KUO CHUAN PRESBYTERIAN SECONDARY SCHOOL
SECONDARY FOUR EXPRESS
2024 EOC CHEMISTRY PRACTICAL TEST PRELIM EXAMS
MARKING RUBRIC

Relative Weighting

Skill Areas	Total Marks	Relative Weighting (%)
Manipulation, measurement and observation (MMO)	5	37.5
Presentation of data and observations (PDO)	13	15.0
Analysis, conclusions and evaluation (ACE)	16	37.5
Planning (P)	6	12.5

From SEAB O Level 6092 Syllabus Document
The assessment of Planning (P) will have a weighting of 15%.
The assessment of skill areas MMO, PDO and ACE will have a weighting of 85%.

Qn	Skill	Indicative Material	Mark	Total
1(a)(i)		<table><tr><td>Titration number</td><td>1</td><td>2</td><td>3</td></tr><tr><td>Final burette reading / cm^3</td><td>27.10</td><td>20.90</td><td>23.20</td></tr><tr><td>Initial burette reading / cm^3</td><td>11.10</td><td>7.20</td><td>9.30</td></tr><tr><td>volume of P used /cm^3</td><td>16.00</td><td>13.70</td><td>13.90</td></tr><tr><td>Best titration results (√)</td><td></td><td>√</td><td>√</td></tr></table>		**[5]**
	PDO	Correct header with units	1	
	PDO	Readings to the nearest 0.05 cm^3	1	
	PDO	Compare average value with teacher's value: *±0.20 cm^3, ± 0.30 cm^3*	2	
	PDO	Concordance: *±0.20 cm^3*	1	
1(a)(ii)	ACE	average volume of P = (13.70 + 13.90) / 2 = 13.80 cm^3 *(with 2 dp and correct units)*	1	**[1]**
1(b)(i)	ACE	No. of moles of KOH (aq) = 0.0500 x 25.00 / 1000 = 0.00125 mol	1	**[1]**
1(b)(ii)	ACE	No. of moles of malic acid in average volume of P = ½ x 0.00125 = 0.000625 mol	1	**[1]**
1(b)(iii)	ACE	Concentration (mol/dm^3) of malic acid in P = 0.000625 / 0.01380 = 0.453 mol/dm^3 (e.c.f. applies)	1	**[1]**
1(c)	ACE	Presence of other **acids** in the juice, so greater volumes of KOH needed to neutralise it.	1	**[1]**

Qn	Skill	Indicative Material	Mark	Total
1(d)(i)	MMO	Test 1: A green/blue-green flame is observed. Test 2: The green solid dissolves in nitric acid to form a blue solution. The blue solution turns green. Test 3: Upon adding water, the green solution turns back to blue.	1 1 1 1	**[4]**
1(d)(ii)	P MMO	Test 4: Add nitric acid, and add aqueous silver nitrate. observation: A white ppt. will be formed.	1 1	**[2]**
1(d)(iii)	ACE	To remove any possible carbonate ions that might be present in the sample of salt R.	1	**[1]**
2(a)(i)	PDO	24.0; 0.0 [Note: both values correct and in correct d.p. for 1 mark]	1	**[1]**
2(a)(ii)	PDO	Correct calculation of (40/72 = 0.56) AND correct units cm^3/s	1	**[1]**
2(b)	ACE	Increasing volume of dilute sulfuric acid and decreasing volume of deionised water → increase concentration of dilute sulfuric acid Resulting in decrease in time taken and thus higher rate of reaction (accept: faster reaction; relate time to *rate of reaction*) OR *show calculation of rate of reaction for the experiments*.	1 1	**[2]**
2(c)	ACE	The reaction can be started by tipping the flask, thus do not have to replace / remove the bung, so that no gas escapes / all the hydrogen gas produced can be accurately collected and measured (while the bung is removed / replaced).	1	**[1]**
2(d)	P	Apparatus (A) • Electronic balance • Conical flask/beaker (Reject: evaporating dish) • stopwatch Method (M) • Add 0.5 g magnesium and 25.0 cm^3 of 1.0 mol/dm^3 sulfuric acid together for 5 min. • Add 0.5 g magnesium and 25.0 cm^3 of 0.5 mol/dm^3 sulfuric acid together for 5 min. [Note: Both Apparatus & Method for 1 mark; Variation of concentration for 1 mark]	1 1	**[5]**

<table>
<tr><th>Qn</th><th>Skill</th><th>Indicative Material</th><th>Mark</th><th>Total</th></tr>
<tr><td></td><td></td><td><u>Measurements (M)</u>
• Record the mass of contents of the conical flask/beaker/boiling tube before reaction
• Record the mass of the contents of the conical flask/beaker/boiling tube after 5 min

<u>Data processing (C)</u>
• mass loss = final mass – initial mass
• rate of reaction = $\frac{\text{mass loss}}{\text{time taken to collect the gas}}$
• higher rate of reaction, higher concentration</td><td>1

1

1</td><td></td></tr>
<tr><td>3(a)</td><td>PDO</td><td>Records mass readings to 2 d.p. with units;
• Correct heading and units
○ Mass of container + zinc /g
○ Mass of container + zinc residue/g
[Note: Reject mass of empty container/ mass of container without zinc]
• Mass of zinc added between 2.6 g and 3.2 g

[Note: Do not award if mass of zinc powder > 3.2g or < 2.6g]</td><td>1</td><td>[4]</td></tr>
<tr><td></td><td>MMO</td><td>• All temperature readings recorded to 0.5 °C.
• Trend: constant (±0.5) before 1.5 minute
• Rises from 2 minute then decreases

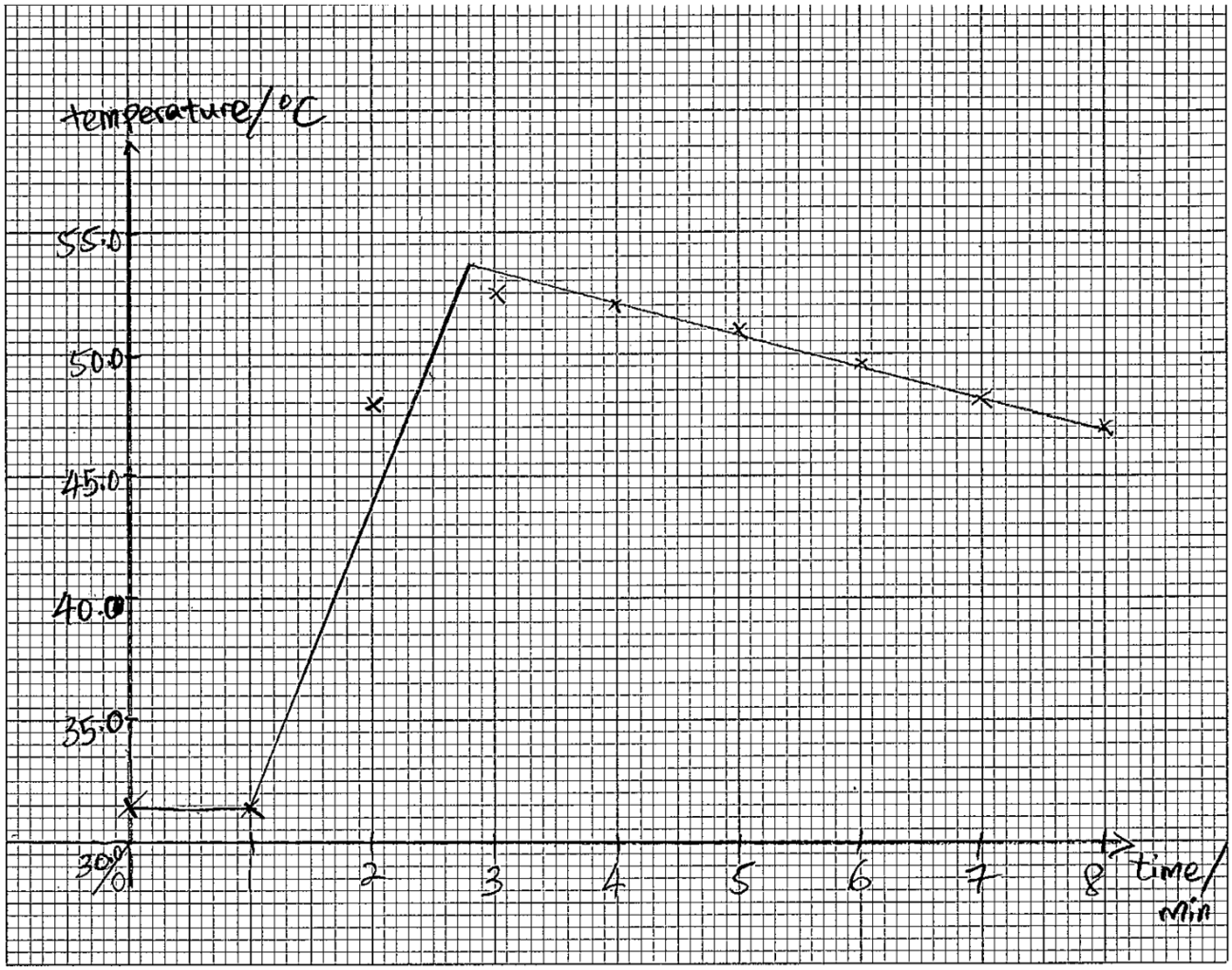
[Note: Reject if the last few points are relatively constant]

Examiner’s data:
<table><tr><th>time / min</th><th>temperature / °C</th></tr><tr><td>0</td><td>31.5</td></tr><tr><td>1</td><td>31.5</td></tr><tr><td>2</td><td>48.0</td></tr><tr><td>3</td><td>52.5</td></tr><tr><td>4</td><td>52.0</td></tr><tr><td>5</td><td>51.0</td></tr><tr><td>6</td><td>49.5</td></tr><tr><td>7</td><td>48.0</td></tr><tr><td>8</td><td>47.0</td></tr></table></td><td>1
1
1</td><td></td></tr>
<tr><td>3(b)</td><td>PDO</td><td>• All recorded points plotted correctly (including the middle segment when the temperature increases)
• Appropriate lines of best fit drawn (Points not on the line must be balanced on either side of the best fit line and any points ringed or labelled as anomalous ignored.)
• Uniform scale chosen to use more than half of each axis including 5°C above the highest recorded temperature
[Note: Reject awkward scale e.g., 4, 8,12..]
[Note: See last page for graph]</td><td>1

1

1</td><td>[3]</td></tr>
</table>

Qn	Skill	Indicative Material	Mark	Total
3(c)(i)	ACE	0.800 x (25 / 1000) = 0.0200 mol 0.0200 x 160 = 3.20 g	1	**[1]**
3(c)(ii)	ACE	Amount of heat released = 3.20 x 4.2 x 22 = 295.68 ≈ 296 J Correct calculation (allow ecf from (c)(i))	1	**[1]**
3(c)(iii)	ACE	Enthalpy change $= -\frac{295.68}{0.02 \times 1000}$ = - 14.784 kJ/mol ≈ - 14.8 kJ/mol [Note: Negative sign must be shown. Allow ecf]	1	**[1]**
3(d)(i)	ACE	<u>Change #1</u> (heat loss) increases/doubled; increased energy output/temperature rise/more exothermic change occurs/increased energy generated by **more moles** of $CuSO_4$ reacting; [Note: Reject $CuSO_4$ is more concentrated.] <u>Change #2</u> no change [Note: Reject no effect]; no change in mass, means there is no change in number of moles. *[Note: Every 2; = 1m]*	1 1	**[2]**
3(d)(ii)	ACE	• Use a pipette or burette for solution T as it has a higher precision (Avoid 'accuracy' – same as question) • Use lid or plastic cup with higher walls to reduce acid spray; • Use of digital thermometer /data logger **with** temperature probe/sensor for greater precision [Note: Reject use lid or use specified extra insulation to reduce heat losses (by convection or conduction)]	1	**[1]**


temperature/°C
55.0
50.0
45.0
40.0
35.0
30.0
1
2
3
4
5
6
7
8
time/min