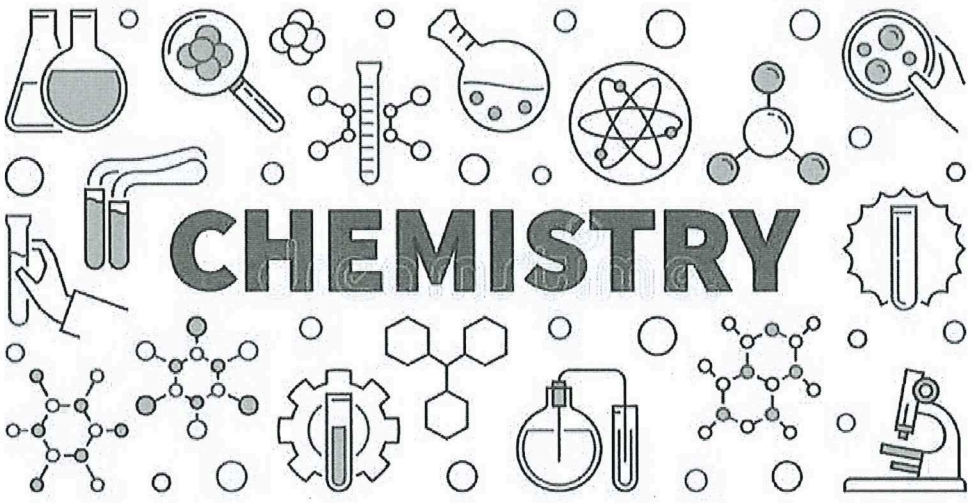


WJEC Chemistry 2

Option – Higher Tier

2.1 Mark Scheme

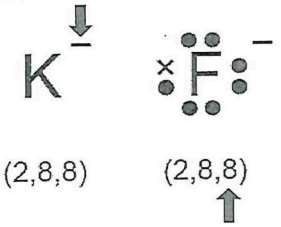
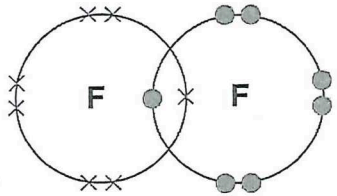
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		transfer of electrons – one calcium atom loses two electrons **AND** one oxygen atom gains two electrons (1) ions – one Ca^{2+} ion **AND** one O^{2-} ion with eight electrons around it (1) if inner shells drawn all atoms and ions must be correct		2		2		
		(ii)		any of following for (1) • strong bonds between ions • strong ionic bonds • strong electrostatic forces between ions neutral answer 'strong bonds' either of following for (1) • attraction between ions with greater charge is greater • 2+/2– attraction is greater than +/– attraction	2			2		

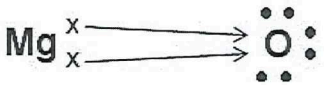
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		(each carbon atom) only bonded to 3 other carbon atoms (1) do not award first mark if any reference to metallic bonding delocalised electrons able to move (through structure) (1)	2			2		
		(ii)		9.1×10^{-10} (3) accept 0.91×10^{-9} if incorrect award (1) for each of following $11 \times 0.26 = 2.86$ diameter = circumference $\div \pi$ / $\frac{2.86}{3.14}$ ecf possible		3		3	3	
				Question 4 total	**4**	**5**	**0**	**9**	**3**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	*(a)*			frames shape memory alloy / SMA - regains shape after bending **both** needed for (1) lenses photochromic pigment) - changes colour with changing light (intensity) / sunlight **both** needed for (1) do **not** accept sun award (1) for both names if both properties incorrect	2			2		
	(b)	(i)		transparent rather than white /opaque (when applied) accept clear rather than white	1			1		
		(ii)		can / could pass through the skin / get into bloodstream / get into the body (1) long-term effect is unknown / could be toxic build-up over time (1) neutral answer - toxic / poisonous	2			2		
		(iii)		10^3 / 1000 (2) accept 1.2×10^3 / 1200 if answer is incorrect award (1) for $\frac{3 \times 10^{-7}}{2.5 \times 10^{-10}}$		2		2	2	
				Question 5 total	**5**	**2**	**0**	**7**	**2**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(c)			**Indicative content** place sulfuric acid in burette measure 25 cm^3 of ammonium hydroxide (into conical flask) add few drops of indicator e.g. phenolphthalein add acid steadily until end-point approaches and drop-wise near end-point record volume of acid needed to just change indicator colour solution is neutral - but contaminated with indicator repeat without indicator - measure 25 cm^3 of ammonium hydroxide (to clean flask) and add exactly the volume of sulfuric acid required to neutralise the alkali solution is neutral - only ammonium sulfate and water present boil off some of the water and leave to cool forming crystals / leave solution to evaporate slowly to form crystals overnight dry crystals (if necessary) sequenced labelled diagrams and appropriate equations should be credited marks limited to lower band if insoluble oxide/carbonate method given	6			6		6
				5-6 marks Full description and explanation of each stage; good attempt at equations *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 and partial explanation of at least two stages *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** Basic description of neutralisation and crystallisation *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 7 total	**9**	**2**	**0**	**11**	**0**	**6**

Common questions

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8/1	(a)	(i)		 award (1) for each mistake identified [no explanation required but should be K^+ and (2,8)]		2		2		
		(ii)		ionic		1		1		
		(iii)		**C**	1			1		
	(b)			 award (2) for correct answer if not correct award (1) for shared pair of electrons accept dots used to represent all electrons		2		2		
				Question 8/1 total	**1**	**5**	**0**	**6**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		 four shared pairs (1) both octets (1)		2		2		
		(ii)		intermolecular forces are weak / forces between molecules are weak (1) accept bonds / interactions / attractions require little energy to overcome / break forces (1) accept doesn't take much heat to overcome / break forces neutral answer - simple molecular do not award any credit if explanation involves covalent bonds	2			2		
	(b)	(i)		 (1)  (1)		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		(in magnesium oxide) the ions have higher charges (1) electrostatic attraction is greater / attraction between ions is greater / ionic bonds are stronger (1) accept converse for both marks	1	1		2		
		(iii)		88 (3) accept 87.5 if answer incorrect credit each correct step in method $\frac{4.12}{58.5}$ = 0.0704 (1) $\frac{0.0704}{0.080}$ = 0.88 (1) 0.88 × 100 = 88 (1) alternative method 0.080 × 58.5 / 4.68 (1) $\frac{4.12}{4.68}$ = 0.88 (1) 0.88 × 100 = 88 (1)		3		3	3	
				Question 5 total	**3**	**8**	**0**	**11**	**3**	**0**