

PRESIDENT'S OFFICE REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT MKALAMA DISTRICT COUNCIL

FORM THREE TERMINAL EXAMINATION MARKING SCHEME

032

CHEMISTRY

SECTION A (16 Marks)

1.

										1	
i	ii	iii	iv	V	vi	vii	viii	ix	X		
D	D	В	C	В	A	В	Е	С	Α		
i		ii		iii		iv		V			vi
C		В		A		I		F		D	

 $1 \operatorname{mark}(a) = 10 \operatorname{marks}$

2.

1mark@ = 06 marks

3. In laboratory

☐ Reaction of dilute hydrochloric acid with Zinc metal

$$Zn_{(s)} + 2HCl_{(aq)}$$

$$ZnCl_{2(s)} + HCl_{2(g)}$$

1/2

mark

In industry

□ By steam reforming

 $\frac{1}{2}$

mark Steam reacts with methane to produce carbon monoxide and hydrogen gas

 $\Box \qquad \qquad H_2O_{(g)} + CH_{4(g)} \longrightarrow CO_{(g)} + 3H_{2(g)}$ \mathbf{mark}

 $\frac{1}{2}$

1 mark

b) Copper (ii) oxide is reduced to copper metal as shown below:-

 $CuO_{(s)} + H_{2(g)} \longrightarrow Cu_{(2)} + H_2O_{(g)}$

c) i. Hydrogen does not cause environmental pollution

ii. Hydrogen can be produced from renewable resources eg. Water

1mark@ = 02 marks

d)

Property	Uses				
i) Reducing agent	Manufacturing margarine				
ii) Lighter than air	Filling weather balloons				
iii) Highly flammable	Preparation of water gas				
iv) Readily react with other substances	Manufacturing of ammonia				

1 mark @ = 04 marks

4.a) i. Data given

Mass of $M(OH)_2$, m=5.8g

Molarity of HCl, $M = 0.2M_{T}$

- Required, atomic mass of metal M, Mr.
- Consider the following equation

$$M(OH)_{2(aq)} + 2HCl_{(aq)}$$
 $MCl_{2(aq)} + 2H_2O_{(I)}$

 $1 \text{mol of M } (OH)_2 \equiv 2 \text{mol of HCl}$

$$X$$
? $\equiv 0.2 \text{mol of HCl}$

$$X = \underline{0.2\text{mol}} = 0.1\text{mol}$$

$$2 \qquad \qquad \mathbf{00} \stackrel{1}{2} \text{ mark}$$

Moles of M $(OH)_2 = 0.1 \text{mol}$

From

Moles = mass

Molar mass

$$0.1 \text{mol} = 5.8 \text{g}$$

 $\frac{1}{002}$ mark

Mr. 58g/mol Molar mass = 58g/mol

- In magnitude molar mass is equal to relative atomic mass

Hence

Atomic mass of M $(OH)_2 = 58$

$$M(OH)_2 = 58$$

$$M + 32 + 2 = 58$$
 00 $\frac{1}{2}$ mark

$$M = 58 - 34 = 24$$

Atomic mass of M (OH)₂ = 24 $00^{\frac{1}{2}}$ mark

ii. The name of metal M is magnesium **01 mark**

4b) Data given

Volume of acid, Va = 25 cm3

Molarity of base, Mb = 1M

Molarity of acid, Ma = 1M

Consider the following equation

$$X (OH)_{2(aq)} + 2HA_{(aq)}$$
 $XA_{2(aq)} + 2H_2O_{(I)}$ **01 mark** $A_{2(aq)} = 2$

$$nb = 1$$

From

$$\underline{Ma \ Va} = \underline{na} \\
\underline{Mb \ Vb} \quad \underline{nb}$$
01 mark

$$\frac{1 \times 25}{1} = \underline{2}$$

$$2vb = 25$$

2 2

 $Vb = 12.5 cm^3$

- \blacksquare The volume capacity of the pipette used = 12.5cm^3 **01 mark**
- c) The burette should be cleaned and rinsed in order to avoid contaminations that may interfere with the reaction.

 2 marks
- 5. a) water sample C is hardest, because it remains hard even after boiling.

 2marks
 - b) water sample D behave as distilled water because it use Little volume of soap solution. 2 marks

It means that water contains no soluble substances.

c) (i) Calcium hydrogen carbonate or magnesium hydrogen carbonate.

1marks

- (ii) Calcium sulphate or magnesium sulphate 2 marks
- d) using more soap during washing
- destruction of boilers, hot water pipes and kettles.

Any 3 points, 1 mark @ = 2marks

- 6. a) Laboratory rules should be obeyed by everyone because laboratory rules help;
 - To have successful practical activities
 - To ensure safety
 - To protect equipments/apparatii in the laboratory
 - To avoid contaminations (Any 3points,1mark@=3marks)
- b) i. A laboratory should be equipped with fire extinguisher so as to extinguish harmful fire in case there is fire accident.
 - ii. A laboratory should have large windows for proper and good ventilation
 - iii. A laboratory should have fume chamber for preparing poisonous gases

(1mark@=3marks)

- c) i. In hospital
 - In petrol filling station
 - In chemical industries

(Any 3points, 00^1 mark@= 1^1 _ marks)

ii. This is because safety signs ensure safety in the laboratory during practical activities. Hence safety signs warn laboratory users on the hazards of chemical and advice laboratory users to handle chemicals

carefully $(1\frac{1}{2}$ marks)

7. a) given data.

Mass = 0.65g

Molar mass = 98g/mol.

Volume = needed

½ marks

Firstly, calculate number of moles then convert into volume

$$n = \frac{mass}{Molar \, mass}$$

$$n = \frac{0.65}{65.5 \, g/mol}$$
1/2 marks

= 0.0099 mol.

From the eqn.

This means

1mol.(Zn) -----> 1mol. (H)

0.0099 ---->?

 $? = 0.0099 \times 1$

1

= 0.0099 mol(H)

½ marks

Convert the obtained moles of hydrogen into volume.

From.

n = volume

Molar gas volume

Volume = $n \times molar gas volume$ $\frac{1}{2} marks$

 $= 0.0099 \times 22.4$

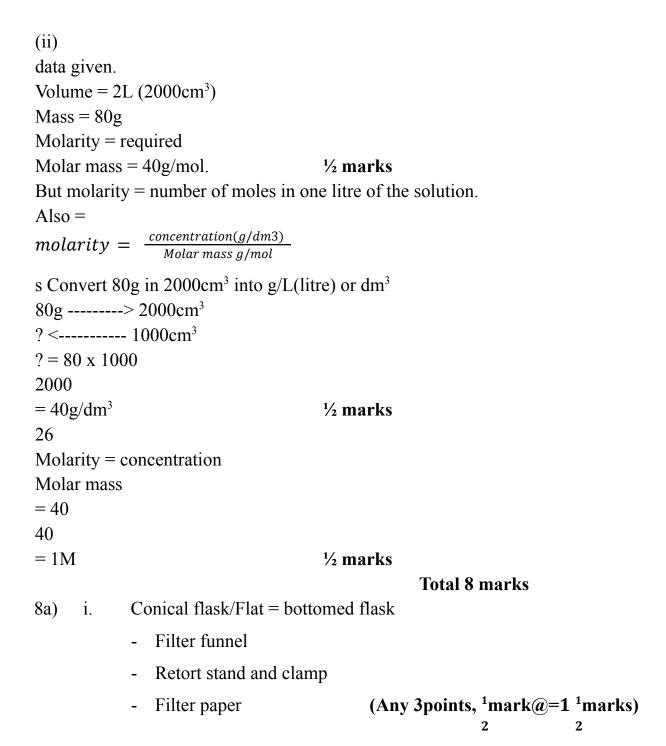
 $= 0.222 dm^3$. ½ marks

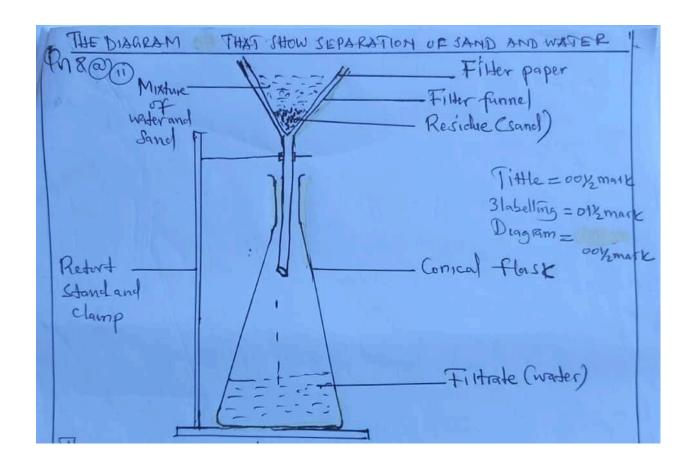
(b) given data.

Molarity = 0.1M

Volume = 400cm^3 Mass = neededMolar mass = 98½ marks Firstly find the number of moles in 400cm³ then convert moles into mass. Remember that Molarity means the number of moles of solute that dissolved to make one litre of the solution. $0.1 \text{mol.} ----> 1000 \text{cm}^3$ $? < ---- 400 \text{ cm}^3$ $?=0.1 \times 400$ 1000 $0.04 \text{mol}(\text{in } 400 \text{cm}^3)$ ½ marks Convert 0.04mol. Into mass. $Mass = n \times molar mass$ $= 0.04 \times 98$ ½ marks = 3.92g.(c) (i) data given. $Volume = 100cm^3$ Mass = 5.3gMolarity = required Molar mass = 106g/mol. ½ marks But molarity = number of mole in one litre of the solution. Also $molarity = \frac{concentration(g/dm3)}{Molar mass g/mol}$ ½ marks Convert 5.3g in 100cm³ into g/L(litre) $5.3g - - > 100cm^3$ $? < ---- 1000 \text{cm}^3$ $? = 5.3 \times 1000$ 100 $= 53g/dm^3$ ½ marks $molarity = \frac{concentration(g/dm3)}{Molar mass g/mol}$ $molarity \frac{53(g/dm3)}{106(\frac{g}{mol})}$ ½ marks

= 0.5M





The sand is separated from the liquid using a porous filter such as filter paper. The sand will remain in the filter paper as residue and water will pass through filter into the conical flask.

 $00^{\frac{1}{2}}$ Mark

- 8b) Solution used in cleaning eg. Soap solution
- Suspensions Used as drug for treatment of diseases
- Emulsion —— Used in decoration eg. Paint

$$-\frac{1}{2}$$
 mark@=1¹marks

- c) Used in drying crops
- Used in drying clothes
- Used in drying mopped areas
- Used in drying washed hairs

Any 3points, 1mark@=03marks

SECTION C: (30 Marks)

9.a) This is because the antacids will neutralize excess acid in the stomach, problem of excess acid will be overcome. **02 marks**

hence the

- b) $Mg(OH)_{2(aq)} + 2HCl_{(aq)}$ $MgCl_{2(aq)} + 2H_2O_{(I)}$ **02marks**
- c) Data given

Normal acid content = 160 millmolar

Abnormal acid content = 210millimolar

Excess stomach acid = 210 - 160

Excess acid = 50millimolar

Converting millimolar to molarity

 $1 \text{mM} \equiv 0.001 \text{mol/dm}^3$

 $50 \text{mM} \equiv X?$

 $X?^3 = \underline{50 \times 0.001 \text{mol/dm}}$

0.05M

 \blacksquare Molarity of excess acid = 0.05M

01mark

- Determining number of moles of excess acid,

From Molarity = moles (n)

0.05M = Moles(n)0.5litres

Moles = 0.025mol

Moles of excess acid = 0.025mol

 $\begin{bmatrix} \frac{1}{2} \\ 00 \\ \frac{1}{2} \end{bmatrix}$ mark

Determine the number of moles of antacid that will neutralize excess acid - consider the following equation.

 $Mg (OH)_{2(aq)} + 2HCl_{(aq)} \longrightarrow MgCl_{2(aq)} + 2H_2O$

1mol of Mg(OH)₂ \equiv 2mols of HCl $\left[00\frac{1}{2} \text{mark}\right]$

$$X? = 0.025 \text{ mol of HCl}$$

$$X = 0.025 \text{ x 1}$$

$$2$$

$$= 0.0125 \text{mol}$$

$$000\frac{1}{2} \text{mark}$$

$$000\frac{1}{2} \text{mark}$$

$$000125 \text{mol of Mg (OH)2 will neutralize excess acid} = 0.0125 \text{mol}$$

$$0.0125 \text{mol of Mg (OH)2 will neutralize } 0.025 \text{mol of HCl}$$

$$1 \text{Then}$$

$$1 \text{Moles} = \frac{\text{Mass}}{\text{Molar mass}}$$

$$0.0125 = \frac{\text{Mass}}{58}$$

$$0.0125 = \frac{\text{Mass}}{58}$$

$$1 \text{mark}$$

$$2 \text{mark}$$

$$2 \text{mark}$$

$$2 \text{mark}$$

$$2 \text{mark}$$

$$2 \text{mark}$$

$$2 \text{mark}$$

10a) i. Neutralization reaction (1mark)

ii. - Used in relieving indigestion

- Used in controlling soil PH
- Used in treating factory wastes (Any 4points,1mark@=4marks)
- Preventing formation of acid rain
- Manufacturing of fertilizers

b) i. Lead (II) sulphate

It is prepared by precipitation reaction

(1mark)

$$Pb(NO_3)_{2(aq)} + Na_2SO_{4(aq)} PbSO_{4(s)} + 2NaNO_{3(aq)}$$
 (1mark)

ii. Copper (II) nitrate

It is prepared by reacting dilute HNO₃ with metal carbonate

(1mark)

$$CuCO3(s) + 2HNO3(aq) \longrightarrow CU(NO3)2(aq) + CO2(g) + H2O(s)$$
(01mark)

iii. Calcium Chloride

It is prepared by reacting dilute HCl with metal carbonate (01mark)

$$CaCO_{3(s)} + 2HCl_{(aq)} \longrightarrow CaCl_{2(aq)} + H_2O_{(q)} + CO_{2(g)}$$
 (01mark)

iv. Calcium Carbonate

It is prepared by precipitation reaction

(01mark)

$$Ca(NO_3)_{2(aq)} + Na_2CO_{3(aq)} \longrightarrow CaCO_{3(s)} + 2NaNO_{3(aq)}$$
 (01mark)

v. Barium sulphate

It is prepared by precipitation reaction

(01mark)

$$BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(aq) + 2NaCl(aq)$$
 (01mark)

11. i. Introduction

- Meaning of chemistry

 $(1\frac{1}{2}$ mark)

- Meaning of Agriculture

 $(1\frac{1}{2}$ mark)

ii. Main body

- It helps to make fertilizers
- It helps to produce pesticides (Any 5points,2mark@=10marks)
- It helps to produce animal vaccine
- It helps to produce weed killers
- It helps to make insecticides

iii. Conclusion

(2mark)