

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

FORM THREE TERMINAL EXAMINATION MARKING SCHEME

032

CHEMISTRY

SECTION A (16 Marks)

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x
D	D	B	C	B	A	B	E	C	A
i		ii		iii		iv		v	
C		B		A		I		F	

1mark@ = 10 marks

2.

1mark@ = 06 marks

3. In laboratory

☐ Reaction of dilute hydrochloric acid with Zinc metal



mark

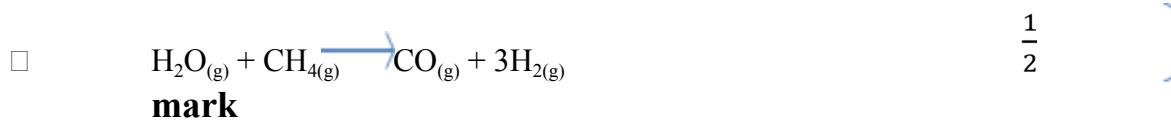
1 ½ mark
½

In industry

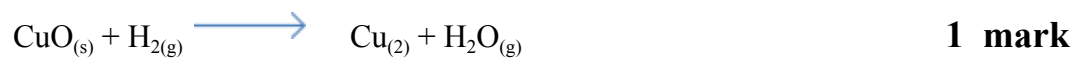
☐ By steam reforming

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

$\frac{1}{2}$



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



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

1mark@ = 04marks

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 , M_r .
- Consider the following equation



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

$X? \equiv 0.2mol$ of HCl

$$X = \frac{0.2mol}{2} = 0.1mol \quad \left[00 \frac{1}{2} \text{ mark} \right]$$

Moles of $M(OH)_2 = 0.1mol$

From

Moles = $\frac{\text{mass}}{\text{molar mass}}$

Molar mass

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

Mr

$00\frac{1}{2}$ 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

M = 58 - 34 = 24

= 24

$00\frac{1}{2}$ mark

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, V_a = 25cm³

Molarity of base, M_b = 1M

Molarity of acid, M_a = 1M

Consider the following equation



n_a = 2

n_b = 1

01 mark

From

$$\frac{M_a V_a}{M_b V_b} = \frac{n_a}{n_b}$$

01 mark

$$1 \quad \begin{array}{r} 1 \times 25 = 2 \\ \times vb \quad 1 \end{array}$$

$$2 \quad \begin{array}{r} 2vb = 25 \\ 2 \end{array}$$

$$Vb = 12.5\text{cm}^3$$

☞ 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 3 points, 00¹mark@=1¹ _ 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
- (1¹/₂ 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

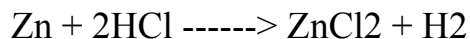
$$n = \frac{\text{mass}}{\text{Molar mass}}$$

½ marks

$$n = \frac{0.65}{65.5\text{g/mol}}$$

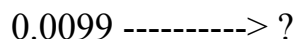
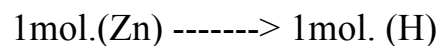
= 0.0099mol.

From the eqn.



½ marks

This means



$$? = 0.0099 \times 1$$

1

$$= 0.0099\text{mol}(\text{H})$$

½ marks

Convert the obtained moles of hydrogen into volume.

From.

n = volume

Molar gas volume

Volume = n x molar gas volume

½ marks

$$= 0.0099 \times 22.4$$

$$= 0.222\text{dm}^3.$$

½ marks

(b) given data.

Molarity = 0.1M

$$\text{Volume} = 400\text{cm}^3$$

Mass = needed

$$\text{Molar mass} = 98$$

½ marks

Firstly find the number of moles in 400cm^3 then convert moles into mass.

Remember that Molarity means the number of moles of solute that dissolved to make one litre

of the solution.

$$0.1\text{mol.} \text{-----} > 1000\text{cm}^3$$

$$? < \text{-----} 400\text{ cm}^3$$

$$? = 0.1 \times 400$$

$$1000$$

$$0.04\text{mol}(\text{in } 400\text{cm}^3)$$

½ marks

Convert 0.04mol. Into mass.

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

$$\text{Mass} = n \times \text{molar mass}$$

$$= 0.04 \times 98$$

$$= 3.92\text{g.}$$

½ marks

(c) (i) data given.

$$\text{Volume} = 100\text{cm}^3$$

$$\text{Mass} = 5.3\text{g}$$

Molarity = required

$$\text{Molar mass} = 106\text{g/mol.}$$

½ marks

But molarity = number of mole in one litre of the solution.

Also

$$\text{molarity} = \frac{\text{concentration}(\text{g/dm}^3)}{\text{Molar mass g/mol}}$$

½ marks

Convert 5.3g in 100cm^3 into g/L(litre)

$$5.3\text{g} \text{-----} > 100\text{cm}^3$$

$$? < \text{-----} 1000\text{cm}^3$$

$$? = 5.3 \times 1000$$

$$100$$

$$= 53\text{g/dm}^3$$

½ marks

$$\text{molarity} = \frac{\text{concentration}(\text{g/dm}^3)}{\text{Molar mass g/mol}}$$

$$\text{molarity} = \frac{53(\text{g/dm}^3)}{106(\frac{\text{g}}{\text{mol}})}$$

$$= 0.5\text{M}$$

½ marks

(ii)

data given.

Volume = 2L (2000cm³)

Mass = 80g

Molarity = required

Molar mass = 40g/mol. **½ marks**

But molarity = number of moles in one litre of the solution.

Also =

$$\text{molarity} = \frac{\text{concentration(g/dm}^3\text{)}}{\text{Molar mass g/mol}}$$

s Convert 80g in 2000cm³ into g/L(litre) or dm³

80g -----> 2000cm³

? <----- 1000cm³

? = 80 x 1000

2000

= 40g/dm³ **½ marks**

26

Molarity = concentration

Molar mass

= 40

40

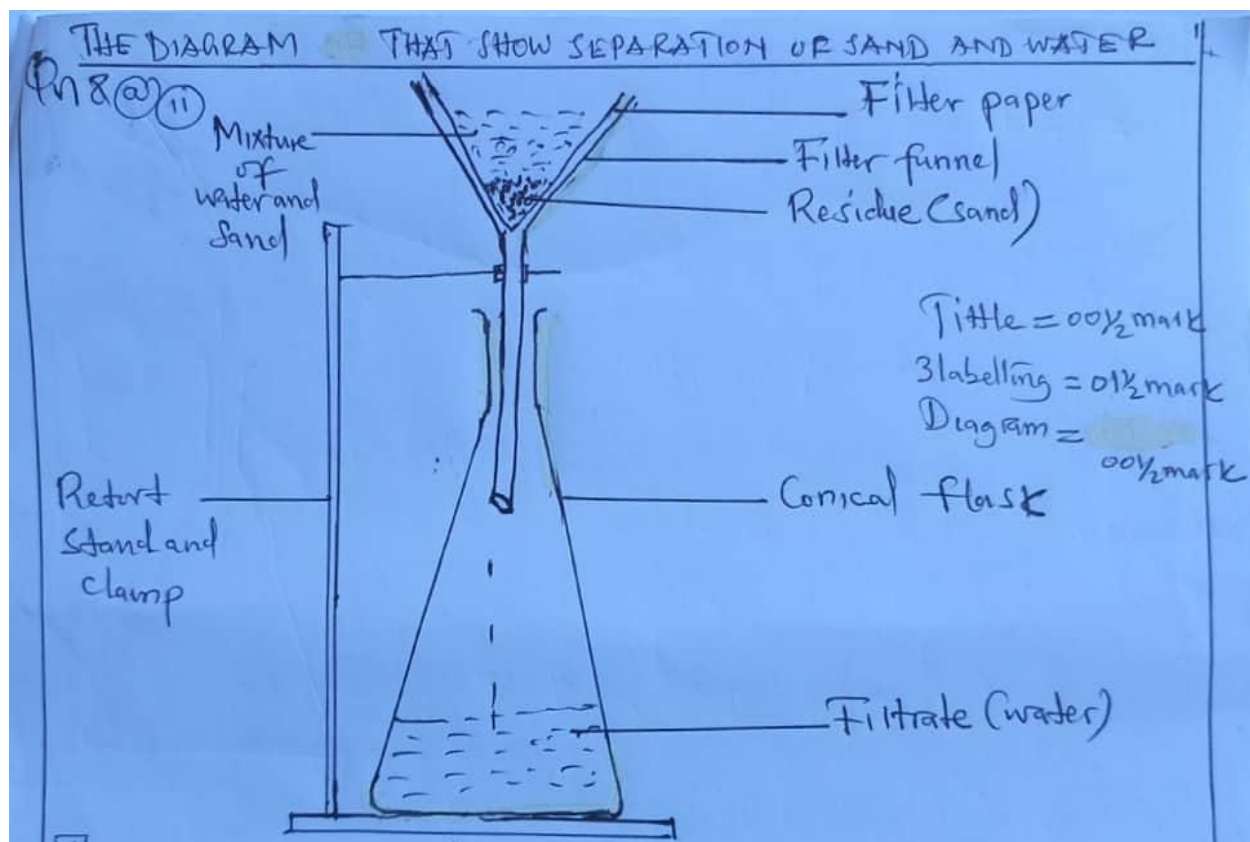
= 1M **½ marks**

Total 8 marks

8a) i. Conical flask/Flat = bottomed flask

- Filter funnel
- Retort stand and clamp
- Filter paper

(Any 3points, ¹mark@=1 ¹marks)
2 2



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

[- ½ mark @ = 1 marks]

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

Any 3 points, 1 mark @ = 03 marks

SECTION C: (30 Marks)

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



c) Data given

Normal acid content = 160 millimolar

Abnormal acid content = 210millimolar

Excess stomach acid = 210 – 160

Excess acid = 50millimolar

Converting millimolar to molarity

$$\begin{aligned} 1\text{mM} &\equiv 0.001\text{mol/dm}^3 \\ 50\text{mM} &\equiv X? \\ X?^3 &= \frac{50 \times 0.001\text{mol/dm}}{1} \\ &= 0.05\text{M} \end{aligned}$$

🚗 Molarity of excess acid = 0.05M [01mark]

- Determining number of moles of excess acid,

From Molarity = moles (n)

Volume (dm³)

[00 $\frac{1}{2}$ mark]

$$0.05\text{M} = \frac{\text{Moles}(n)}{0.5\text{litres}}$$

$$\text{Moles} = 0.025\text{mol}$$

$$\text{Moles of excess acid} = 0.025\text{mol}$$

[00 $\frac{1}{2}$ mark]

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



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

[00 $\frac{1}{2}$ mark]

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

$$X = \frac{0.025 \times 1}{2}$$

$$= 0.0125 \text{ mol} \quad \left[0.0125 \text{ mark} \right]$$

Moles of antacid that will neutralize excess acid = 0.0125 mol

- 0.0125 mol of Mg (OH)₂ will neutralize 0.025 mol of HCl

Then

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

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

$\left[1 \text{ mark} \right]$

$$\text{Mass} = 0.725 \text{ g}$$

☞ Mass of tablet to be given is 0.725 g

$\left[1 \text{ mark} \right]$

d) Mass of tablet = 0.725 g = 725 mg

$$1 \text{ tablet} \equiv 145 \text{ mg}$$

$$X? \equiv 725 \text{ mg}$$

$$X = \frac{1 \text{ tablet} \times 725 \text{ mg}}{145 \text{ mg}}$$

$$145 \text{ mg}$$

$$= 5 \text{ tablets}$$

$\left[2 \text{ mark} \right]$

$\left[2 \text{ mark} \right]$

☞ The student will be given 5 tablets.

e) $2\frac{1}{2}$ days

(02 mark)

10a) i. Neutralization reaction (1 mark)

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

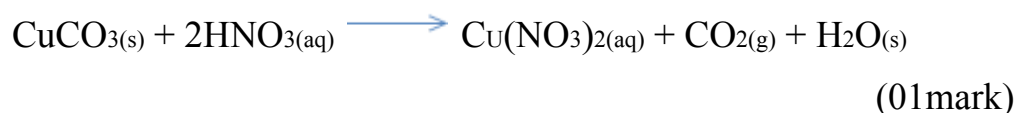
b) i. Lead (II) sulphate

It is prepared by precipitation reaction (1mark)



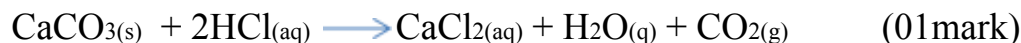
ii. Copper (II) nitrate

It is prepared by reacting dilute HNO_3 with metal carbonate (1mark)



iii. Calcium Chloride

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



iv. Calcium Carbonate

It is prepared by precipitation reaction (01mark)



v. Barium sulphate

It is prepared by precipitation reaction (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)