

THE UNITED REPUBLIC OF TANZANIA
DODOMA REGION
FORM FOUR MOCK EXAMINATION MAY 2023
ACTUAL PRACTICAL
CHEMISTRY 2A - MARKING SCHEME

SOLUTION

1. (a)

Burette reading in cm ³	pilot	1	2	3
Final volume	25.50	50.00	25.00	50.00
Initial volume	00.00	25.00	00.00	25.00
Volume used	25.50	25.00	25.00	25.00

(04MARKS)

(b) (i) The volume of pipette used is **25.00cm³** (01
MARK)

(ii) Volume of solution Q is 25.00cm³ (01
MARK)

(iii) Yellow to orange (01

MARK)

(c) (i) $\text{Na}_2\text{CO}_{3(aq)} + 2\text{HCl}_{(aq)} \rightarrow 2\text{NaCl}_{(aq)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(l)}$ (2

MARKS)

ii) Molarity of R

$$\text{Molarity} = \frac{\text{Conc.g/dm}^3}{\text{molar mass}} \quad (01$$

mark)
$$\text{Molarity} = \frac{3.65\text{g/dm}^3}{36.5\text{g/mol}}$$

(01 mark)

Molarity of R = 0.1M

(01mark)

ii) Molarity of Q

From the relation

$$\frac{MaVa}{MbVb} = \frac{na}{nb}$$

Where; Ma = Molarity of acid

Va = Volume of acid

na = Number of moles of acid

Mb = Molarity of base

(01 mark)

Vb = Volume of base

nb = Number of moles of base

$$\frac{0.1\text{mol/dm}^3 \times 25\text{cm}^3}{Mb \times 25\text{cm}^3} = \frac{2}{1} \quad (02 \text{ marks})$$

$$Mb = \frac{0.1\text{mol/dm}^3 \times 25\text{cm}^3 \times 1}{25\text{cm}^3 \times 2} \quad (01\text{mark})$$

$$\text{Molarity of Q} = 0.05\text{M} \quad (01 \text{ mark})$$

(d) Value of X in $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O}$

(i) Concentration of $\text{Na}_2\text{CO}_3 = ?$

From,

$$\text{Molarity} = \frac{\text{Conc.g/dm}^3}{\text{molar mass}}$$

$$0.05\text{mol/dm}^3 = \frac{\text{Conc.g/dm}^3}{106\text{g/mol}}$$

Concentration of $\text{Na}_2\text{CO}_3 = 5.3\text{g/dm}^3$

$$\frac{\text{Molar mass of water of crystallization}}{\text{molar mass of anhydrous compound}} = \frac{\text{Mass or conc.of water of crystallization}}{\text{Mass or conc. of anhydrous compound}}$$

$$\frac{18x}{106} = \frac{9}{5.3}$$

$$18x \times 5.3 = 106 \times 9$$

$$95.4x = 954$$

$$X = 954/95.4$$

$$X = 10$$

OR

$$\frac{\text{Molar mass of water of hydrated compound}}{\text{molar mass of anhydrous compound}} = \frac{\text{Mass or conc.of water of hydrated compound}}{\text{Mass of anhydrous compound}}$$

$$\frac{106+18x}{106} = \frac{14.30}{5.3}$$

$$(106 + 18x)5.3 = 106 \times 14.30$$

$$561.8 + 95.4x = 1515.8$$

$$95.4x = 1515.8 - 561.8$$

$$95.4x = 954$$

$$X = 954/95.4$$

$$X = 10$$

OR,

Given, -Conc. Of $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O} = 14.30\text{g/dm}^3$

-Molarity of $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O} = 0.05\text{M}$

From Molarity =
$$\frac{\text{Conc. (g/dm}^3\text{)}}{\text{Molecular weight (g/mol)}}$$
 (1 MARK)

$$0.05\text{Mol/dm}^3 = \frac{14.30\text{g/dm}^3}{\text{Molecular Weight}}$$
 (2MARKS)

Molecular Weight =
$$\frac{14.30\text{g/dm}^3}{0.05\text{Mol/dm}^3}$$

$$= 286\text{g/mol}$$
 (1 MARK)

But,

$$286 = \text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O}$$
 (1 MARK)

$$286 = (23 \times 2) + 12 + (16 \times 3) + 18x$$
 (1 MARK)

$$286 = 106 + 18x$$

$$180 = 18x$$

$$\frac{180}{18} = \frac{18x}{18}$$
 (1 MARK)

$$X = 10$$

The value of x in $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O} = 10$ (1 MARK)

2.(a)

Experiment	Volume of DD	Volume of BB	Volume of distilled water	Time in second(t)	Rate (1/t)

1	5	50	0	43	0.023
2	5	40	10	55	0.018
3	5	30	20	66	0.015
4	5	20	30	105	0.009
5	5	10	40	245	0.004

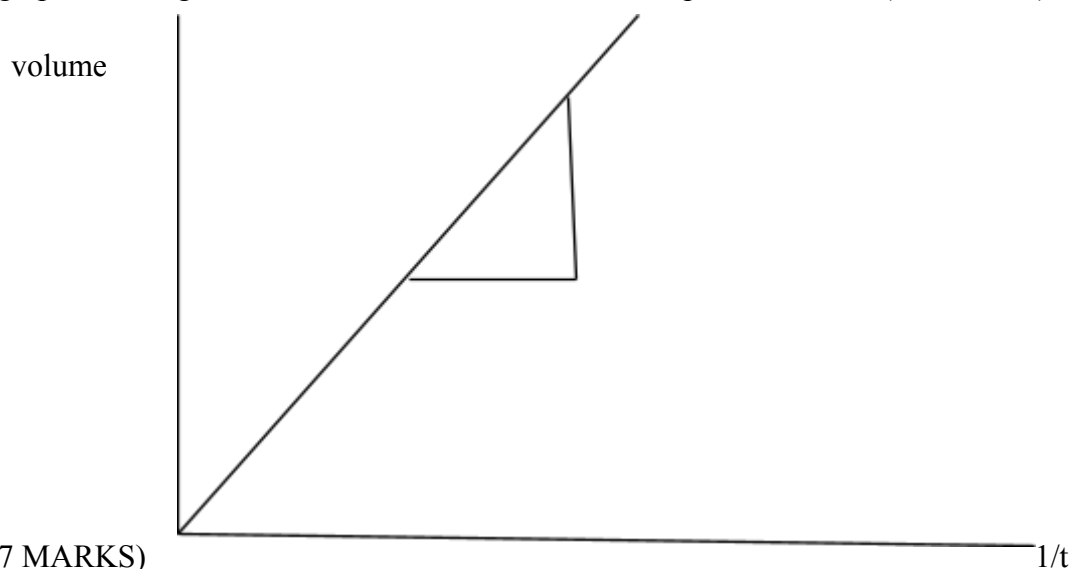
$1/2 @ =$

5MARKS



(d) Sulphur (3 MARKS)

(e) A graph of $1/t$ against the volume of the sodium thiosulphate. (1 MARKS)



(f) Graph show that rate of reaction is directly proportional to the volume of sodium thiosulphate this means the rate of reaction increases with the increase of the concentration of sodium thiosulphate.

(02 MARKS)

(g) By using filtration then evaporation (05 marks)