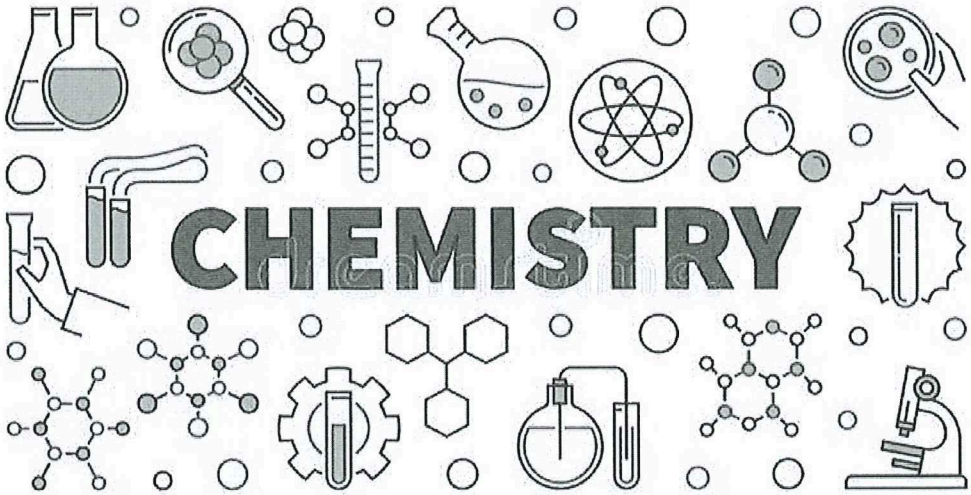
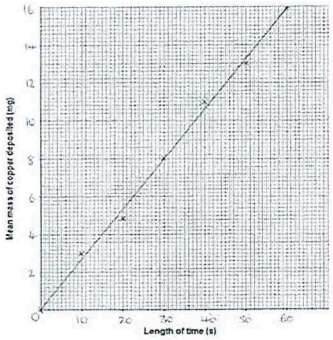


WJEC Chemistry 2

Dual Award – Foundation Tier

2.3 Mark Scheme

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/1	(a)			 award (2) for all points plotted correctly – tolerance ±½ square award (1) for any four correct points award (1) for straight line through origin do not accept point to point line		3		3	3	3
	(b)	(i)		2.5 (2) ignore +/– if incorrect award (1) for correct workings e.g. $\frac{8.2-8.0}{8.0} \times 100$ **or** $\frac{7.8-8.0}{8.0} \times 100$ **or** $\frac{0.2}{8.0} \times 100$	1	1		2	2	2
		(ii)		some of the copper fell to the bottom of the beaker / some copper was left in the beaker time too long or too short – neutral some copper was left on the electrode – neutral reference to concentration of solution – neutral			1	1		1

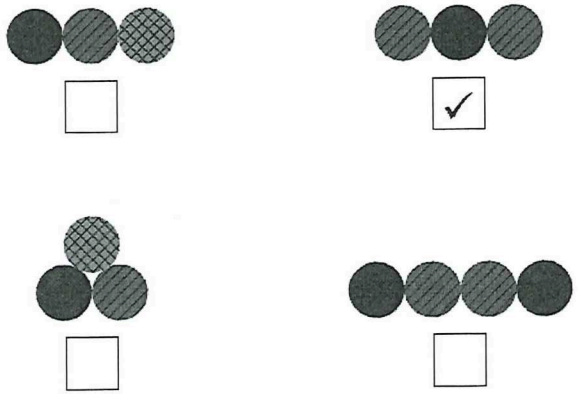
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	I	aluminium ions are positively charged and cathode is negative (1) opposites attract / move to opposite charge / gain three electrons from the cathode (1) aluminium 'atoms' – do not credit for first mark but second mark possible	2			2		
			II	$2\,Al_2O_3 \rightarrow$ 4 Al + 3 O_2 both products (1) correct balancing (1) balancing mark can only be awarded if both products are correct		2		2	1	
		(ii)		K_2CO_3		1		1		
				Question 7/1 total	**3**	**7**	**1**	**11**	**6**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			0 1 2 3 (4) 5 6 accept any correct indication of the answer		1		1		
	(b)			0 – 25% (1 – 19%) 19 – 25% 6 – 24% accept any correct indication of the answer			1	1	1	
	(c)			The alloys all contain at least one metal ☐ The alloys all contain at least two metals ☐ The alloys all contain at least three metals ☑ The alloys all contain at least four metals ☐ accept any correct indication of the answer		1		1		
	(d)			All of the alloys are used for decorative purposes ☐ All of the gold alloys are used for decorative purposes ☑ All of the silver alloys are used for decorative purposes ☐ None of the silver alloys are used for decorative purposes ☐ accept any correct indication of the answer			1	1		
	(e)			0.00198 / 1.98×10^{-3} / 0.002 award (2) for correct answer award (1) for multiplication by 18 or 5:90 ratio if incorrect answer e.g. 18×0.00011 / 5:90 / $90 \div 5$			2	2	2	
				Question 4 total	**0**	**2**	**4**	**6**	**3**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	*(a)*	(i)		10	1			1		
		(ii)		salt petre / KNO_3 / potassium			1	1	1	
	(b)	(i)		so the <u>ions</u> can <u>move</u> accept reference to the lead/Pb^{2+} and chloride/Cl^- ions	1			1		1
		(ii)		(because the chloride ions are) negatively charged (1) opposite charges attract (1)	1	1		2		2
		(iii)		(the lead ions) <u>gain electrons</u>		1		1		
		(iv)		$2Cl^- + 2e^- \rightarrow 2Cl$ ☐ $Cl^- + e^- \rightarrow Cl^{2-}$ ☐ $2Cl^- \rightarrow Cl_2 + 2e^-$ ✓ $Cl^- + e^- \rightarrow Cl$ ☐ $\underline{Cl}^- \rightarrow Cl_2 + 2e$ ☐ accept any correct indication of answer			1	1		

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
	Indicative content • near a dock / coast – to import the aluminium ore from overseas – because there is no aluminium ore in the UK • near a power station – to negotiate a cheap electricity supply – because of the large amounts used and the high costs • railway links – to be able to easily transport the aluminium • road links – to be able to transport the aluminium and for access for employees • housing area – available workforce nearby • distance from homes – reduce impact of noise pollution **AO1 – recalling factors important to location (3)** **AO2 – application to given example (3)**	3	3		6		
	5-6 marks Five or six of the factors are identified and correctly justified, including the need to be near the dock to import the aluminium ore from overseas and the power station to get sufficient electrical power; explanations are detailed and clearly justify why each factor is important for the location *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.* **3-4 marks** Two or three of the factors are identified and some attempt at justifying their importance; explanations are reasonably detailed but might not justify why the factor is important to the process *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure.* **1-2 marks** One or two factors listed but little/no attempt at justifying their importance; there is little or no attempt at any explanation *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure.* **0 marks** *No attempt made or answer worthy or any credit.*						
	Question 5 total	**6**	**5**	**2**	**13**	**1**	**3**

Foundation Tier only questions

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		**A** (1) **B** (1) **D** (1)	3			3		
		(ii)		1		1		1		
		(iii)		$CaCO_3$		1		1		
		(iv)					1	1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		award (1) for each correct line anode → positive electrode a substance that removes impurities electrolyte → a substance that is split up during the process using electricity to make a compound electrolysis → using electricity to split up a compound negative electrode	3			3		
		(ii)		melting point (1) import (1) liquid (1)	3			3		
		(iii)		$2\,Al_2O_3 \longrightarrow \boxed{4}\,Al + 3O_2$		1		1	1	
				Question 1 total	**9**	**3**	**1**	**13**	**1**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac

5				**Indicative content**
				
				AO1
				• More reactive metal can displace a less reactive metal
				• Explanation of order of reactivity in terms of displacement
				  • Mg displaces all of the metals
				  • Cu does not displace any of the metals
				  • Fe displaces Cu
				  • Metals cannot displace themselves
				
				AO2
				• Order of reactivity Mg > Fe > Cu
				• Word / symbol equations for the reactions taking place
					3	3		6		6

				5-6 marks Correct order of reactivity with clear reasoning in terms of reactions taking place; correct word/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** Correct order of reactivity with attempt at explanation with reference to some reactions; reference to product(s) of reactions *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** Correct description of results; some knowledge of displacement of less reactive metals *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 answer worthy or any credit.*						
				Question 5 total	**3**	**3**	**0**	**6**	**0**	**6**

Common questions

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6/1	(a)	(i)		award (1) for either of following 11429 11466		1		1	1	1
		(ii)		award (1) for either of following able to absorb <u>many times</u> their own mass (of water) able to absorb <u>hundreds of times</u> their own mass (of water) accept weight as alternative to mass neutral answersable to absorb 11429 times their own mass (of water) able to absorb more than their own mass (of water) able to absorb lots of water			1	1		
	(b)	(i)		award (2) for all points plotted correctly – tolerance ±½ square award (1) for 4 or 5 points plotted correctly award (1) for appropriate curve do not accept point to point line		3		3	3	3
		(ii)		award (1) for any of following bead absorbs water at 40°C more quickly / at higher rate bead absorbs more water at 40°C bead absorbs water at 10°C more slowly / at lower rate bead absorbs less water at 10°C award (1) for any of following bead becomes saturated (after 10 hours) in water at 40°C bead stops absorbing water at 40°C (after 10 hours) bead not yet saturated (after 10/12 hours) in water at 10°C bead still absorbing water at 10°C (after 10/12 hours)			2	2		2
				Question 6/1 total	**0**	**4**	**3**	**7**	**4**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			limestone (1) (hot) air (1)	2			2		
	(b)			$Fe_2O_3 + 3CO \rightarrow 2\ Fe + 3CO_2$		1		1		
	(c)			40 + 28 + 16 ☐ 40 + 40 + 40 + 28 + 28 + 28 + 16 + 16 + 16 ☐ 40 + 28 + 16 + 16 + 16 ✓ 40 + 16 + 16 + 16 ☐ 40 + 28 + 28 + 28 + 16 + 16 + 16 ☐		1		1		
	(d)			46.9 (2) if answer incorrect award (1) for any of following $\frac{820}{1750}$ 0.46857147 / 0.5 / 46.857147 / 46.86 / 46.8 / 46 / 47		2		2	2	
				Question 2 total	**2**	**4**	**0**	**6**	**2**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			the *s*-block, *p*-block and *d*-block ✓ the *s*-block and *p*-block only ☐ the *s*-block only ☐ the *d*-block and *p*-block only ☐ the *p*-block only ☐	1			1		
	(b)			titanium / Ti			1	1	1	
	(c)			the Group 1 metals and transition metals all have a +1 oxidation state ☐ the transition metals all have a +3 oxidation state ✓ the Group 1 metals all have a +1 oxidation state ✓ iron and lithium have the same oxidation states ☐ the Group 1 metals and transition metals all have a +4 oxidation state ☐ award (1) for each correct tick if more than two ticks award (1) for two correct and one incorrect award (0) for one correct and two incorrect			2	2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			agree – award (1) for either of following • if the compound is coloured it must be a transition • metal the transition metals have coloured compounds (whereas the Group 1 metals do not) accept 'Group 1 metal compounds are white' assume that coloured means not white disagree – award (1) for any of following • titanium has a white compound but is not a Group 1 metal • titanium <u>also</u> has a white compound • just because the compound is white does not mean it is in Group 1 neutral answer – some of the transition metal compounds are white			2	2		
				Question 4 total	**1**	**0**	**5**	**6**	**1**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				**Indicative content** **AO1** • use of aluminium in aircraft / overhead power cables / saucepans / window frames • use of copper in electrical wires / saucepans / coins / jewellery • use of titanium in replacement joints / helicopter rotor blades / car parts **AO2** • uses of the metals linked to the properties in the table e.g. ➢ aluminium used in aircraft because of low density and good resistance to corrosion ➢ copper used in saucepans because of high melting point and good thermal conductivity ➢ titanium used in replacement joints because of low density and good resistance to corrosion **5-6 marks** At least one use for each of the metals linked to two properties from the table; no reference made to other properties e.g. strength (AO3 marks) *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.*	2	2	2	6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				3-4 marks One use for two of the metals linked to at least one property from the table *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** One use for two of the metals without links to properties from the table *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 answer worthy or any credit.*						
				Question 6 total	**2**	**2**	**2**	**6**	**0**	**0**