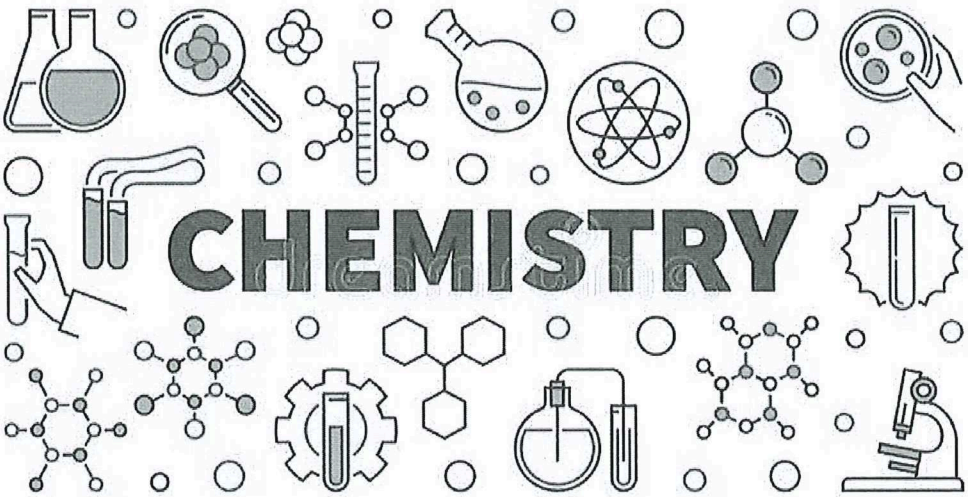

WJEC Chemistry 1

Dual Award – Higher Tier

1.4 Mark Scheme

<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 rowspan="5">7/1</td><td rowspan="4">(a)</td><td>(i)</td><td></td><td>less carbon dioxide today / carbon dioxide has decreased (1)

now contains oxygen / oxygen has formed /
oxygen has increased / more oxygen today (1)

award (1) for numerical value given for the present day percentage of either gas e.g. 21% oxygen, 0.04% carbon dioxide (or correctly calculated change from pie chart)</td><td>3</td><td></td><td></td><td>3</td><td></td><td></td></tr>
<tr><td>(ii)</td><td></td><td><table><tr><th>gas</th><th>test carried out</th><th>expected observation</th></tr><tr><td>hydrogen</td><td>put a lit splint into the gas</td><td>there is a squeaky pop and the splint goes out</td></tr><tr><td>carbon dioxide</td><td>bubble the gas through limewater</td><td>the limewater goes from clear to milky</td></tr></table>
award (1) for each correct test and observation
award (1) if both tests given but incorrect observation(s)</td><td>2</td><td></td><td></td><td>2</td><td></td><td>2</td></tr>
<tr><td rowspan="2">(b)</td><td>(i)</td><td></td><td>(average global) temperatures have increased (1)

(average global) temperatures have increased by greater amounts over time / have increased exponentially (2)</td><td></td><td>1</td><td>1</td><td>2</td><td>2</td><td></td></tr>
<tr><td>(ii)</td><td></td><td>3.60% (2) accept 3.59 / 3.597 / 4.0

award (1) for reference to an increase of 10 ppm
ecf possible for incorrect subtraction</td><td></td><td>2</td><td></td><td>2</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 7/1 total</td><td>5</td><td>3</td><td>1</td><td>9</td><td>4</td><td>2</td></tr>
</table>

Common questions

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/1	(a)	(i)		all points plotted correctly (2) 5/6 points plotted correctly (1) tolerance ±½ small square suitable curve (1)		3		3	3	
		(ii)		increase until 1980/1990/late 1980s (allow specified year e.g.1987) (1) decrease after 1980/1990/late 1980s (allow specified year e.g.1987) (1) award (1) only for simple statement referring to an initial increase followed by a decrease			2	2		
		(iii)		award (1) for any of following • only one reading every 10 years • 10 years between every reading • graph does not go up one year at a time • emissions very similar in 1980 and 1990 and there is no way of knowing what happened in between • there could have been a lag in the reduction of sulfur dioxide emissions after the regulation came into force			1	1		
	(b)			$SO_2 + 2H_2S \rightarrow 3S + 2H_2O$ H_2O (1) balancing (1) balancing mark only awarded if H_2O correct		2		2	1	
				Question 7/1 total	**0**	**5**	**3**	**8**	**4**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			6.21×10^4 (3) if answer incorrect award (1) for each of following $(2.85 \times 10^6) + (2.25 \times 10^6) + (1.30 \times 10^6) = 6.40 \times 10^6$ $6.40 \times 10^6 \times 0.0097$ or $6.40 \times 10^6 \times \frac{0.97}{100}$ max (2) marks if answer not in standard form ecf possible e.g. if incorrect total distance calculated but correct use of 0.97%		3		3	3	
	(b)	(i)		the Earth's crust is divided into tectonic plates (1) these plates move very slowly (1) due to convection currents in the mantle (1)	3			3		
		(ii)		North American Plate and Eurasian Plate have moved apart (accept arrows on the diagram) (1) Mid-Atlantic Ridge has formed as more and more magma has risen through the gap and cooled creating new igneous rock as it cools (1)	2			2		
				Question 4 total	**5**	**3**	**0**	**8**	**3**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)		metallurgists, physicists and chemists are concerned with different properties of heavy metals ✓			1	1		
		(ii)		water becomes contaminated with toxic lead that builds up in body / bioaccumulates			1	1		
		(iii)		lead contamination in road-side soil at all distances is much greater in towns than in the country ✓ lead contamination in road-side soil decreases between 12m and 42m from the centre of the road in the countryside ✓			2	2		
		(iv)		it took 15 years for paint and petrol to become lead free ✓			1	1		
	(b)	(i)		**6** $PbCO_3$ + O_2 → **2** Pb_3O_4 + **6** CO_2		1		1	1	
		(ii)		Pb_2O_3 (3) if answer incorrect award (1) for each of following mass of oxygen = 1.18 g Pb : O ratio is 0.0491 : 0.07375 ecf possible		3		3	3	
				Question 8 total	**0**	**4**	**5**	**9**	**4**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9/2	(a)	(i)		award (1) each for any of following • different continents fit together like a jigsaw puzzle • similar fossils found on different continents • similar rocks found on different continents neutral answers different <u>countries</u> fit together like a jigsaw puzzle different continents / countries have <u>similar</u> coastlines same animals / plants found on different continents	3			3		
		(ii)		he could not suggest <u>how/why</u> the continents moved (1) neutral answer – no evidence to support his theory award (1) for either of following • we now know that the continents are on <u>huge/tectonic plates</u> that can <u>move</u> • we now know that tectonic <u>plates are moved</u> by <u>convection currents in the mantle</u> below the Earth's crust (1) neutral answers plates were discovered plate boundaries were discovered	2			2		
	(b)			earthquake	1			1		
				Question 9/2 total	**6**	**0**	**0**	**6**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			respiration/combustion uses up oxygen and produces carbon dioxide (1) photosynthesis uses up carbon dioxide and produces oxygen (1) if neither mark credited – award (1) for naming <u>process</u> from <u>both</u> balance is maintained when both oxygen and carbon dioxide are used up at the same rate as they are produced (1)	3			3		
	(b)			**must** be reference to **both** countries for any marks any indication that USA and India both increase (up to 2005 / to begin with) (1) e.g. describing the increase using numbers 'USA doubles but India increases by 18 times' after 2005 / in 2015 / at the end USA decreases but India rises <u>dramatically</u> (1) must reference 'time' in some way and 'very large' rise for India neutral answers reference to USA being larger than India to begin with reference to India being larger than USA at the end e.g. India 550 more than USA in 2015			2	2		
	(c)			C_3H_8 + 5 O_2 ⟶ 3 CO_2 + 4 H_2O		1		1	1	
				Question 6 total	**3**	**1**	**2**	**6**	**1**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4				**Indicative content** **A** – destructive/convergent plate boundary oceanic and continental plates move towards one another more dense oceanic plate forced under less dense continental plate friction causes earthquakes, subducted plate melts, rising magma forms volcanoes, mountain building **B** – constructive/divergent plate boundary plates move apart magma wells up to fill gap magma cools and forms new igneous, sea-floor spreading **5-6 marks** Both boundaries discussed, good detail for both *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** Some detail relating to both boundaries or one boundary with good detail *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.*	6			6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1-2 marks Some detail relating to one boundary *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 4 total	**6**	**0**	**0**	**6**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			Carbon dioxide concentration increased by approximately 10 ppm every 10 years ☐ Carbon dioxide concentration increased more between 1970 and 2010 than it did between 1930 and 1960 ✓ Carbon dioxide concentration increased more between 1930 and 1960 than it did between 1970 and 2010 ☐ There is no trend to the change in carbon dioxide concentration between 1930 and 2010 ☐			1	1	1	
	(b)			as carbon dioxide concentration increases (from 1930 to 2010) then so does the Earth's mean temperature (so good evidence) to support this claim (1) award (1) for any of following / OWTTE • as solar activity increases from 1930 to 1960 then so does Earth's mean temperature but after 1960 solar activity decreases but Earth's average temperature continues to increase (so not good evidence) • solar activity does not change much between 1930 and 2010 but the temperature increases (so not good evidence) • solar activity decreasing at the end but temperature still increasing (so not good evidence) if neither of these marks credited award (1) for 'data suggests that claim is true for carbon dioxide but not true for solar activity' / OWTTE			2	2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			award (1) for any of following • this is only one piece of evidence / not enough evidence to prove global dimming / more evidence needed from other events • this is only local information (for a 20-mile radius) around Mount Pinatubo • more information is needed about the temperature values before 1990			1	1		
	(d)			carbon capture / carbon capture and storage	1			1		
	(e)			green plants evolved which photosynthesised (thus absorbing carbon dioxide) (1) award (1) each for any two of following • (some) carbon dioxide became locked into fossil fuels • (some) carbon dioxide became locked into shells of marine animals / limestone / chalk / rocks • (some) carbon dioxide was absorbed by oceans / seas	3			3		
	(f)			$Ca(OH)_2$		1		1		
				Question 7 total	**4**	**1**	**4**	**9**	**1**	**0**