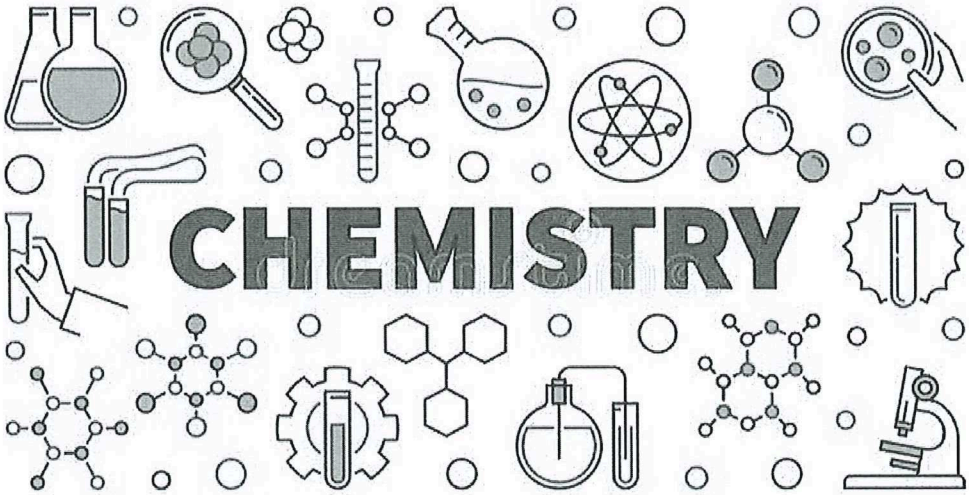

WJEC Chemistry 1

Option – Foundation Tier

1.3 Mark Scheme

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		large insoluble particles sink to the bottom ✓	1			1		
		(ii)		chlorine (1) kills bacteria / kills germs / sterilises water (1) accept: kill ≡ remove	2			2		
		(iii)		source (1) e.g. sewage / factory / industry / fertiliser / pesticides / herbicides / septic tank / farm animal slurry related mechanism (1) (sewage) leakage / (factory) accident / (factory) leakage / (fertiliser / pesticides / herbicides) run-off / (septic tank) leakage / (farm animal slurry) run-off	2			2		
	(b)	(i)		40 (2) award (1) for 180 if answer is incorrect allow ecf for miscalculated value >150		2		2	2	
		(ii)		it does not enter the body / is not consumed			1	1		
				Question 4 total	**5**	**2**	**1**	**8**	**2**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		81		1		1	1	
		(ii)		20 (2) award (1) for 10 **and** 30 read from graph if answer is incorrect		2		2	2	
	(b)	(i)		122.5 (2) award (1) for 39 + 35.5 + 3(16) if answer is incorrect		2		2	2	
		(ii)		32 / 31.8 (2) allow ecf from (i) award (1) for 39/122.5 if answer is incorrect		2		2	2	
	(c)			**2**KCl + **3**O_2 both needed		1		1	1	
				Question 5 total	**0**	**8**	**0**	**8**	**8**	**0**

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
6	**Indicative content** Fair test • use equal volumes of water samples / equal amounts / specified volume e.g. $5cm^3$ • add soap solution $1cm^3$ at a time / other specified volume / equal volumes at a time • shake 5 times / shake for 5 seconds / shake equal amounts • add soap solution until permanent lather is obtained / lather remains for 30 seconds Conclusion • **B** needs most soap solution, **A** needs least soap solution therefore **B** is hardest and **A** is softest **5-6 marks** All aspects of fair test **and** full conclusion *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** Partial fair test **and/or** partial conclusion *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 fair test statements **or** attempt at conclusion *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.*		4	2	6		6
	Question 6 total	**0**	**4**	**2**	**6**	**0**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8				**Indicative content** Interpretation of graph less tooth decay in areas that fluoridate their water supplies areas that have fluoridated for longer see more benefit more decay in areas that do not fluoridate decay has fallen in all areas between 2008 and 2012 all areas have less decay in 2012 than the fluoridated area had in 2008 Supporting fluoridation decrease DMFT, less money spent on dental treatment Opposing fluoridation graph does not give strong evidence of benefit, fluoride is toxic in high concentrations, can cause fluorosis, other ways of taking fluoride, mass medication	4		2	6		
				5-6 marks Uses the graph **and** knowledge in support of **and** in opposition to the fluoridation debate *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** Uses the graph to support fluoridation **and** some knowledge in support of **or** in opposition to the debate *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** Uses the graph **or** some knowledge in support of **or** in opposition to the fluoridation debate *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 8 total	**4**	**0**	**2**	**6**	**2**	**0**

Common questions

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9/1	(a)	(i)		**C** (1) **all** hardness is removed by boiling (1) accept after boiling it only needs the same amount of soap as soft water / water sample **A** explanation mark only to be awarded if correct sample chosen			2	2		2
		(ii)		both types contain dissolved calcium ions / Ca^{2+} / magnesium ions / Mg^{2+}	1			1		
	(b)			benefits – any of following for (1) • stronger teeth • stronger bones • prevents heart disease drawbacks – either of following for (1) • causes limescale • forms scum with soap award additional (1) for development of any point e.g. stronger bones linked to calcium ions; limescale linked to furring up / blocking of pipes or decreased efficiency of heating elements	3			3		
				Question 9/1 total	**4**	**0**	**2**	**6**	**0**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10/2	(a)	(i)		51 ±1		1		1	1	1
		(ii)		award (3) for 424 if incorrect answer award (1) for readings of 240 and 28 award (1) for 212 × 2 ecf possible		3		3	3	
		(iii)		water would not be liquid / would be a gas above 100 °C			1	1		
	(b)	(i)		Na^+ **and** K^+	1			1		
		(ii)		electron loss (1) one electron from outer shell (1)	2			2		
	(c)			$3\ KNO_3 + Al(OH)_3 \rightarrow Al(NO_3)_3 + 3\ KOH$		1		1	1	
				Question 10/2 total	**3**	**5**	**1**	**9**	**5**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	*(a)*			**Indicative content** • sedimentation - allows large insoluble particles to settle at the bottom of the tank over a period of time • filtration - removes small insoluble particles by passing the water through beds of sand / filter beds • chlorination - addition of chlorine to kill germs / bacteria / viruses	6			6		

5-6 marks
Complete account of the purpose of all three stages
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
Basic account of 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
Reference to one or two stages
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				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)			award (1) for any of following • reduces risk of tooth decay • prevents tooth decay • strengthens tooth enamel award (1) for any of following • toxic in large amounts • fluorosis • stomach cancer • mass medication • removes choice of individual • other sensible answers	2			2		
	(c)			52.5 % / 53% (2) if incorrect award (1) for 84 litres saved		2		2	2	
				Question 7 total	**8**	**2**	**0**	**10**	**2**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		D **B E A** C			1	1		1
		(ii)		magnesium	1			1		
		(iii)		<table><tr><td>volume of soap solution</td><td>✓</td></tr><tr><td>type of water</td><td></td></tr><tr><td>type of soap solution</td><td>✓</td></tr><tr><td>volume of water</td><td>✓</td></tr><tr><td>height of lather</td><td></td></tr><tr><td>width of test tube</td><td>✓</td></tr></table> award (2) for all 4 correct with no other ticks award (1) for any 2 or 3 deduct (1) per incorrect box ticked			2	2		2
	(b)	(i)		54°C no tolerance		1		1	1	
		(ii)		solubility of both increases as the temperature increases (1) award (1) for any of following (solubility of) copper(II) sulfate increases much more (than that of sodium chloride) (solubility of) sodium chloride increases much less (than that of copper(II) sulfate) (solubility of) copper(II) sulfate increases a lot and that of sodium chloride increases only slightly comparison needed		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		290 g (2) if incorrect award (1) for either of following 29 g (correct reading from graph) any value multiplied by 10		2		2	2	
	(c)	(i)		1		1		1		
		(ii)		174 (2) if incorrect award (1) for either of following (39 × 2) + 32 + (4 × 16) 2 K + 1 S + 4 O		2		2	2	
				Question 5 total	**1**	**8**	**3**	**12**	**5**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)			**B** **C** **A** award (2) for all three correct award (1) for any one correct			2	2		2
	(b)			award (1) for disadvantage relating to soap / scum • forms scum with soap • wastes soap / doesn't lather with soap award (1) for disadvantage relating to limescale • forms limescale in kettles / boilers • furs pipes • furring of kettles • reduces efficiency of kettles / boilers neutral answers – blocks pipes / bad taste			2	2		
	(c)	(i)		award (1) for either of following • at 35°C the solubility is 66 g (in 100 g of water) / • 66 g dissolves at 35°C		1		1	1	1
		(ii)		26 (2) if incorrect award (1) for either of following • solubility 79 read from graph • 53 subtracted from value read from graph to get corresponding answer		2		2	2	2
		(iii)		40 accept value in the range 39-41		1		1	1	1
				Question 8 total	**0**	**4**	**4**	**8**	**4**	**6**