

## 032/2B CHEMISTRY 2

### MARKING SCHEME

1. Pipette used 20.00 cm<sup>3</sup>

(01Mark)      Table of  
results                      (04marks)

Experiment	Pilot	1	2	3
Final readings (cm <sup>3</sup> )	10.20	20.00	30.00	40.00
Initial reading (cm <sup>3</sup> )	0.00	10.00	20.00	30.00
Volume used (cm <sup>3</sup> )	10.20	10.00	10.00	10.00

NB: For a pipette of 25cm<sup>3</sup> capacity then the value of V<sub>a</sub> will be 12.5cm<sup>3</sup>

Table and labeling (01mark)

Two decimal place (01marks)

Accuracy (02marks)

a).(i). Average volume (volume of acid) =  $\frac{v_1+v_2+v_3}{3}$  (1/2 mark )

Average volume =  $\frac{10.00+10.00+10.00}{3}$  (1/2 mark )

$\frac{=30.00}{3}$  (1/2 mark )

Average volume (volume of acid) = 10.00 cm<sup>3</sup> (1/2 mark )

(ii). The colour change at the end point was from **Yellow** to **Pink** (1/2)

(iii). **10.00 cm<sup>3</sup>** of Q required **20.00 cm<sup>3</sup>** G for complete reaction (*01mark@1/2 mark*)

(iv).  $\text{H}_2\text{SO}_4 (\text{aq}) + 2\text{KOH}(\text{aq}) \rightarrow \text{K}_2\text{SO}_4 (\text{aq}) + \text{H}_2\text{O}(\text{l})$  (*01mark*)

b). (i). Concentration of Q and G in mole per litre:

$$M_d = \frac{M_c V_c}{V_d} \text{ (1 mark)}$$

$$M_d = \frac{0.5 \times 20}{100}$$

$$= 0.1\text{M} \text{ (01marks)}$$

$$\frac{M_a V_a}{M_b V_b} = \frac{n_a}{n_b} \text{ (1/2mark)}$$

$$\text{Volume of acid (V}_a\text{)} = 10.00 \text{ cm}^3$$

$$\text{Volume of base (v}_b\text{)} = 20.00 \text{ cm}^3$$

$$\text{Molarity of acid (M}_a\text{)} = 0.1\text{M} \text{ (1/2 mark)}$$

$$\text{Number of moles of acid (n}_a\text{)} = 2\text{mol}$$

$$\text{Number of moles of base (n}_b\text{)} = 1\text{mol}$$

$$\frac{0.1\text{M} \times 10.00\text{cm}^3}{M_b \times 20.00 \text{ cm}^3} = \frac{1}{2} \text{ (01 marks)}$$

$$M_b = 0.1\text{M} \text{ (1/2)}$$

(ii). The molar mass of G

$$\text{Molarity} = \frac{\text{concentration}}{\text{molar mass}} \text{ (1/2 mark)}$$

$$200\text{cm}^3/1000 = 0.2\text{dm}^3$$

$$\text{Concentration of pure XOH} \frac{1.12\text{g}}{0.2(\text{dm}^3)} \text{ (1 mark)}$$

$$= 5.6\text{g/dm}^3$$

$$\text{Molar mass(g/mol)} = \frac{\text{concentration}}{\text{molarity(M)}} \text{ (1 mark)}$$

$$\text{Molar mass (g/dm}^3\text{)} = \frac{5.6 \text{ g/dm}^3}{0.1\text{M}}$$

$$= 56\text{g/mol} \text{ (02marks)}$$

(iii). Atomic mass of X and identity of X:

$$XOH = 56$$

$$X + 16 + 1 = 56$$

$$X = 39 \text{ (02 marks)}$$

(iv). X is potassium. (01 marks)

(v). Electronic configuration of X = 2:8:8:1 (01 marks)

### Question.2

a) Table of results

(04marks)

Exp No	Volume (v) of R <sub>1</sub> (cm <sup>3</sup> )	Volume of water in cm <sup>3</sup>	Concentration of solution R <sub>1</sub> after adding water in (mol dm <sup>-3</sup> )	Time (t) for the cross to disappear in sec (s)	Rate of reaction (1/t) in (sec <sup>-1</sup> )
1	30	20	0.12	36	0.0278
2	25	25	0.10	54	0.0185
3	20	30	0.08	74	0.0135
4	15	35	0.06	118	0.0085
5	10	40	0.04	210	0.0048

➤ **Experiment 1**

$$M_c V_c = M_d V_d$$

$$0.2 \times 30$$

$$M_d \times 50,$$

$$M_d = 0.12M$$

➤ **Experiment 2**

$$M_c V_c = M_d V_d$$

$$0.2 \times 25$$

$$M_d \times 50$$

$$M_d = 0.10M$$

➤ **Experiment 3**

$$M_c V_c = M_d V_d$$

$$0.2 \times 20$$

$$M_d \times 50,$$

$$M_d = 0.08M$$

➤ **Experiment 4**

$$M_c V_c = M_d V_d$$

$$0.2 \times 15 = M_d \times 50, M_d = 0.06M$$

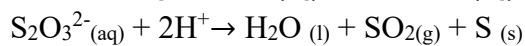
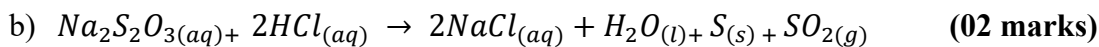
➤ **Experiment 5**

$$M_c V_c = M_d V_d$$

$$0.2 \times 10$$

$$M_d \times 50$$

$$M_d = 0.04M \quad (@ 2 \text{ marks})$$



c) The formation of a solid **Sulphur** is the one that obscured the solution and the smell experienced choking and irritating is due to the formation of a gas which is essential in making sulphuric acid **Sulphur dioxide gas** **(02 marks)**

d) Graph plotted below

e) The concentration is directly proportional to the rate of reaction.

**(01 marks)**

A graph of conc. of  $Na_2S_2O_3$  against the rate of reaction,  $\frac{1}{t}$  in  $\text{sec}^{-1}$  **(01 mark)**

