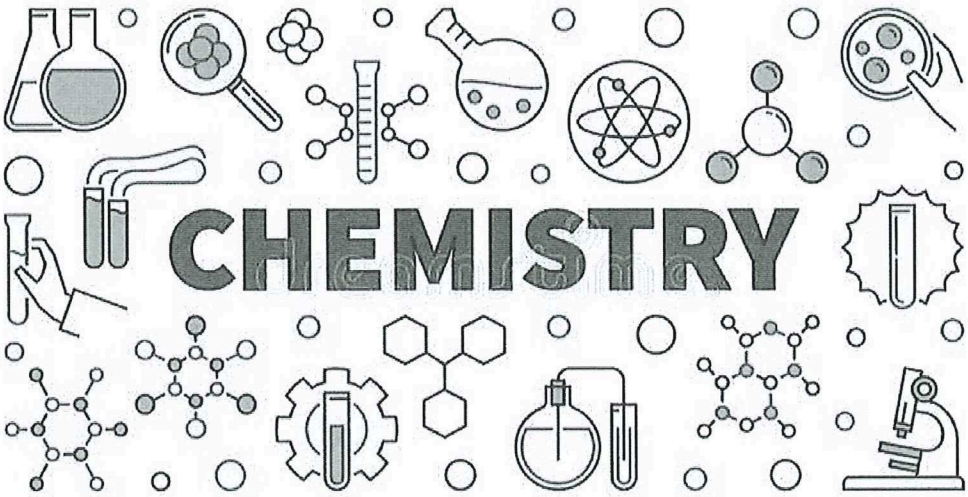
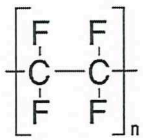


WJEC Chemistry 2

Option – Foundation Tier

2.5 Mark Scheme

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			**A** (1) **C** (1)	2			2		
	(b)	(i)				1		1		
		(ii)		vinyl chloride / chloroethene		1		1		
	(c)	(i)		32 (2) if answer is incorrect award (1) for clear indication that the formula includes one carbon atom, four hydrogen atoms and one oxygen atom		2		2	1	
		(ii)		10500 (2) if answer is incorrect award (1) for temperature rise = 25		2		2	2	2
		(iii)		**C**			1	1		1
		(iv)		**A**	1			1		
				Question 2 total	**3**	**6**	**1**	**10**	**3**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		petrol / gasoline			1	1	1	
		(ii)		14 / C_{14}		1		1		
		(iii)		1 accept CH_4 / methane			1	1	1	
	(b)			petrol and diesel – both needed for (1) fuel for cars / lorries / transport (1) neutral answer – fuels / cars			2	2		
	(c)	(i)		any of following • litter • contributes to landfill • harms wildlife • toxic fumes on burning • carbon dioxide from burning / global warming from burning • other sensible suggestion neutral answer – vague reference to cost / manufacturing / global warming / habitat destruction / non-biodegradable	1			1		
		(ii)		95 (2) if answer is incorrect award (1) for 8900		2		2	2	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		the bags were made the same thickness but from a less dense plastic (1) the bags were made from the same plastic but were thinner (1)			2	2		
				Question 3 total	**1**	**3**	**6**	**10**	**4**	**0**

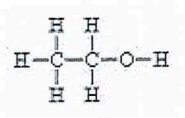
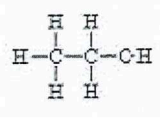
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5				**Indicative content** removal of air/oxygen, heat or fuel puts out a fire methods suitable for moorland fire removal of heat using water from fire engines / helicopters removal of air/oxygen using fire beaters / fire retardants removal of fuel by cutting fire breaks or back burning reference to CO_2 cylinders, fire blankets and/or foam extinguishers is irrelevant in this context	4	2		6		
				5-6 marks Principle of fire triangle stated and **three** suitable methods explained *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** Principle of fire triangle and **two** suitable methods explained *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** At least **one** suitable method explained *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 5 total	**4**	**2**	**0**	**6**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	*(a)*	(i)		oxygen accept O_2 / O	1			1		
		(ii)		speeds up the reaction	1			1		
		(iii)		water accept H_2O	1			1		
		(iv)		$2SO_2 + O_2 \rightleftharpoons \mathbf{2SO_3}$ award (1) for product award (1) for balancing **only** if product is correct		2		2	1	
	(b)			9 (2) if answer incorrect award (1) for 91 ECF possible from addition error		2		2	2	
	(c)			ammonia accept NH_3 / ammonium hydroxide do **not** accept ammonium		1		1	1	
				Question 3 total	**3**	**5**	**0**	**8**	**4**	**0**

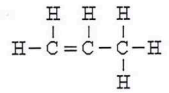
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	*(a)*			**Indicative content** **Advantages (relevant to context)** mouldable light transparent thermal insulator easily coloured non-toxic doesn't break / durable / tough waterproof **Disadvantages (relevant to context)** non-biodegradable relies on crude oil / non-renewable raw material difficult to dispose of / causes litter / pollutes rivers / pollutes sea need for landfill sites / burning forms toxic gases not all can be recycled softens / melts when holding hot food Do **not** credit irrelevant properties e.g. good electrical insulator	3	3		6		
				5-6 marks Several advantages described; ideas linked in description of disadvantages showing understanding of environmental issues *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** Reference to two advantages and knowledge of environmental concerns over waste plastic *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 any advantage and disadvantage *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)	(i)		less than 10 mm ☐ between 5 mm and 10 nm ✓ greater than 5 mm and less than 10 nm ☐ between 5 mm and 10 mm ☐	1			1		
		(ii)		plastic production has remained constant ✓ plastic production has increased ☐ plastic production has decreased ☐			1	1		
		(iii)		rayon			1	1		
		(iv)		the quantity of microplastics found in the Earth's oceans is increasing ☐ microplastics carry contaminants from sea water into animals ☐ microplastics cause tissue damage in marine animals ✓ microplastics are a greater problem near land than in deep water ☐			1	1		

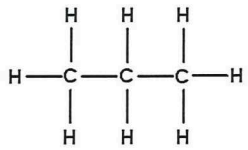
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(v)		any sensible media platform e.g. • TV • newspapers • websites • radio • posters • social media • teachers / schools			1	1		
				Question 6 total	**4**	**3**	**4**	**11**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	*(a)*			CH_3OH (1) accept CH_4O   (1) propanol / propan-1-ol (1) do **not** accept: propan-2-ol	3			3		
	(b)	(i)		$C_6H_{12}O_6 \xrightarrow{\text{yeast}} 2C_2H_5OH + \boxed{2}\ CO_2$ award (1) for formula award (1) for balancing **only** if formula is correct		2		2		2
		(ii)		it is not used up / it doesn't change (in the reaction)	1			1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			award (1) for any advantage and explanation • less carbon dioxide per 1 dm^3 burned - lower contribution to global warming • cleaner - less soot / less toxic fumes • renewable source - less reliant on fossil fuel / will never run out / obtained from crops annually accept other sensible answers award (1) for any disadvantage and explanation • sugar cane grown to make fuel - less food / more expensive food • land used to grow sugar cane - habitat destruction / deforestation • less energy released per 1dm^3 burned - more needed to do same mileage / more CO_2 released to get same energy accept other sensible answers award (1) for advantage and disadvantage with no explanation			2	2		
				Question 7 total	**4**	**2**	**2**	**8**	**0**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
10/3	*(a)*			C_nH_{2n+2}	1			1		
	(b)			CO_2 and H_2O **both** needed - either order	1			1		
	(c)				1			1		
	(d)			orange to colourless neutral answers - decolourises / orange to clear	1			1		1
				Question 10/3 total	**4**	**0**	**0**	**4**	**0**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			hundreds of years ☐ thousands of years ☐ millions of years ✓	1			1		
	(b)			fractional distillation ✓ filtration ☐ cracking ☐ polymerisation ☐	1			1		
	(c)	(i)		petrol			1	1		
		(ii)		diesel (oil)			1	1		
		(iii)		naphtha			1	1		
		(iv)		petrol (1) forms no smoke (1)	1		1	2		
				Question 2 total	**3**	**0**	**4**	**7**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			 (1) C_4H_{10} (1)	2			2		
	(b)			**C** accept correct structure drawn	1			1		
	(c)			bromine (water)	1			1		1
	(d)	(i)		ethanol	1			1		
		(ii)		46 (2) if incorrect award (1) for any clear indication of correct number of atoms of each element e.g. (2 × C) + (6 × H) + (1 × O) or 2(12) + 5(1) + 16 + 1		2		2	2	
				Question 3 total	**5**	**2**	**0**	**7**	**2**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		heat accept ignition	1			1		
		(ii)		oxygen accept air	1			1		
				fuel	1			1		
	(b)			4		1		1	1	
	(c)	(i)		37		1		1	1	1
		(ii)		Which alcohol gives out the most heat energy? ✓ Which gases are produced when alcohols burn? Which alcohol has the lowest boiling point? Which alcohol burns for the longest?			1	1		1
	(d)			32 (2) if answer incorrect award (1) for any clear indication of the correct number of all atoms e.g. • 12 + 4 + 16 • C + 4H + O no ecf possible		2		2	2	
				Question 2 total	**3**	**4**	**1**	**8**	**4**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8/2	(a)	(i)		**X** boiling / evaporation **Y** condensing / condensation **both** needed neutral answers – liquid to gas / gas to liquid	1			1		1
		(ii)		award (2) for statement linking boiling point and chain length e.g. the longer the chain length, the higher the boiling point award (1) for either of following different boiling points different chain lengths chain lengths and size of molecules are equivalent	2			2		
		(iii)		award (3) for 8300 award (2) for 8274 - answer not to two sig figs if answer incorrect award (1) for temperature rise of 19.7 ecf possible from incorrect temperature rise		3		3	3	3
	(b)	(i)		C_6H_{12} accept $2C_3H_6$		1		1		
		(ii)		award (1) for any two conditions • high temperature / heat • catalyst • high pressure accept 'high temperature and pressure'	1			1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		award (1) for any of following • has double bond between two carbon atoms • has C=C bond • has carbon atoms which could bond with more hydrogen / more atoms • could undergo an addition reaction neutral answer – not completely surrounded by hydrogen atoms	1			1		
		(iv)		C_8H_{18} (one of the compounds) present in petrol / good fuel (1) neutral answer – used in cars C_2H_4 used to make plastics / polymers / polythene / ethanol (1) neutral answer – fuel	2			2		
				Question 8/2 total	**7**	**4**	**0**	**11**	**3**	**4**