GCSE MARKING SCHEME

SUMMER 2018

GCSE
CHEMISTRY – COMPONENT 1

C410U10-1
C410UA0-1

INTRODUCTION

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCSE CHEMISTRY COMPONENT 1: Concepts in Chemistry

MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

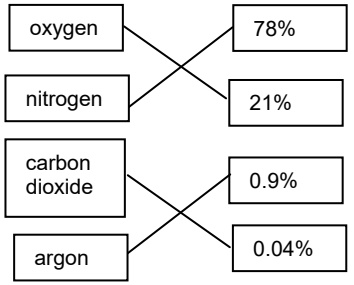
A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao	=	correct answer only
ecf	=	error carried forward
bod	=	benefit of doubt

Foundation Tier only questions

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)			 all correct (2) any two correct (1)	2			2		
	(b)			carbon dioxide decreased and oxygen increased ✓	1			1		
	(c)			(sulfur burns) forming **sulfur dioxide** (1) (sulfur dioxide) reacts with **rain** / **water** **OR** (which forms **sulfuric acid/sulfurous acid**) (1) kills forests / kills fish / damages statues / corrodes metals (1)	3			3		
	(d)			since 1995 there has been a small decrease in the amount of sulfur dioxide released ✓ the amount of sulfur dioxide decreased rapidly between 1990 and 1995 ✓			2	2	2	
				Question 1 total	**6**	**0**	**2**	**8**	**2**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)	I	**B** all correct (2) **C** any one correct (1) **A**	2			2		2
			II	step **B** use up the acid / neutralise the acid / form zinc chloride (1) step **C** remove (unreacted) zinc carbonate (1) step **A** remove / evaporate water (1)	3			3		3
		(ii)		$ZnCl_2$ ✓		1		1		
		(iii)		zinc / zinc oxide / zinc hydroxide accept Zn / ZnO / $Zn(OH)_2$	1			1		
	(b)	(i)		**3**			1	1		1
		(ii)		red **and** blue – both needed			1	1		1
		(iii)		0.43 / 0.4 (2) if answer incorrect award (1) for $\frac{3}{7}$		2		2	1	
		(iv)		dots at 'red' **and** 'yellow' positions – both needed			1	1		1
				Question 2 total	**6**	**3**	**3**	**12**	**1**	**8**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		mass of iron per gram 0.10 /0.1 (1) mass of iron per kilogram 100 (1)		2		2	2	
		(ii)		**C** (1) ecf possible if answer > 120 given in part (i) produces the most iron (1)			2	2		
		(iii)		83 (2) if answer incorrect award (1) for $\frac{29}{35}$ / 82.86 / 82.857 / 82.9	1	1		2	2	
	(b)			air/oxygen **and** water are needed for rusting to take place (1) salt speeds up rusting (1)			2	2		2
	(c)			painting stops air and/or water (getting to iron) (1) sacrificial protection zinc above iron in reactivity series / zinc more reactive than iron (1) zinc corrodes instead of iron / zinc corrodes before iron (1) do not accept reference to 'zinc ***rusts*** instead of iron'	3			3		
	(d)			Fe_2O_3		1		1		
				Question 3 total	**4**	**4**	**4**	**12**	**4**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			**C** (1) (measuring cylinder) is graduated / scaled (1)	1	1		2		2
	(b)	(i)		all points plotted correctly (2) tolerance ±½ square any seven points plotted correctly (1) smooth curve through all points (1)		2	1	3	3	
		(ii)	I	36 ± 0.5 ecf possible – accept correct reading reading from graph		1		1	1	
			II	3 ± 0.5 ecf possible – accept correct reading reading from graph		1		1	1	
	(c)			increased rate / faster reaction (1) bigger surface area (1) greater chance of collision (1)	3			3		
	(d)			= 94.6 ✓ (1) no substance(s) have left or entered the flask/apparatus (1)	1	1			1	1
				Question 4 total	**5**	**6**	**1**	**12**	**6**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			ethane **and** ethene (1) **both** needed, either order (both contain) hydrogen and carbon **only** (1)	2			2		
	(b)			methanol **and** ethanol (1) **both** needed, either order alcohol(s) (1)	2			2		
	(c)			ethanol	1			1		
	(d)			ethene (1) double bond opens / breaks (1) (ethene molecules) join together / single molecule formed / forms a polymer (1)	3			3		
				Question 5 total	**8**	**0**	**0**	**8**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		**A** carbon dioxide / CO_2 (1) **B** chlorine / Cl_2 (1) **C** ammonia / NH_3 (1)			3	3		3
		(ii)		**D** sodium chloride / NaCl **E** potassium carbonate / K_2CO_3 **F** calcium iodide / CaI_2 award (3) for all six ions correct award (2) for four/five ions correct award (1) for two/three ions correct			3	3		3
	(b)			$2NaCl + BaSO_4$ (2) if incorrect award (1) for $BaSO_4$		2		2	1	

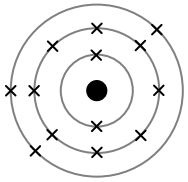
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(c)			**Indicative content** displacement reactions metals high in reactivity series displace lower metals from solution order of reactivity – Mg, Zn, Cu Mg displaces Zn and Cu therefore must be above Zn and Cu Zn displaces Cu but not Mg therefore Zn above Cu (and below Mg) Cu doesn't displace Mg or Zn therefore below Mg and Zn magnesium + zinc sulfate → magnesium sulfate + zinc Mg + $ZnSO_4$ → $MgSO_4$ + Zn	2	2	2	6		6
				5-6 marks Clear reasoning in giving order of reactivity, good attempt at symbol equation *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3-4 marks** Order of reactivity with some reasoning, good attempt at word equation *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.* **1-2 marks** Order of reactivity, reference to displacement *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure.* *The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks** *No attempt made or no response worthy of credit.*						
				Question 6 total	**2**	**4**	**8**	**14**	**1**	**12**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)		Li^+ both boxes (1) 2,8,8 (1)		2		2		
		(ii)		electrostatic	1			1		
		(iii)		Li_2S		1		1		
	(b)	(i)		**C**		1		1		
		(ii)		covalent	1			1		
				Question 7 total	**2**	**4**	**0**	**6**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)		temperature goes down / endothermic reaction (1) the greater the mass added, the greater the change (1)			2	2		1
		(ii)		**A**		1		1		
		(iii)		(electronic) balance accept 'scales'	1			1		1
	(b)	(i)		80 (2) if answer incorrect award (1) for 14 + 4 + 14 + 48		2		2	2	
		(ii)		35 (2) ecf possible from part (i) if answer incorrect award (1) for $\frac{28}{80}$		2		2	2	
	(c)	(i)		85.0 / 85 (2) if answer incorrect award (1) for $\frac{101}{109}$ / 84.87 / 84.9 / 84.874		2		2	1	
		(ii)		uses less natural resources (1) forms less waste (1)	2			2		
				Question 8 total	**3**	**7**	**2**	**12**	**5**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(a)	(i)		0.08 (2) if answer incorrect award (1) for $\frac{total}{4}$		2		2	2	
		(ii)		award (1) for any of following • magnesium oxide lost (during burning) • magnesium oxide smoke escapes • not all the magnesium has reacted • product escapes / lost do not accept 'incorrect readings'			1	1		1
	(b)	(i)		award (1) for any appropriate y and x values e.g. 0.3 and 0.2 accept workings on graph $\frac{y}{x}$ value = 1.5 (1)		2		2	2	
		(ii)		0.4			1	1	1	
				Question 9 total	**0**	**4**	**2**	**6**	**5**	**1**

Common questions

<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>10/1</td><td>(a)</td><td></td><td></td><td>proton 1 (1)
electron −1 (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td></td><td>
<table>
<tr><td>fluorine</td><td></td><td></td><td></td><td></td><td>9</td><td>(1)</td></tr>
<tr><td>potassium</td><td></td><td></td><td>19</td><td></td><td></td><td>(1)</td></tr>
<tr><td>argon</td><td>40</td><td></td><td></td><td></td><td></td><td>(1)</td></tr>
</table>
</td><td></td><td>3</td><td></td><td>3</td><td></td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td></td><td>B</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>C</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>(d)</td><td></td><td></td><td> 
ignore correct or incorrect written electronic structure</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>(e)</td><td>(i)</td><td></td><td>light / caloric / heat</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>could not be broken down (into simpler substances)</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 10/1 total</td><td>2</td><td>8</td><td>0</td><td>10</td><td>0</td><td>0</td></tr>
</table>

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<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>11/2</td><td>(a)</td><td>(i)</td><td></td><td>C (1)

ratio of H:O is 2:1 / twice as much hydrogen as oxygen (1)

more hydrogen formed than oxygen – neutral answer</td><td></td><td></td><td>2</td><td>2</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>H^+ attracted to negative cathode (1)

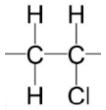
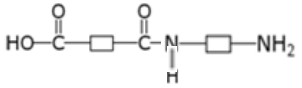
OH^- attracted to positive anode (1)

award (2) for either of following
• H^+ attracted to cathode, OH^- attracted to anode because opposites attract
• H^+ goes to cathode, OH^- goes to anode because opposites attract</td><td>2</td><td></td><td></td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td>  (1)  (1)

two hydrogen molecules needed</td><td></td><td>2</td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td></td><td><table><tr><td>Pb^{2+}</td><td>I^-</td><td></td><td></td></tr><tr><td></td><td></td><td>copper/Cu</td><td></td></tr><tr><td></td><td></td><td></td><td>chlorine/Cl_2</td></tr></table>
award (1) for each correct answer</td><td>4</td><td></td><td></td><td>4</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 11/2 total</td><td>6</td><td>2</td><td>2</td><td>10</td><td>2</td><td>4</td></tr>
</table>

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
12/3	(a)	(i)	I	$\boxed{4}$ Li + O_2 → $\boxed{2}$ Li_2O		1		1		
			II	30 do not accept 60		1		1		
			III	stored in oil / stored in liquid paraffin do not accept 'paraffin'	1			1		1
		(ii)	I	products $LiOH + H_2$ (1) balancing **2**(LiOH) (1)		2		2		
			II	purple (1) accept 'blue' (strong) alkali (1)	2			2		2
		(iii)		$2Li + Cl_2 \rightarrow 2LiCl$ reactants and product (1) balancing (1) reactants and product **must** be correct before awarding balancing mark		2		2		
	(b)			Li_2CO_3		1		1		
				Question 12/3 total	**3**	**7**	**0**	**10**	**0**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		products Fe + CO_2 (1) balancing **2**(Fe) + **3**(CO_2) (1) products must be correct before awarding balancing mark		2		2		
		(ii)		iron(III) oxide loses oxygen / Fe^{3+} ions gain electrons (forming iron)	1			1		
	(b)			neutralisation / acid-base reaction (1) CaO is a base/alkali **and** SiO_2 is an acid (1)	2			2		
	(c)			limestone is heated (1) (limestone) breaks down / undergoes decomposition (1) calcium carbonate ≡ limestone award (2) for 'thermal decomposition of limestone'	2			2		2
	(d)			to heat up in-going air	1			1		
				Question 4 total	**6**	**2**	**0**	**8**	**0**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		C=C (1) accept 'alkene'  (1) ignore ‘n’ and brackets	2			2		
		(ii)	I	 + H_2O award (1) for dimer and (1) for water	2			2		
			II	two (different) functional groups at ends of each monomer (1) functional groups react / join (1) repeating unit contains both monomers (1) small molecule / H_2O also formed (1)	4			4		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)			**credit possible for any choice** credit points relating to **one** material **only** award (1) each for any of following **plastic bottle** • low/lowest CO_2 emission therefore less/least effect on global warming • light/lightest therefore fewer trucks and least effect on global warming • 100% of bottles recyclable therefore sustainable **OR** **aluminium** • comparable CO_2 emission to plastic therefore low effect on global warming • no degradation to properties therefore can be re-used for same purpose • high / 70 % recyclable therefore nearly sustainable • least time to break down • relatively low mass therefore fewer trucks and less effect on global warming **OR** **glass** • readily available raw materials • no degradation of properties • re-usable			3	3		
				Question 5 total	**8**	**0**	**3**	**11**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			**A** ammonium carbonate / $(NH_4)_2CO_3$ **B** calcium iodide / CaI_2 **C** copper(II) bromide / $CuBr_2$ award (3) for all six ions correct award (2) for four/five ions correct award (1) for two/three ions correct			3	3		3
	(b)			alanine (1) lysine (1)			2	2	1	2
				Question 6 total	**0**	**0**	**5**	**5**	**1**	**5**

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<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td></td><td>(higher value) copper not dried completely / contains water (1)

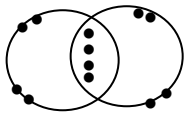
dry / heat the copper until constant mass (1)</td><td></td><td></td><td>2</td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>(lower value) copper remains in filter paper / flask (1)

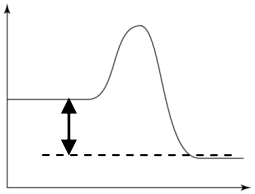
not all copper retrieved – neutral answer

swirl out flask with water (to recover all copper) (1)</td><td></td><td></td><td>2</td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td>(b)</td><td></td><td></td><td>
<table>
<tr><th rowspan="2">Metal</th><th colspan="4">Metal nitrate solution</th></tr>
<tr><th>metal A</th><th>metal B</th><th>metal C</th><th>metal D</th></tr>
<tr><td>A</td><td></td><td>X</td><td>X</td><td>✓</td></tr>
<tr><td>B</td><td>✓</td><td></td><td>X</td><td>✓</td></tr>
<tr><td>C</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>D</td><td>X</td><td>X</td><td>X</td><td></td></tr>
</table>

award (2) for all 12 correct
award (1) for any 6 correct</td><td></td><td></td><td>2</td><td>2</td><td></td><td>2</td></tr>
</table>

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			award (1) for any of following • doesn't rely on (human) observation • changes might not be visible • changes too slow to be seen • quantitative readings (can measure small changes)			1	1		
	(d)			63.6 (2) if answer incorrect award (1) for (63 × 70) + (65 × 30)		2		2	2	
				Question 7 total	**0**	**2**	**7**	**9**	**2**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)		award (1) for each of the following • electron transfer • correct charges • octet around oxygen / electronic structure for both ions		3		3		
		(ii)		 four electrons in intersection (1) octet around each atom (1)		2		2		
		(iii)		calcium oxide has strong (electrostatic) forces between ions / strong ionic bonding (1) oxygen has weak intermolecular forces (1)	2			2		
	(b)			delocalised electrons / sea of electrons / free electrons (1) electrons can move / mobile electrons / electrons carry charge from place to place (1)	2			2		
				Question 8 total	**4**	**5**	**0**	**9**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(a)			energy absorbed in bond breaking = 4728 (2) if incorrect award (1) for [5(413) + 347 + 358 + 464 + 3(498)] energy released in bond making = 6004 (2) if incorrect award (1) for [4(805) + 6(464)] overall energy change = 1276 (1) accept −ve value ecf possible		5		5	5	
	(b)				1			1		
	(c)			as the number of carbon atoms (present in an alcohol) increases the (overall relative) energy change increases (1) the increase is linear / proportional accept description e.g. for every additional carbon atom the energy increases by 618 / approximately 600 (1) positive correlation – neutral answer			2	2	2	
				Question 9 total	**1**	**5**	**2**	**8**	**7**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10	(a)			cooling between heating and adding acid / time delay in adding acid do not accept 'adding cold acid'	1			1		1
	(b)			2 cm ≡ 10°C 2 cm ≡ 10×10^{-3} s^{-1} (1) both needed all five readings plotted correctly (2) tolerance ±½ square any three readings plotted correctly (1) smooth curve of best fit (1)		3	1	4	4	4
	(c)	(i)		award (1) for rate read from graph at any temperature award (1) for second rate read at temperature 10°C higher / lower e.g. rate at 20°C is 4×10^{-3} and rate at 30°C is 8×10^{-3}		2		2	2	2
		(ii)		at 70°C rate = 128×10^{-3} (1) 1/t =0.128 (1) t = 7.8 / 8 s (1)			3	3	3	
		(iii)		percentage error in timing is a large proportion of 5 s / delay in stopping stopwatch is a large proportion of 5 s human error / difficult to stop the watch quickly enough – neutral		1		1		1
				Question 10 total	**1**	**6**	**4**	**11**	**9**	**8**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
11	(a)	(i)		reaction in equilibrium will oppose any changes / (at high temperature) the system will move to decrease temperature / (at low pressure) the system will move to increase pressure (1) therefore move in endothermic reaction / move L to R (1) therefore move in direction of greater number of particles / move L to R (1)			3	3		
		(ii)		17.6 (2) answer **must** be given to 3 significant figures if answer incorrect award (1) for $\frac{6}{34} \times 100$	1	1		2	2	
		(iii)		$\frac{0.16}{16}$ = 0.01 (1) 0.01 : 0.03 (1) $0.03 \times 0.024 = 0.00072$ / 7.2×10^{-4} m^3 (1) ecf possible		3		3	3	
	(b)			award (1) for each element **and** its benefit **nitrogen / N** strong growth / fast growth / more seeds / more fruit / better quality plants / helps photosynthesis / building proteins **phosphorus / P** helps roots grow / helps flowers grow / plant development / respiration **potassium / K** important for overall plant health / reduces disease	3			3		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			**Indicative content** phosphoric acid /ammonium hydroxide inter-changeable appropriate apparatus e.g. burette, conical flask measured amount of alkali in conical flask add indicator e.g. phenolphthalein add acid ……. drop-wise near end-point / colour change/ neutralisation record volume of acid added repeat without indicator adding recorded volume of acid boil off some of the water leave solution to evaporate dry crystals obtained phosphoric acid + ammonium hydroxide → ammonium phosphate + water $H_3PO_4 + 3NH_4OH \rightarrow (NH_4)_3PO_4 + 3H_2O$	6			6		6
				5-6 marks Effective method; good attempt at symbol equation *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3-4 marks** Description of initial step; evaporation to obtain crystals; word equation *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.* **1-2 marks** Attempt at description of method; apparatus named; attempt at word equation *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks** *No attempt made or no response worthy of credit.*						
				Question 11 total	**10**	**4**	**3**	**17**	**5**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
12	(a)	(i)	I	moles of NaOH = 0.0015 (1) ratio 0.00075: 0.0015 (1) conc^{n} of acid = 0.03 (1) alternative method 2 × conc^{n} of acid × vol of acid = conc^{n} of alkali × vol of alkali (1) 2 × conc^{n} of acid × 25 = 0.1 × 15 (1) conc^{n} of acid = 0.03 (1) ecf possible throughout		3		3	3	
			II	1.86 ecf possible from part I		1		1	1	
		(ii)		malic acid / other acids in apple juice (will also neutralise the alkali)			1	1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		sodium ethanoate	1			1		
		(ii)		$Mg + 2CH_3COOH \rightarrow Mg(CH_3COO)_2 + H_2$ reactants (1) products (1) balancing (1) reactants and products must be correct to award the balancing mark		3		3	1	
	(c)			ethanoic acid is a weaker acid (1) less dissociation of ions in ethanoic acid / less H^+ in solution (1) ethanoic acid contains 100 times less H^+ ions in solution than hydrochloric acid (1) accept converse throughout	3			3		
				Question 12 total	**4**	**7**	**1**	**12**	**5**	**0**

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	6	0	2	8	2	0
2	6	3	3	12	1	8
3	4	4	4	12	4	2
4	5	6	1	12	6	3
5	8	0	0	8	0	0
6	2	4	8	14	1	12
7	2	4	0	6	0	0
8	3	7	2	12	5	2
9	0	4	2	6	5	1
10	2	8	0	10	0	0
11	6	2	2	10	2	4
12	3	7	0	10	0	3
TOTAL	47	49	24	120	26	35

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	2	8	0	10	0	0
2	6	2	2	10	2	4
3	3	7	0	10	0	3
4	6	2	0	8	0	2
5	8	0	3	11	0	0
6	0	0	5	5	1	5
7	0	2	7	9	2	6
8	4	5	0	9	0	0
9	1	5	2	8	7	0
10	1	6	4	11	9	8
11	10	4	3	17	5	6
12	4	7	1	12	5	0
TOTAL	45	48	27	120	31	34