



WJEC Chemistry 1
Dual Award – Foundation Tier
1.3 Mark Scheme

Question	Marking details	Marks Available						
		AO1	AO2	AO3	Total	Maths	Prac	
3 (a)	(i)	<p>all correct for (2) any one correct for (1)</p>	2			2		
	(ii)	I 13 II bathing accept 21 %		1		1	1	
(b)	(i)	<i>hardest</i> <u> </u> A <u> </u> C <i>softest</i> <u> </u> B			1	1		1
	(ii)	assume C is in the correct position if A and B are correct B – no credit on its own but needed for the explanations boils at (exactly) 100°C (1) produces the most froth / softest water (1) no credit for reasons if A or C is given			2	2		2

Question	Marking details	Marks Available				
		AO1	AO2	AO3	Total	Prac
(iii)	shaking the mixture / tube (1) shake a set number of times / for a specified length of time (1)	2			2	2
(iv)	award (1) only for reference to water temperature, type of soap, concentration of soap CaF ₂		1		1	
	Question 3 total	4	3	3	10	5

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
2	award (1) each for any two of following						
(a)	<ul style="list-style-type: none"> used equal volumes/amounts of each water sample shook each water sample for an equal amount of time used the same concentration of soap solution for each water sample 	2			2		2
(b)	$\frac{18 + 19 + 17}{3}$ (1) must show working 18 (1) award (1) max for 18 with no working		2		2	2	
(i)							
(ii)	A (1) needed highest volume/amount of soap solution (to form permanent lather) (1) ecf possible from part (i)			2	2		2
(c)	all three of following for (2) award (1) for any one/two <ul style="list-style-type: none"> wastes soap forms a scum with soap forms limescale when heated 	2			2		
(d)	Ca ²⁺	1			1		
	Question 2 total	5	2	2	9	2	4

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
6	<p>Indicative content</p> <p>Benefit - fluoride reduces tooth decay / results in less fillings in teeth</p> <p>Reasons to oppose</p> <ul style="list-style-type: none"> • can have possible side effects on health e.g. brittle bones, infertility, kidney problems, stomach cancer, birth defects • can cause fluorosis - teeth going yellow • unethical - fluoride added to drinking water without public consent / mass medication • fluoride is toxic in high concentrations <p>5-6 marks</p> <p>Detailed description of benefit and peoples' concerns; includes at least two health side effects; describes ethical argument</p> <p><i>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.</i></p> <p>3-4 marks</p> <p>Good description of benefit and peoples' concerns; mentions one health side effect; mentions ethical argument</p> <p><i>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.</i></p> <p>1-2 marks</p> <p>Brief description of benefit; mentions one health side effect or ethical argument</p> <p><i>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.</i></p> <p>0 marks</p> <p>No attempt made or no response worthy of credit.</p>				6		
Question 6 total		6	0	0	6	0	0

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
5 (a)	<p>A <input type="checkbox"/></p> <p>B <input type="checkbox"/></p> <p>C <input checked="" type="checkbox"/></p> <p>D <input type="checkbox"/></p>			1	1		
(b)	<p>A <input checked="" type="checkbox"/></p> <p>B <input type="checkbox"/></p> <p>C <input type="checkbox"/></p> <p>D <input type="checkbox"/></p>			1	1		
(c)	<p>potassium fluoride and calcium sulfate <input type="checkbox"/></p> <p>ammonium sulfate and potassium nitrate <input type="checkbox"/></p> <p>calcium fluoride and ammonium nitrate <input type="checkbox"/></p> <p>ammonium sulfate and calcium fluoride <input checked="" type="checkbox"/></p>			1	1		

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
(d)	(i)	136		1		1	1	
	(ii)	48.7 (2) accept 49 if answer incorrect award (1) for either of following 38 or (19 × 2) shown in working 24.4 (ecf – use of 19 instead of 38)		2		2	2	
		Question 5 total	0	3	3	6	3	0

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths Prac	
7	<p>Indicative content</p> <p>Advantages good for healthy bones and teeth (due to calcium ions) reduces risk of heart disease good for brewing beer better taste</p> <p>Disadvantages does not readily form lather with soap solution / forms scum more soap solution needed to produce lather for washing e.g. clothes, dishes boilers and hot water pipes become 'furred up' (due to calcium carbonate / limescale precipitating) boilers and kettles become less efficient and pipes and radiators can become completely blocked energy is wasted as a result</p> <p>5-6 marks Detailed description of advantages and disadvantages of hard water; two examples of each with reference to consequences of disadvantages <i>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.</i></p> <p>3-4 marks Basic description of advantages and disadvantages of hard water; one example of each with simple development of one point <i>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.</i></p> <p>1-2 marks Simple reference to one advantage and one disadvantage <i>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.</i></p> <p>0 marks <i>No attempt made or no response worthy of credit.</i></p>	6			6		
Question 7 total		6	0	0	6	0	0

Question	Marking details	Marks available								
		AO1	AO2	AO3	Total	Maths	Prac			
2	(a)	(i)	I	D						
			II	B E F	award (1) for each correct letter – any order	3		3		
		(ii)		convection		1		1		
	(b)	(i)		14.8			1	1	1	
		(ii)		carbon dioxide		1		1		
				neutral answers – methane / greenhouse gas						
		(iii)		award (1) each for up to two of following						
				climate change (more) extreme weather (more) drought conditions (more) flooding forest fires snowier winters slowing of gulf stream leading to colder weather in UK/ northern Europe polar ice caps melting (at a faster rate) sea levels rising crop failure different pests affecting farmland loss of wildlife habitat	2		2			
				Question 2 total	8	0	1	9	1	0

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
3	(a)						
		2 times <input type="checkbox"/>					
		3 times <input checked="" type="checkbox"/>		1	1	1	
	4 times <input type="checkbox"/>						
	5 times <input type="checkbox"/>						
(b)	(i)	award (2) all points plotted correctly tolerance $\pm\frac{1}{2}$ square award (1) for 4/5 points plotted correctly award (1) for suitable curve ecf possible from incorrect plotting	3		3	3	3
	(ii)	award (1) for any value in the range 72-76 ecf possible from incorrectly plotted/drawn line	1		1	1	1
		award (1) for any value in the range 34-38 ecf possible from incorrectly plotted/drawn line	1		1	1	1
(c)	(i)	$2\text{KNO}_3 \rightarrow 2\text{KNO}_2 + \text{O}_2$	1		1	1	

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
(ii)	72 (2) if answer incorrect award (1) for any of following $\frac{3.13}{4.35}$ $\frac{6260}{87}$ 71.9		2		2	2	
	Question 3 total	0	8	1	9	8	5

Question	Marking details	Marks available						
		AO1	AO2	AO3	Total	Maths	Prac	
6	(a)	London, Yorkshire and the North West all have a mean DMFT of 1.0						
		The South East has the lowest mean DMFT	✓					
		East Midlands has the highest mean DMFT						
		East England, the South West and the South East have a mean DMFT of 0.7			2	2		
		The East Midlands has a lower mean DMFT than Yorkshire	✓					
		London, the North West and South West all have a mean DMFT of 0.9						
(b)	(i)	All areas with fluoridated drinking water have lower mean DMFT than areas which do not fluoridate water			1	1		
		All areas with fluoridated drinking water have the same mean DMFT as non-fluoridated areas						
		All areas with fluoridated drinking water have lower mean DMFT than the North West	✓					
(ii)	(ii)	It is not possible to decide whether fluoridation of drinking water lowers mean DMFT	✓					
		All areas with fluoridated drinking water have higher mean DMFT than areas which do not fluoridate drinking water			1	1		
		All areas with fluoridated drinking water have a higher mean DMFT than the South West						

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
(c)	award (1) for any of following <ul style="list-style-type: none"> • more people brush their teeth (with toothpaste) • better dental hygiene / use mouthwash / floss • natural fluoride in (drinking) water • less sugar in diets neutral answers toothpaste better education wealthier area			1	1		
Question 6 total		0	0	5	5	0	0

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
8/2	(a)		2		2	2	
	(b)		1		1		
	(c)		3		3		3

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
	(d)	Na ₂ CO ₃		1		1		
Question 8/2 total			4	3	0	7	2	3