

1. **Table 1...** marked out of 5mks  
 a) Complete table with 3 titration alone .. 1mk

**NOTE**

- i) If only 2 titration are done are constant .... (1mk)  
 ii) If only 2 titration and are inconsistent ... ( ½ mk)  
 iii) If only 1 titration is done ..... ( 0 mk)

**Penalties**

- i) Wrong arithmetic  
 ii) Inverted table penalize ½ mk to maximum 1  
 iii) Unexplained readings beyond 50.0cm<sup>3</sup>  
 iv) Un realistic titre readings

- b) Use of the decimal (1mk)

Check this in 1<sup>st</sup> and 2<sup>nd</sup> row only

- i) Only accept 1 or 2 decimals only used consistently.  
 ii) If the 2<sup>nd</sup> decimal is used then the 2<sup>nd</sup> place is O or 5. Otherwise penalize fully.

- c) Accuracy (1mk)

Compare any of the students values with the school value (s.v)

**NOTE:**

- i) At least one value is within  $\pm 0.1$  of the school value ( 1mk)  
 ii) At least one value is within  $\pm 0.2$  of the school value .... ( ½ mk)  
 iii) All values beyond  $\pm 0.2$  ..... (0mk)

- d) Principal of averaging..... ( 1mk)

Note

- i) If 3 consistent titres are averaged. (1mk)

.....

- ii) If 3 titrations are done ; only 2 are consistent and averaged .. award ... (1mk)

- iii) If non consistent values are averaged the award..... (0mk)

- e) Final answer  
 Compare the school value with the average titre

**NOTE**

- i) Average within  $\pm 0.1$  of S.V... (1mk)  
 ii) Average within  $\pm 0.2$  of s.v ..... ( ½ mk)  
 iii) Average beyond  $\pm 0.2$  of s.v .... (0mk)

Calculations

- i) Moles of  $\text{MnO}_4^- = \frac{0.02 \times \text{Average titre}}{1000} \checkmark \frac{1}{2}$
- Moles of  $\text{C}_2\text{O}_4^{2-} = \frac{\text{Answer I} \times 5}{2} \checkmark \frac{1}{2}$
- Correct Answer II  $\checkmark \frac{1}{2}$
- ii) Moles of  $\text{C}_2\text{O}_4^{2-} = \frac{\text{Correct answer II} \times 250}{25} \checkmark \frac{1}{2}$
- = Correct answer III  $\checkmark \frac{1}{2}$
- ii) Moles of  $\text{Na}_2\text{C}_2\text{O}_4$  in  $50\text{cm}^3$  of solution  
 =  $\frac{\text{Answer III} \times 50}{25} \checkmark \frac{1}{2}$   
 = Correct Answer IV(iii)  $\checkmark \frac{1}{2}$
- iii) Moles of  $\text{NaC}_2\text{O}_4$  in  $50\text{cm}^3$  of water  
 = Correct Answer IV x RFM(122)  $\checkmark \frac{1}{2}$
- = Answer V
- Solubility of  $\text{Na}_2\text{CO}_3 = \frac{\text{Answer V} \times 100}{50} \checkmark \frac{1}{2}$   
 = Correct Answer VIg / 100g water at steady temp of candidate

### CONDITIONS FOR CALCULATIONS

- i) Average titre in (a) (i) must be transferred intact otherwise penalize fully for strange figures.
- ii) Penalise  $\frac{1}{2}$  mk for surrounding off unless the values works out exactly to less than 3 decimals in (a) i) and a(ii)
- iii) When one answer is required in the subsequent steps; it should be transferred without alteration. Otherwise penalize fully for strange figures.
- iv) if a wrong Answer is used correctly in subsequent steps; Awards accordingly
- v) In a (iii) the correct units must be stated at the steady temperature for the candidate to earn full credit ; otherwise penalize  $\frac{1}{2}$  mk in the answer.
2. a) Table III ----- ( 4mks)
- a) Complete table ... ( 1mk)
- Penalties
- 1/t values less 3 d.pl
- Unless of it works out exactly
- Any space not filled
  - Any wrong values for 1/t with error greater than 2 units in the third decimal place
- Penalise  $\frac{1}{2}$  mk for each to a maximum of 1mk
- b) **Decimal** ..... (1mk)
- Tied to the time column)
  - Accept whole numbers in seconds for time recordings
  - Reject mixed units for time recording and award zero
- c) **Accuracy** ..... (1mk)
- Compare the candidates first time recording to the teachers' value ;
  - If  $\pm 5$  seconds - 1mk otherwise penalize fully
- d) **Trend** ..... (1mk)

- Accept a continuous increase in time recordings for fully credit – otherwise penalize fully.

- b)
- i) Graph .... (3mks)  
 Axes.... (½ mk)
- Well labelled axes
  - Units if shown must be correct
  - Inverted axes should be awarded
- N/B  
 Penalize if any of the above is not fulfilled
- ii) Scale ..... (1mk)
- The plots must be covering more than ½ of the grid provided
  - Scale internal must be uniform
- Otherwise penalize fully
- iii) Plots..... (1mk)
- 4 -5 plots correctly shown award . .... (1mk)
  - 2 – 3 plots correctly shown award .... (½ mk)
- iv) Curve ..... (½ mk)
- Accept a strength time going through the origin otherwise penalize fully
- ii) - Showing on the graph (1mk)
- Correct value .... (1mk) (2mks)
- iii) The concentration of thiosulphate ions is directly proportional to the rate of reaction. (2mks)

3. **PART I**

a)

Observation	Inferences
-Colourless liquid ✓ ½ formed on cooler part of the test tube - White residue ✓ ½ or solid is left (1mk)	- Hydrated salt - Present (1mk)

**Conditions**

- Reject observations if the following has been used
- Droplets
- Moisture
- Vapour

-Water condemned

-Colourless liquid condemned

- influence is tied to correct observation i.e colourless liquid formed

b)

Observation	Inferences
-Colourless ✓ ½ filtrate -White ✓ ½ residue  (1mk)	-Compound ✓ ½ is sparingly soluble N/B - Accept the following tied to colourless filtrate for ½ mk i) Absence of coloured ions ii) Presence of  (1mk)

i)

Observation	Inferences
Solution turns pink from ✓ 1 Colourless ✓ 1  (1mk)	OH- ✓ 1 HCO <sub>3</sub> <sup>-</sup> , CO <sub>3</sub> <sup>2-</sup> ✓ 1 All 3 – 1mk 2 – ½ mk 1 – omk Accept basic for ½ mk

ii)

Observation	Inferences
No effervescence ✓ 1  (1mk)	OH <sup>-</sup> present OR CO <sub>3</sub> <sup>2-</sup> , HCO <sub>3</sub> <sup>-</sup>  (1mk)

Reject

- Wrong symbol check the 'O's 'C'
- Joining of symbols
- OH- if not mentioned in the b(i)

iii)

- White ✓ 1 ppt Ca<sup>2+</sup> ✓ 1 Ba<sup>2+</sup>
- Joining of symbols
  - Wrong symbols

- mark out out 1mk if there;s a contradiction  
Pb<sup>2+</sup> or Al<sup>3+</sup> e.t.c

iv)

Observation	Inferences
No white ✓ 1 ppt (1mk)	Ba <sup>2+</sup> ✓ 1 or Ca <sup>2+</sup> (1mk)

## PART II

a) i)

Observation	Inferences
Burns with a sooty flame ✓ ½ (1mk)	C = C – or –C ≡ C – (1mk)
	Reject - Wrong symbols - Alkenes, ankynes in words

ii)

Observation	Inferences
Dissolves ✓ ½ (1mk)	COOH ✓ ½ ROH Correct 2 – ½ mk 1 – 0mk Reject 'OH- (1mk)

b) i)

Observation	Inferences
Effervescence ✓ ½ (1mk)	RCOOH or - COOH ✓ ½ Reject H <sup>+</sup> (1mk)

ii)

Observation	Inferences
Pink $\text{KmnO}_4$ ✓ $\frac{1}{2}$ decolourized  <b>Reject</b> $\text{KmO}_4$ decolourized  (1mk)	$\text{C} = \text{C}$ - or $-\text{C} \equiv \text{C}$ - (Tied to correct air )  (1mk)