032/2B CHEMISTRY 2

MARKING SCHEME

1. Pipette used 20.00 cm^3

(*01Mark)* **Table of results** **(04marks)**

Experiment	**Pilot**	**1**	**2**	**3**
Final readings (cm^3)	10.20	20.00	30.00	40.00
Initial reading (cm^3)	0.00	10.00	20.00	30.00
Volume used (cm^3)	10.20	10.00	10.00	10.00

NB: For a pipette of 25cm^3 capacity then the value of Va will be 12.5cm^3

Table and labeling ***(01mark)***

Two decimal place ***(01marks)***

Accuracy ***(02marks)***

a).(i). Average volume (volume of acid) = $\frac{v1+v2+v3}{3}$ **(*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^3 ***(1/2 mark)***

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

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

(iv). H_2SO_4 (aq) + 2KOH(aq) $\rightarrow K_2SO_4$ (aq) + H_2O(l) ***(01mark)***

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

$Md = \frac{McVc}{Vd}$ **(1 mark)**

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

= 0.1M ***(01marks)***

$\frac{MaVa}{MbVb} = \frac{na}{nb}$ ***(1/2mark)***

Volume of acid (Va) = 10.00 cm^3

Volume of base (vb) = 20.00 cm^3

Molarity of acid (Ma) = 0.1M ***(1/2 mark)***

Number of moles of acid (na)= 2mol

Number of moles of base (n_b) = 1mol

$\frac{0.1M \times 10.00cm3}{Mb \times 20.00\ cm3} = \frac{1}{2}$ ***(01 marks)***

Mb= 0.1M **(1/2)**

(ii). The molar mass of G

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

200cm^3/1000= 0.2dm^3

Concentration of pure XOH $\frac{1.12g}{0.2(dm3)}$ **(1 mark)**

= 5.6g/dm^3

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

$Molar\ mass\ (g/dm3) = \frac{5.6\ g/dm3}{0.1M}$

= 56g/mol ***(02marks)***

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

XOH= 56

X+16 +1=56

X=39 (**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_1 (cm^3)	Volume of water in cm^3	Concentration of solution R_1 after adding water in (mol dm^{-3})	Time (t) for the cross to disappear in sec (s)	Rate of reaction (1/t) in (sec^{-1})
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**
  McVc = Mdvd
  0.2 x 30
  M_d x 50,
  M_d = 0.12M
- **Experiment 2**
  McVc= MdVd
  0.2 x 25
  M_d x 50
  M_d = 0.10M
- **Experiment 3**
  McVc = MdVd
  0.2 x 20
  M_d x 50,
  M_d = 0.08M
- **Experiment 4**
  McVc = MdVd

0.2 x 15 = M_d x 50, M_d = 0.06M

- **Experiment 5**

McVc = MdVd

0.2 x 10

M_d x 50

M_d =0.04M ***(@ 2 marks)***

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

$S_2O_3^{2-}{}_{(aq)} + 2H^+ \rightarrow H_2O_{(l)} + SO_{2(g)} + S_{(s)}$

c) The formation of a solid **Sulphur** is the one that obscured the solution and the smell experienced chocking 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 sec^{-1} (01 mark)