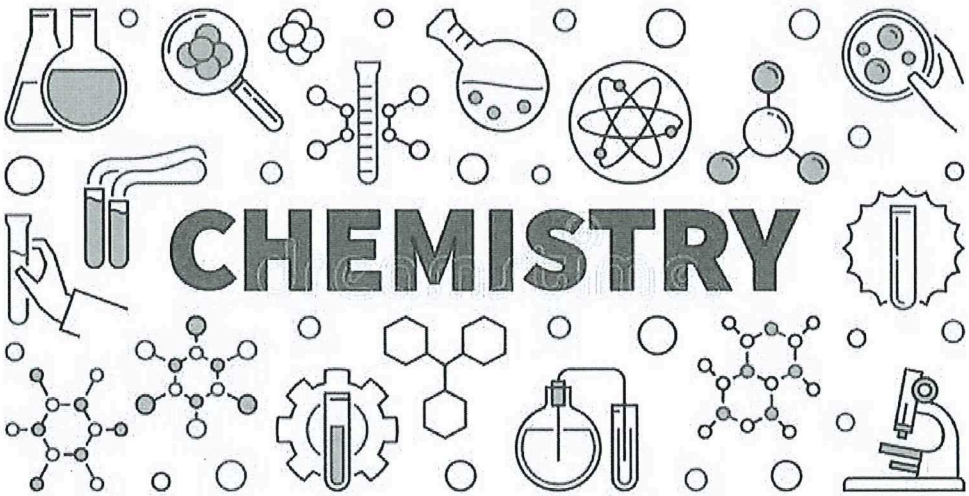


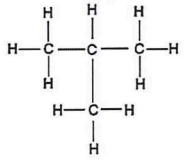
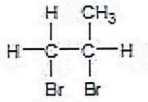
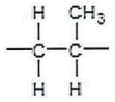
WJEC Chemistry 2

Option – Higher Tier

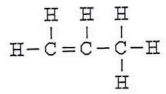
2.5 Mark Scheme

Higher Tier only questions

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		up to C_{13}-C_{16} demand is greater than supply (1) from C_{17}-C_{20} upwards supply is greater than demand (1) award (1) for 'at first demand is greater than supply then supply becomes greater than demand'			2	2		
		(ii)	I	$C_4 H_{10}$		1		1		
			II	butane	1			1		
			III	any of following • used to make polythene • used to make polymers • used to make other monomers • used to make plastics • used to make ethanol	1			1		
		(iii)		$C_3H_8 + \mathbf{5}\ O_2 \rightarrow \mathbf{3}\ CO_2 + \mathbf{4}\ H_2O$		1		1	1	
	(b)	(i)		shale gas and contaminated water ✓			1	1		
		(ii)		fracking produces vast quantities of contaminated water ✓			1	1		
				Question 3 total	**2**	**2**	**4**	**8**	**1**	**0**

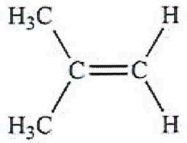
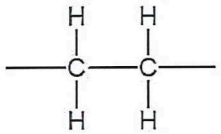
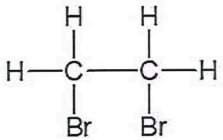
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			C_nH_{2n+2}	1			1		
	(b)			 (1) award (1) for any of following 2-methylpropane methylpropane	2			2		
	(c)			**A**  (1) **B**  (1) ignore brackets and/or 'n'	2			2		
	(d)			(add acidified potassium) dichromate(VI) solution (1) orange to green (1)	2			2		2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(e)			ethanol **A** (1) ethanoic acid **C** (1)			2	2		
				Question 7 total	**7**	**0**	**2**	**9**	**0**	**2**

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
5	(a)	(i)		award (1) for each correct answer **A** fermentation **B** filtration **C** (fractional) distillation	3			3		3
		(ii)	I	add bromine water ☐ add acidified potassium dichromate solution ✓ add silver nitrate solution ☐ add barium chloride solution ☐	1			1		1
			II	orange to colourless ☐ orange to green ✓ green to orange ☐ colourless to green ☐	1			1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		**A**			1	1		
		(ii)		**F**			1	1		
	(c)	(i)		award (1) for any sensible answer e.g. liver disease cancer of mouth / throat / oesophagus high blood pressure brain damage ulcers breast cancer obesity heart disease depression accept damage ≡ disease neutral answer - cancer do not accept skin cancer / lung cancer / prostate cancer	1			1		
		(ii)		award (1) for any sensible answer e.g. impaired judgement unconsciousness / blackouts fights / domestic violence car accidents / alcohol poisoning vomiting	1			1		
				Question 5 total	**7**	**0**	**2**	**9**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		cracking	1			1		
		(ii)		C_6H_{14}		1		1		
	(b)			award (1) for any correct structure e.g. 		1		1		
	(c)	(i)		 ignore brackets / number of units	1			1		
		(ii)	I			1		1		
			II	1,2-dibromoethene ☐ 1,1-dibromoethane ☐ 1,2-dibromoethane ✓ 1,1-dibromoethene ☐		1		1		

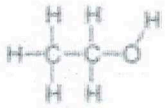
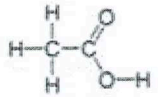
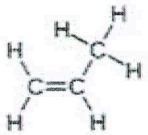
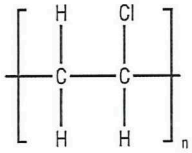
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)		award (1) for method incineration / burning award (1) for any associated problem toxic fumes acid rain climate change / global warming / formation of carbon dioxide neutral answers - air pollution	2			2		
		(ii)		crude oil / petroleum (1) award (1) for any of following non-renewable resource finite resource used to make other important products neutral answer - conserves crude oil	2			2		
				Question 6 total	**6**	**4**	**0**	**10**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			It is cheaper than the traditional method ☐ It uses less energy ✓ It reduces carbon dioxide emissions ✓ It uses gold nano-particles ☐ It uses more fuel ☐			2	2		
	(b)			$2CH_4$ + O_2 → 2 CH_3OH award (1) for reactant and product award (1) for balancing - can only be awarded if reactant and product are correct			2	2		
	(c)			The melting points of gold nano-particles and bulk gold are the same ☐ Gold nano-particles have a fixed melting point value ☐ Smaller gold nano-particles have higher melting points than larger gold nano-particles ☐ The melting point of gold nano-particles depends on their size ✓			1	1		
				Question 7 total	**0**	**0**	**5**	**5**	**0**	**0**

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**

HIGHER TIER ONLY QUESTIONS

<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>3</td><td>(a)</td><td>(i)</td><td></td><td>
<table>
<tr><th>Name</th><th>Molecular formula</th><th>Structure</th><th>Homologous series</th></tr>
<tr><td>ethanol</td><td>C_2H_5OH</td><td>  </td><td>alcohols</td></tr>
<tr><td>ethanoic acid</td><td>CH_3COOH</td><td>  </td><td>carboxylic acids</td></tr>
<tr><td>propene</td><td>C_3H_6</td><td>  </td><td>alkenes</td></tr>
</table>
award (1) for each correct answer</td><td>3</td><td></td><td></td><td>3</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>C_7H_{14}</td><td></td><td>1</td><td></td><td>1</td><td>1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td></td><td>  repeat unit (1)
n and side bonds (and brackets) (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
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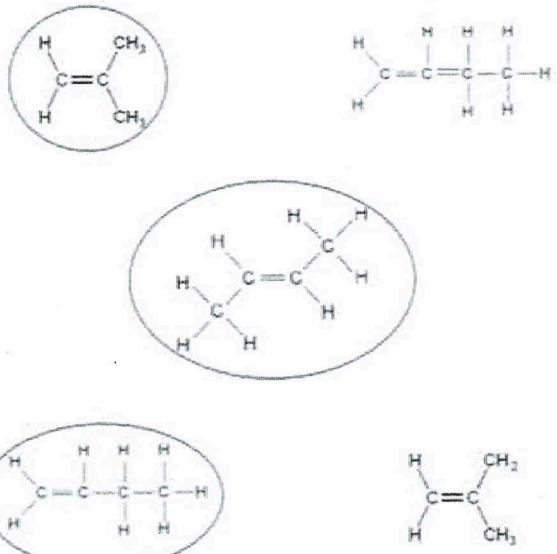
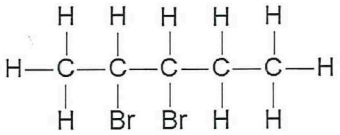
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			 all three correct (2) any two correct (1)	2			2		
	(d)					1		1		
				Question 3 total	**7**	**2**	**0**	**9**	**1**	**0**