

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 test 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 O_2 one mark for balancing	1 1	4.8.2.2
03.2	Level 3: 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
	Level 2: 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	

Question	Answers	Extra information	Mark	AO / Specification reference
	Level 1: Some steps of the experiment are described correctly, but the description lacks detail. The writing lacks clarity and coherence. The order is not logical.		1-2	
	No relevant content.		0	
	Indicative content: - draw a line 0.5 cm from the bottom of a piece of chromatography paper - in pencil - chromatography paper is stationary phase - use a capillary tube - grind up the leaves using pestle and mortar - transfer small spot of the ground leaves to the pencil line - pour some solvent into a beaker - so that the level is below the pencil line - solvent is mobile phase - put chromatography paper into beaker - place a lid on the beaker - leave until solvent is 1 cm from the top of the paper - remove the chromatography paper from the beaker - mark and label the positions of the solvent front and spots on the paper			
03.3	chromatogram showing four spots in a row (along a vertical line)		1	AO2 4.8.1.3

Question	Answers	Extra information	Mark	AO / Specification reference
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

Question	Answers	Extra information	Mark	AO / Specification reference
05.3	two from: - A is a pure substance - B is a mixture of two substances - C is a mixture of three substances - A, B and C all include the same substance/the substance that has moved furthest up the paper - B contains two of the same substances as C - C contains one substance that is not present in any of the other substances	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	- filter paper into funnel - funnel into a conical flask/beaker - pour reaction mixture into filter paper - solution will collect in the conical flask/beaker - magnesium will collect in the filter paper - wear safety glasses when working with acid		1 1 1 1 1 1	AO1 AO3 4.1.1.2

Question	Answers	Extra information	Mark	AO / Specification reference
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 ₇ H ₁₆		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	Level 3: A full description of the method provided, with at least two pieces of equipment named.		5-6	AO1 4.1.1.2
	Level 2: 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	
	Level 1: Method identifies idea that water needs to evaporate/be heated. No equipment named.		1-2	
	No relevant content.		0	

Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content: • mixture placed in evaporating dish • evaporating dish placed on beaker with water • place beaker/evaporating dish on tripod and gauze • heat the mixture/water • using Bunsen burner • until crystals start to form • remove mixture from the heat • leave for the rest of the water to evaporate			
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	$\text{C}_{19}\text{H}_{40} \rightarrow \text{C}_8\text{H}_{20} + \text{C}_5\text{H}_{10} + \text{C}_6\text{H}_{10}$		1	AO1 4.7.1.4
10.2	alkane		1	AO1 4.7.1.1

Question	Answers	Extra information	Mark	AO / Specification reference
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	mass of 1 mole of C = $(3 \times 12) + (6 \times 1) + (16 \times 2) = 74$ g $\text{number of moles of water} = \frac{\text{mass}}{\text{mass of 1 mole}}$ $= \frac{10.0}{74} = 0.14$		1 1 1	AO2 4.3.2.1