x
C	B	C	B	B	C	D	D	C	B

2. @ 1 mark = 6 marks

i	ii	iii	iv	v	vi
H	E	I	D	B	G

3. SECTION B (54 marks).

3. a) i). Rusting

ii). Burning.

iii). Rotting

iv). Fermentation of fruits

v). Souring of milk.

vi). Decaying.

Any three points @ 1 mark = 3 marks

b). Muddy water is a mixture.

Justification.

i). The components of mixture can be separated from one another by physical method.

ii). Mixture may vary widely composition. The components are mixed in any proportions

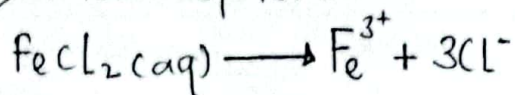
iii). No chemical change occur when mixture are formed.

iv). The properties of mixture are those of the individual components.

v). Components of mixture may be separated

Any three points @ 1 mark = 3 marks

c). i). Mole of ions.



Total ions = $1\text{Fe}^{3+} + 3\text{Cl}^- = (1+3) = 4$ moles of ions.

∴ The number of moles of ions when Iron (III) Chloride ionize in water completely = 4. 1.5 mark

ii). Number of ion (N).

Given

$n = 4$ moles (number of moles)

$L_A = 6.02 \times 10^{23}$ ions/mol

$N = ?$ (Number of particles (ions))

From Avogadro's

$$\frac{n}{1} = \frac{N}{L_A}$$

$$N = n L_A$$

$$N = 4 \text{ moles} \times 6.02 \times 10^{23} \text{ ions/mol}$$

$$N = 2.408 \times 10^{24} \text{ ions.}$$

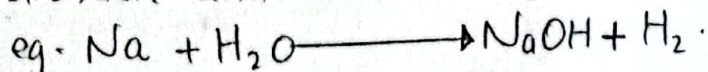
∴ The number of ions (N) when Iron (III) chloride completely ionize in water $N = 2.408 \times 10^{24}$ ions 0.5 mark

4 a). i). Name: Water and chemical formula H_2O 1 mark

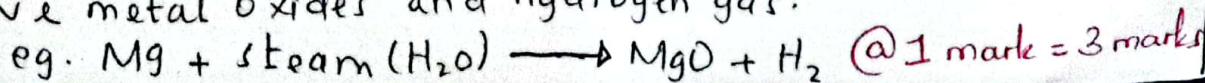
ii). Hydrate Copper (II) Sulphate which turns blue upon addition of an unknown compound. 1 mark

iii). Pure water is neutral at room temperature. It is neither acidic nor basic.

- Cold water reacts with some metals to form metal hydroxide and liberate hydrogen gas.



- Steam can react with some metals to give the respective metal oxides and hydrogen gas.



b). Given

5.34g Carbon, 0.44g Hydrogen, 14.22g Oxygen.

Total masses = $5.34 + 0.44 + 14.22 = 20g$

% composition of carbon = $(5.34 \div 20) \times 100\%$
 $= 26.70\%$

hydrogen = $(0.44 \div 20) \times 100\% = 2.20\%$

Oxygen = $(14.22 \div 20) \times 100\% = 71.10\%$ 01 mark

Now.

Method	C	H	O
% composition	26.70	2.20	71.10
R.A.M	12	1	16
% comp \div R.A.M	$26.70 \div 12 = 2.225$	$2.2 \div 1 = 2.2$	$71.10 \div 16 = 4.443$
Divide by smallest number	$2.225 \div 2.22 = 1.002$	$2.2 \div 2.2 = 1$	$4.443 \div 2.22 = 2.01$
Ratio	1	1	2

2 marks

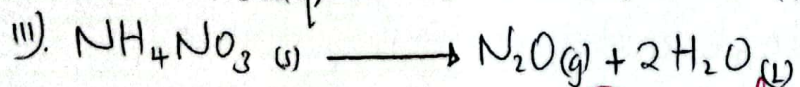
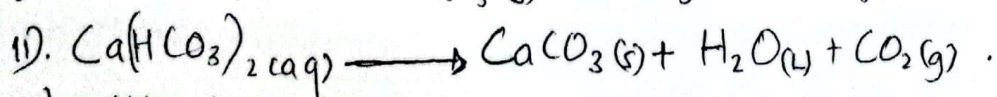
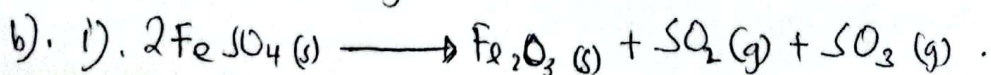
\therefore Empirical formula is CHO_2 . 1 mark

5. a). (i). Enforcement of laws and regulations.

(ii). Recycling.

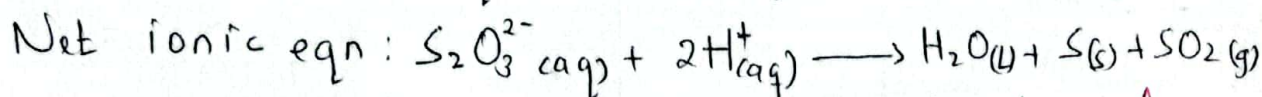
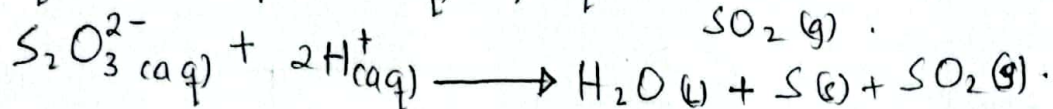
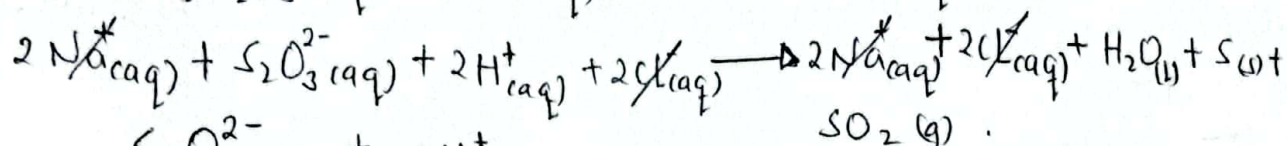
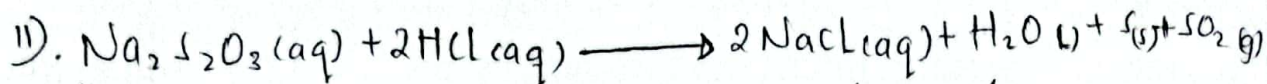
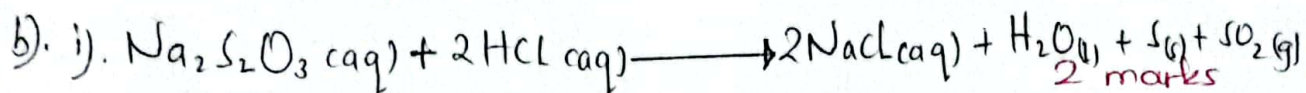
@ 1 mark = 3 marks

(iii). Controlling chemicals before release.



@ 2 marks = 6 marks

6. a) It is a stable element its outermost shell is fullfill with electron in such a way that does not contribute any electron during bond formation. Thus does not react with Sodium. 3 marks



The spectactor ions are Cl^- and Na^+ . 4 marks

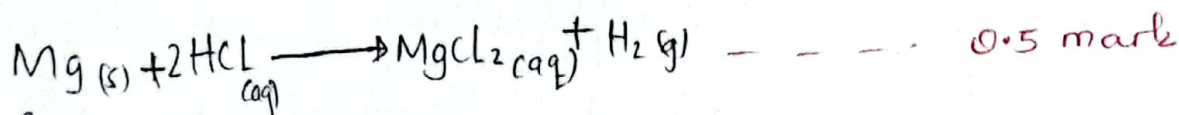
7. a). Data given.

Volume of gas (v) = $288\text{cm}^3 = 0.288\text{dm}^3$

Molar volume (Gmv) = 22.4dm^3

Mass of metal = required from b.

From balanced chemical reaction



But

$n = \frac{\text{Volume of H}_2}{\text{Molar volume}}$ 0.5 mark

$n = \frac{0.288\text{dm}^3}{22.4\text{dm}^3/\text{mol}}$

$n = 0.013\text{ moles of H}_2$ 0.5 mark

Then;

$1\text{mol of mg} = 1\text{mol of H}_2$

$x = 0.013\text{mol of H}_2$

$x = 0.013\text{mol of metal}$ 0.5 mark

Recall.

$$n = \frac{\text{Mass of metal}}{\text{Molar mass}}$$

$$n \cdot \text{Molar mass} = \text{Mass} \quad - - - - 0.5 \text{ mark}$$

$$\text{Mass} = 0.013 \times 24$$

$$\text{Mass} = 0.31\text{g}$$

$$\therefore \text{The mass of metal} = 0.31\text{g} \quad - - - - 1 \text{ mark}$$

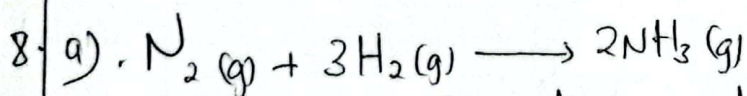
b) i) Gas x is Hydrogen gas (H_2) $- - - 1 \text{ mark}$

Gas z is Oxygen gas (O_2) $- - - 1 \text{ mark}$

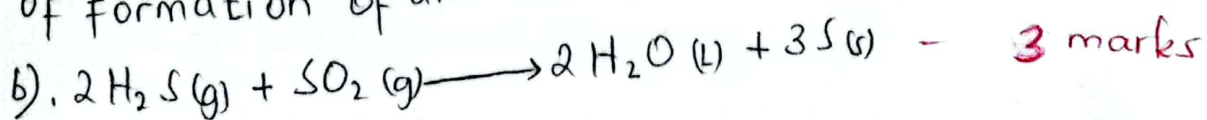
ii) Gas z is collected by downward delivery or upward displacement because it is denser than air. 1 mark

iii) Uses of gas x are

- Used in environment, to that the sewage plant.
- Used in manufacturing of steel from Iron metal cutting and Glass making.
- Used in chemical process. for example manufacture of synthesis fuels and manufacture of chemicals such as acid and oxides. $\text{Any two points @ } 1 \text{ mark} = 2 \text{ marks}$



The role played by catalyst is to speed up the rate of formation of ammonia. 3 marks



c) i. Sodium / Potassium.

ii. Calcium.

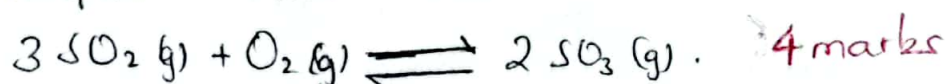
iii. Lead

@ $01 \text{ mark} = 03 \text{ mark}$

SECTION C (30 marks).

9. a) i). Element A is Sulphur
Catalyst B is Vanadium pentoxide (V_2O_5).
Acid C is conc. H_2SO_4 @ 2 marks = 6 marks

ii). Balanced chemical equation for the formation of sulphuric trioxide.



ii). - Calcium chloride

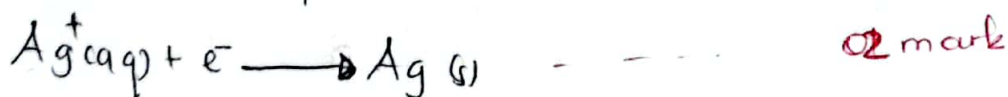
- Carbon dioxide gas.

- Water.

@ 2.5 marks = 5 marks

10. a) The first Faraday's Law states that the mass of element deposited at the electrode varies proportional to the quantity of electricity passed through the electrolytes. While Faraday's second law states that if the same amount of electricity is passed through different electrolytes, the mass of ions deposited at the electrode are direct proportional to the chemical equivalent. 5 marks

b). Ionization of silver at the cathode.



From:

$$1F = 96500C$$

$$x = 9650C$$

} 1 mark

By cross multiplication = $\frac{1F \times 9650C}{96500C}$

$$= 0.1F \quad \dots \quad 02 \text{ mark}$$

From the Ionization equation.

$$1F = 108 \text{ g/mol}$$

$$0.1F = x$$

$$\text{Mass of Ag} = \frac{0.1F \times 108 \text{ g/mol}}{1F}$$

$$= 10.8 \text{ g} \quad \text{--- 2 marks}$$

01 mark Volume of Oxygen $4\text{H}^+_{(\text{aq})} \longrightarrow 2\text{H}_2\text{O}_{(\text{l})} + \text{O}_{(\text{g})}^{2+} + 4\text{e}^-$

$$4F = 22.4 \text{ dm}^3$$

$$0.1F = x$$

By cross Multiplication

$$\frac{0.1F \times 22.4 \text{ dm}^3}{4F}$$

$$= 0.56 \text{ dm}^3 \text{ or } 560 \text{ cm}^3$$

} 01 mark

\therefore The volume of oxygen gas is 0.56 dm^3 or 560 cm^3
01 mark

11 According to Le-Chatelier's principle, the rate of production of I^- can be altered by either of the following facts

i). Change in concentration of reactants.

ii). Change in pressure

iii). Change in temperature.

iv). Addition of a catalyst.

15 marks