

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	magnesium chloride hydrogen		1 1	AO2 4.4.2.1
01.2	hold a lit splint at the end of the rest tube of gas (squeaky) pop sound		1 1	AO1 4.8.2.1
01.3	bubble through limewater turns cloudy		1 1	AO1 4.8.2.3
01.4	chlorine		1	AO2 4.8.2.4
02.1	chemically pure substances contain a single element or compound, not mixed with any other substance  in everyday language, a pure substance can mean a substance that has had nothing added to it		1  1	
02.2	B D		1 1	AO2 4.8.1.1
02.3	mixture of different chemicals, each with a specific purpose that produces a useful product		1 1	AO2 4.8.1.2
03.1	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	one mark for identifying $\text{O}_2$ one mark for balancing	1 1	4.8.2.2
03.2	<b>Level 3:</b> All steps of the experiment are described correctly and in suitable detail. The writing is clear, coherent and logically organised.		5-6	AO1 4.8.1.3
	<b>Level 2:</b> Most steps of the experiment are described correctly, but the description may lack detail. The writing is mainly clear and coherent, but the order may not be logical.		3-4	

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	<p><b>Level 1:</b> Some steps of the experiment are described correctly, but the description lacks detail. The writing lacks clarity and coherence. The order is not logical.</p>		1-2	
	<p><b>No relevant content.</b></p>		0	
	<p><b>Indicative content:</b></p> <ul style="list-style-type: none"> <li>• draw a line 0.5 cm from the bottom of a piece of chromatography paper</li> <li>• in pencil</li> <li>• chromatography paper is stationary phase</li> <li>• use a capillary tube</li> <li>• grind up the leaves using pestle and mortar</li> <li>• transfer small spot of the ground leaves to the pencil line</li> <li>• pour some solvent into a beaker</li> <li>• so that the level is below the pencil line</li> <li>• solvent is mobile phase</li> <li>• put chromatography paper into beaker</li> <li>• place a lid on the beaker</li> <li>• leave until solvent is 1 cm from the top of the paper</li> <li>• remove the chromatography paper from the beaker</li> <li>• mark and label the positions of the solvent front and spots on the paper</li> </ul>			
03.3	chromatogram showing four spots in a row (along a vertical line)		1	AO2 4.8.1.3

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03.4	$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$		1	AO1 4.8.1.3
03.5	xanthophyll		1	AO3 4.8.1.3
04.1	A: carbon dioxide B: oxygen C: hydrogen		1 1 1	AO2 4.8.2.1 4.8.2.2 4.8.2.3
04.2	damp litmus paper bleached		1 1	AO1 4.8.2.4
05.1	water		1	AO1 4.8.1.3
05.2	the ink spot is below the water the ink spot will mix with the water and not rise up the paper		1 1	AO3 4.8.1.3

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05.3	<b>two</b> from: <ul style="list-style-type: none"> <li>• A is a pure substance</li> <li>• B is a mixture of two substances</li> <li>• C is a mixture of three substances</li> <li>• A, B and C all include the same substance/the substance that has moved furthest up the paper</li> <li>• B contains two of the same substances as C</li> <li>• C contains one substance that is not present in any of the other substances</li> </ul>	one mark for each correct answer up to a maximum of two marks	2	AO3 4.8.1.3
05.4	$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$ $= 0.71$		1 1	AO2 4.8.1.3
05.5	bottom spot in C circles its lowest spot has moved the shortest distance		1 1	AO3 4.8.1.3
06.1	<ul style="list-style-type: none"> <li>• filter paper into funnel</li> <li>• funnel into a conical flask/beaker</li> <li>• pour reaction mixture into filter paper</li> <li>• solution will collect in the conical flask/beaker</li> <li>• magnesium will collect in the filter paper</li> <li>• wear safety glasses when working with acid</li> </ul>		1 1 1 1 1 1	AO1 AO3 4.1.1.2

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07.1	a mixture that has been designed as a useful product		1	AO1 4.8.1.2
07.2	$\frac{20}{20 + 70 + 110} \times 100\%$ or $\frac{20}{200} \times 100\%$ = 10%	award two marks if answer correct and no working shown	1 1	AO2 4.8.1.2
07.3	C <sub>7</sub> H <sub>16</sub>		1	AO2 4.7.1.1
07.4	ethanol is renewable/can be obtained sustainably		1	AO1 4.10.1.1
08.1	filtration		1	AO1 4.1.1.2
08.2	<b>Level 3:</b> A full description of the method provided, with at least two pieces of equipment named.		5-6	AO1 4.1.1.2
	<b>Level 2:</b> Basic method provided, identifying that the water needs to evaporate (either by heating or by being left). At least one piece of equipment identified.		3-4	
	<b>Level 1:</b> Method identifies idea that water needs to evaporate/be heated. No equipment named.		1-2	
	<b>No relevant content.</b>		0	

Question	Answers	Extra information	Mark	AO / Specification reference
	<b>Indicative content:</b> <ul style="list-style-type: none"> <li>• mixture placed in evaporating dish</li> <li>• evaporating dish placed on beaker with water</li> <li>• place beaker/evaporating dish on tripod and gauze</li> <li>• heat the mixture/water</li> <li>• using Bunsen burner</li> <li>• until crystals start to form</li> <li>• remove mixture from the heat</li> <li>• leave for the rest of the water to evaporate</li> </ul>			
08.3	chromatography		1	AO1 4.1.1.2
09.1	A		1	AO2 4.1.1.2
09.2	dyes B and C produced spots that overlap with dye A and each other therefore, cannot distinguish whether dye B or C produces the top spot		1 1	AO3 4.1.1.2
09.3	rerun experiment with different mobile phase/solvent		1	AO3 4.1.1.2
10.1	$C_{19}H_{40} \rightarrow C_8H_{20} + C_5H_{10} + C_6H_{10}$		1	AO1 4.7.1.4
10.2	alkane		1	AO1 4.7.1.1

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10.3	$C_8H_{20}$		1	AO1 4.7.1.1
10.4	$C_6H_{10}$		1	AO1 4.7.2.1
10.5	extra carbon atom added two C=C double bonds included hydrogens added so that all carbon atoms only have 4 bonds	position of double bonds does not matter	1 1 1	
10.6	high temperature and catalyst		1	4.7.1.4
11.1	propene		1	AO2 4.7.2.1
11.2	alcohols		1	AO2 4.7.2.3
11.3	mass of 1 mole of C = $(3 \times 12) + (6 \times 1) + (16 \times 2) = 74$ g $number\ of\ moles\ of\ water = \frac{mass}{mass\ of\ 1\ mole}$ $= \frac{10.0}{74} = 0.14$		1 1 1	AO2 4.3.2.1
11.4	<b>Level 3:</b> The comparisons are detailed and accurate. The writing is clear, coherent and logical and comparisons are clearly made.		5-6	AO1 4.7.2.3
	<b>Level 2:</b> The comparisons are generally correct, although may lack detail. The writing is mainly clear, although the structure may lack logic and comparisons are not always clear.		3-4	4.7.2.4

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	<b>Level 1:</b> Some comparisons are correct. The writing lacks clarity, coherence and logic, and the comparisons are not clearly expressed.		1-2	
	<b>No relevant content.</b>		0	
	<b>Indicative content:</b> <ul style="list-style-type: none"> <li>• both burn to make carbon dioxide and water</li> <li>• on burning, both release energy / transfer energy to the surroundings</li> <li>• C bubbles with carbonates to make carbon dioxide, D does not</li> <li>• C reacts with alcohols to make esters, but D reacts with carboxylic acids to make esters</li> <li>• both dissolve in water</li> <li>• D is oxidised by oxidising agents (such as potassium dichromate(VI)) but C is not oxidised <b>or</b> C is acidic and D is neutral</li> </ul>			