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 **25.00cm^3** (01 MARK)

(ii)Volume of solution Q is 25.00cm^3 (01 MARK)

(iii) Yellow to orange (01 MARK)

(c) (i) $Na_2CO_{3\,(aq)} + 2HCl_{(aq)} \rightarrow 2NaCl_{(aq)} + CO_{2(g)} + H_20_{(l)}$ (2 MARKS)

ii)Molarity of R

$Molarity = \frac{Conc.g/dm3}{molar\ mass}$ (01 mark) $Molarity = \frac{3.65g/dm3}{36.5g/mol}$

(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

$$\frac{0.1mol/dm3 \times 25cm3}{Mb \times 25cm3} = \frac{2}{1}$$ (02 marks)

$$Mb = \frac{0.1mol/dm3 \times 25cm3 \times 1}{25cm3 \times 2}$$ (01mark)

Molarity of Q = 0.05M (01 mark)

(d) Value of X in $Na_2CO_3.xH_2O$

(i) Concentration of Na_2CO_3 = ?

From,

$$Molarity = \frac{Conc.g/dm3}{molar\ mass}$$

$$0.05mol/dm3 = \frac{Conc.g/dm3}{106g/mol}$$

Concentration of Na_2CO_3 = 5.3g/dm3

$$\frac{Molar\ mass\ of\ water\ of\ crstallization}{molar\ mass\ of\ unhydrous\ compound} = \frac{Mass\ or\ conc.of\ water\ of\ cristallization}{Massor\ conc.\ of\ unhydrous\ compound}$$

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

18x ×5.3 = 106 × 9

95.4x = 954

X = 954/95.4

X = 10

OR

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

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

(106 +18x)5.3 = 106 × 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 $Na_2CO_3.xH_2O$ = 14.30g/dm^3

-Molarity of$Na_2CO_3.xH_2O$ = 0.05M

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

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

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

= 286g/mol (1 MARK)

But,

286 = $Na_2CO_3.xH_2O$ (1 MARK)

286 = (23x2) + 12 + (16x3) +18x (1 MARK)

286 = 106 + 18x

180 = 18x

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

X = 10

The value of x in $Na_2CO_3.xH_2O$ = 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

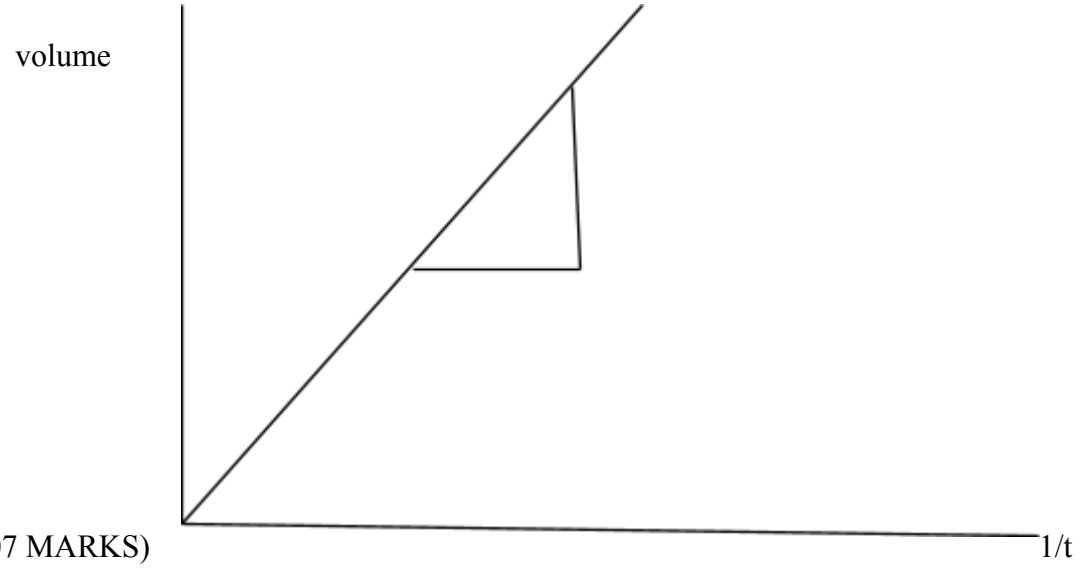
$^1/_2$ @ = 5MARKS

(b) $Na_2S_2O_{3(aq)} + 2HCl_{(aq)} \longrightarrow 2NaCl_{(aq)} + H_2O_{(l)} + S_{(s)} + SO_{2(g)}$ (02 MARKS)

(c) $2Na^+_{(aq)} + S_2O_3^{2-}{}_{(aq)} + 2H^+_{(aq)} + 2Cl^-_{(aq)} \longrightarrow 2Na^+_{(aq)} + 2Cl^-_{(aq)} + H_2O_{(l)} + S_{(s)} + SO_{2(g)}$ (03 marks)

(d) Sulphur (3 MARKS)

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



. (07 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)