

Table 1.....5mks

Distributed as follows:

- (a) Complete table .....(1mk)
- (i) Complete table with 3 titrations.....(1mk)
  - (ii) Incomplete table with two titrations.....( ½ mk)
  - (iii) Incomplete table with one titration ... (0mk)

(b) Use of decimals (tied to the 1<sup>st</sup> and 2<sup>nd</sup> rows only)

Accept ONLY either 1 or 2 decimal places used consistently otherwise penalize fully.

(c) Accuracy....(1mk)

Compare candidate's titre values with the school value (s.v) and tick(√) the chosen value where it earns a mark.

(d) Principle of averaging ... (1mk)

Values must be shown and MUST be within ±0.2 units of each other.

(e) Final answer.....(1mk) (Tied to correct average titre)

Compare the candidate's correct average titre to the school value (s.v)

- (i) If within ±0.1cm<sup>3</sup> of s.v .....(1mk)
- (ii) If not within ±0.1cm<sup>3</sup> but within ±0.2cm<sup>3</sup> s.v.....(½mk)
- (iii) If beyond ±0.2cm<sup>3</sup> of s.v ....(0mk)

(b) 1mole of NaOH = 40g

$$? = 2g = \left(\frac{2}{40} \times 1\right) \text{ litre } \sqrt{\frac{1}{2}}\text{mk} = 0.05\text{moles /litre } \sqrt{\frac{1}{2}}\text{mk}$$

**PROCEDURE II**

(a) table II - award marks as per the conditions applied in table 1

(b) Moles of NaOH, solution L which reacted with HCl in solution P =  $\frac{25 \times 0.05}{1000} = 0.00125\text{moles}$

(c) Av. titre of solution P contains 0.00125moles of HCl

$$100\text{cm}^3 \text{ of P} = \frac{100}{\text{Av. Titre}} \times 0.00125 \sqrt{\frac{1}{2}}\text{mk} = \text{correct answer } \sqrt{\frac{1}{2}}\text{mk} \quad (1\text{mk})$$

(d) (i) Procedure I answer (c) x 100  $\sqrt{\frac{1}{2}}\text{mk} = \text{correct answer } \sqrt{\frac{1}{2}}\text{mk}$

(ii) Answer d(i) – Answer(c)  $\sqrt{\frac{1}{2}}\text{mk} = \text{correct answer } \sqrt{\frac{1}{2}}\text{mk} \quad (1\text{mk})$

(iii)  $\text{CaCO}_{3(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{CaCl}_{2(aq)} + \text{CO}_{2(g)} + \text{H}_2\text{O}$

Mole ratio = 1:2

Moles of carbonate used up =  $\frac{\text{answer d(ii)}}{2} \sqrt{\frac{1}{2}}\text{mk} = \text{correct answer } \sqrt{\frac{1}{2}}\text{mk}$

(e) (i) 1 mole of CaCO<sub>3</sub> 100g

Answer d(ii) ?

$$\frac{(\text{answer d(iii)} \times 100\text{g})}{1} \sqrt{\frac{1}{2}}\text{mk} = \text{correct answer } \sqrt{\frac{1}{2}}\text{mk}$$

$$\text{(ii) \% purity} = \frac{(\text{answer e(i)} \times 100)\%}{0.5} \sqrt{\frac{1}{2}}\text{mk} = \text{correct answer } \sqrt{\frac{1}{2}}\text{mk}$$

2. (a) Table III....(6mks)

Complete table .....award 2mks

5 expts. done .....2mks  
 3-4expts done .....1mk  
 Less than 3 expts. ....0mk  
Decimal place ....1mk

Answer must be at least to 2d.p, otherwise award zero.

Accuracy.....1mk

Compare first experiment of the s.v and the candidate's value. If the difference is 2units in the second d.p award 1mk; otherwise award zero.

Trend .....(1mk)

Award 1mk for the correct trend

Calculation of  $1/t$ .....1mk

5 correct calculations award 1mk

3-4 calculations award ½ k

Less than 3 calculations award 0mk

(b) (i) GRAPH .....3mks

Labeling of axes ..... ½mk

Both axes should be labeled correctly to earn ½mk, otherwise award zero

Scale ..... ½ mk

- Actual plots should cover either ¾ or ½ of the graph.....award ½mk otherwise penalize fully.

Plotting .....1mk

5pts plotted correctly award 1mk

3-4pts correctly plotted award .....1mk

Less than 3 pts correctly plotted award. ....0mk

Line ....1mk- Award 1mk for a straight line starting from the origin

(ii) Correct showing on the graph award ½mk

Correct reading on the graph award ½mk

(iii) The rate of reaction decreases with the decrease in concentration – 1mk

3. (a)

Observations	Inferences
(a) Dissolves $\sqrt{1/2}$ mk to form a colourless $\sqrt{1/2}$ mk solution	Absence of coloured $\sqrt{1/2}$ mk ions $Fe^{2+}$ , $Fe^{3+}$ , $Cu^{2+}$ (aq) ions (2mks)
(b) No white ppt. $\sqrt{1}$ mk	Absence $Al^{3+}$ , $Pb^{2+}$ , $Zn^{2+}$ , $Ca^{2+}$ , $Ba^{2+}$ , $Mg^{2+}$ $\sqrt{1}$ mk Presence of $Na^+$ or $K^+$ ions. 5-6 ions mentioned – 1mk 3-4ions mentioned – ½mk 1-2 ions mentioned – 0mk (2mks)
(c) No white ppt. $\sqrt{1}$ mk	Absence of $Al^{3+}$ , $Pb^{2+}$ , $Zn^{2+}$ , $Ca^{2+}$ , $Ba^{2+}$ , $Mg^{2+}$ ions 5-6 ions mentioned – 1mk 3-4 ions mentioned – ½mk 1 -2 ions mentioned – 0mk (2mks)
(d) White ppt. $\sqrt{1}$ mk formed	Presence of $CO_3^{2-}$ , $SO_4^{2-}$ , $SO_3^{2-}$ $Cl^-$ 4 ions mentioned – 1mk 2-3 ions mentioned – ½mk 1 ion mentioned – 0mk (2mks)
(e) White ppt. Formed $\sqrt{1/2}$ mk dissolves $\sqrt{1/2}$ mk when	$CO_3^{2-}$ , $SO_3^{2-}$ $\sqrt{1}$ mk

HCl is added.	award ½mk for each ion (2mks)
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