

AQA

GCSE

Chemistry

SET B – Foundation Tier

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Answers

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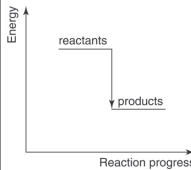
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Paper 1

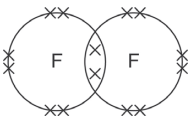
Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
01.1	Two elements in the same period = C and W An element with a full outer shell = Z or W A transition metal = C An element with only six protons = D		1 1 1 1	AO1 4.1.1.4 4.1.2.1 4.1.2.4 4.1.3.2
01.2	2,5		1	AO1 4.1.1.7
01.3	7		1	AO2 4.1.1.5
01.4	Same number of protons and electrons Protons are positive and electrons are negative (Opposite) Charges cancel each other out		1 1 1	AO2 4.1.1.4
01.5	element — a substance that is made from only one type of atom compound — where two or more substances have chemically combined mixture — where two or more substances are together but can be separated all have to be correct for one mark		1	AO1 4.1.1.1 4.1.1.2
02.1	hydrogen		1	AO1 4.1.1.1
02.2	OH ⁻	allow hydroxide	1	AO2 4.4.2.4
02.3	any two from potassium... ...produces a lilac flame, sodium produces an orange flame ...fizzes / bubbles more...moves quicker across the surface ...melts / reacts faster	allow converse for each response	2	AO2 4.1.2.5

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
02.4	any three from: <ul style="list-style-type: none"> increasing size of atom / number of shells / atomic radius / more shells increased shielding outer electron / shell further from nucleus (must be talking about outer electrons)* so less attraction for outer electron / shell therefore outer electron lost more easily <p>*It must be stated that we are talking about outer electrons here at some point during the response. However, there is no need for it to be repeated. If not then any marking point regarding electron should not be given.</p>	allow converse arguments	3	AO2 4.1.2.5
02.5	in the centre / middle	accept d-block accept another correct description of transition block location	1	AO1 4.1.3
02.6	They are less reactive than Group 1 metals. They have higher melting points than Group 1 metals.		1 1	AO1 4.1.3.1
03.1	independent variable — type of metal dependent variable — number of bubbles control variable — concentration of acid used	all three correct for two marks, one or two correct for one mark	2	AO1 4.4.2.1
03.2	gas syringe (allow 'syringe')		1	AO1 4.6.1.2
03.3	points correctly plotted curve of best fit used to join points	line must not include anomalous point	1 1	AO2 AO3 4.6.1.2

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
03.4	30 (seconds) the result doesn't follow the pattern / the result is less than 20 seconds		1 1	AO3 4.6.1.2
03.5	Any two from: volume of hydrogen released was quick at first then slowed down over time. reaction stopped at 50 seconds		2	AO3 4.6.1.2
03.6	$23 \div 60$ = 0.4 (to 1 d.p.)		1 1	AO2 4.6.1.1
04.1	Covalent		1	AO1 4.2.1.4
04.2	This substance is a giant covalent structure. — D This substance is a compound. — A This substance is a solid. — C This substance is evaporating. — E This substance is a gas. — B	5 correct = 4 marks 4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark 0 / 1 correct = 0 marks	4	AO2 4.2.2.1 4.2.1.3 4.2.3.2
04.3	Comparison (not just a description) of the features of the two models required: Plum pudding has electrons scattered or in random positions / nuclear model has electrons in shells/outside the nucleus. Plum pudding has no nucleus / nuclear model has a nucleus. Plum pudding has no neutrons / nuclear model has neutrons in nucleus. Plum pudding has a spread out positive charge/nuclear model has protons in a nucleus.		4	AO3 4.1.1.3
05.1	calcium chloride = (+)9 °C potassium chloride = -6 °C		1 1	AO3 4.5.1.1
05.2		correct profile (reactants on LHS, products on RHS, and reactants higher than products) correct labels for reactants and products	1 1	AO3 4.5.1.1
05.3	potassium chloride		1	AO2 4.5.1.1
05.4	exothermic		1	AO1 4.5.1.1
05.5	111		1	AO2 4.3.1.2

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
06.1	(in order): soft, distorted, harder		3	AO1 4.2.2.7
06.2	Diagram should show two electrons in the first shell, eight in the second and two in the third.	All shells must have the correct number of electrons for two marks; allow one mark for one error.	2	AO2 4.1.1.7
06.3	2 electrons in the outer shell, so Group 2 3 electron shells, so Period 3		1 1	AO1 4.1.1.7 4.1.2.1
06.4	good conductors of electricity — delocalised electrons to carry a charge often have a high melting points — strong electrostatic forces of attraction malleable — have layers which can slide over each other	3 correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks	2	AO1 4.2.1.5 4.2.2.7 4.2.2.8
06.5	Their diameter is between 1–100 nm	accept 'their diameter is less than 100 nm.'	1	AO1 4.2.4.1
06.6	1.65×10^{-1} nm	1 mark for 16.5×10^{-2} nm or 165×10^{-3} nm	2	AO2 4.2.4.1
07.1	10.50 cm ³		1	AO2 4.3.1.4
07.2	mass of solute = $\frac{45}{1000} \times 10.5$ = 0.47 g		1 1	AO2 4.3.2.5
07.3	50.25 cm ³	allow no units	1	AO2 4.3.1.4
07.4	sulfuric acid		1	AO1 4.4.2.2
07.5	neutralisation		1	AO1 4.4.2.4
07.6	Level 3 Response contains a description that allows a successful titration to be completed. Level 2 Response contains a reasonable description of an experimental method such as using the pipette/burette with given measurement, or the addition of the alkali to acid (or acid to alkali).		5–6 3–4	AO2 4.4.2.5

Question	Answer(s)	Extra info	Mark(s)	AO/SPEC ref.
	Level 1 Response only contains a weak description of how to use some of the equipment therefore having a weak method.		1–2	
	No indicative content		0	
	Indicative content <ul style="list-style-type: none"> • volume of acid measured using pipette acid in (conical) flask • putting indicator in acid / conical flask sodium hydroxide added to burette (below eye level) • placing a white tile under flask for colour change to be seen more easily • drop wise addition of alkali when near end point • swirling motion used throughout • colour change signifies end point • record the volume of sodium hydroxide added 			
08.1	carbon three		1 1	AO1 4.2.3.2 4.2.3.3
08.2	contains free / delocalised electrons... ...that can carry a charge (through the structure)		1 1	AO1 4.2.3.2 4.2.3.3
08.3	(lubricants) contain graphite atoms that form in layers... ...which can slide over each other		1 1	AO1 AO2 4.2.3.2
09.1	Molten magnesium chloride A solution of potassium iodide	both answers needed for one mark; more than two ticks negates mark	1	AO1 4.4.3.1 4.4.3.2 4.4.3.4
09.2	sodium hydroxide	accept NaOH	1	AO1 4.4.3.4
09.3	Hydrogen ions are positive and opposite charges attract.	hydrogen ions are positive / opposite charges attract alone is not enough for the mark	1	AO2 4.4.3.1
09.4	Sodium is more reactive than hydrogen. (Sodium reacts with water to make sodium hydroxide; hydrogen does not react with water.)	accept converse	1	AO2 4.4.1.2 4.4.3.1 4.4.3.4
09.5	Chloride ion loses 1 electron.		1	AO2 4.2.1.4

Question	Answer(s)	Extra info	Mark(s)	AO/SPEC ref.
09.6	$2\text{Na(s)} + \text{Cl}_2\text{(g)} \rightarrow 2\text{NaCl(s)}$	accept multiples (as long as remains balanced)	1	AO2 4.3.1.1
09.7	Halogens		1	AO1 4.1.2.6
09.8	brown	accept dark red	1	AO3 4.1.2.6
09.9	–30 to –60		1	AO3 4.1.2.6
09.10	Fluorine is more reactive than bromine.	accept converse	1	AO2 4.1.2.6 4.4.1.2
09.11	orange		1	AO3 4.1.2.6
10.1	 <p>both fluorines should have a further 6 electrons around its outer shell</p>	accept dots and / or crosses to represent electrons	1	AO2 4.1.1.7 4.2.1.4
10.2	BeF_2		1	AO2 4.2.1.2 4.2.1.3
10.3	beryllium atom loses 2 electrons... ...and becomes an ion with a charge of 2+ each fluorine atom gains 1 electron... ...resulting in 2 fluoride ions both with a charge of 1–		1 1 1 1	AO2 4.2.1.2 4.2.1.3
10.4	Level 3 There is a detailed response regarding the type of bonding and / or structure and melting / boiling point of beryllium fluoride and fluorine. Explanation of why fluorine is a gas at room temperature and beryllium fluoride is a solid.		5–6	AO2 4.2.1.2 4.2.1.3 4.2.1.4 4.2.2.3 4.2.2.4
	Level 2 There is a response regarding the type of bonding and / or structure and melting / boiling point of beryllium fluoride or fluorine.		3–4	
	Level 1 There is a simple comment / response regarding the type of bonding and / or structure or melting / boiling point of beryllium fluoride or fluorine.		1–2	
	No indicative content		0	

Question	Answer(s)	Extra info	Mark(s)	AO/Spec ref.
	Indicative content: Beryllium fluoride <ul style="list-style-type: none"> giant structure ionic bonds or electrostatic attraction strong bonds (in all directions) between oppositely charged ions solid at room temperature as large amounts of energy are needed to break bonds this means it has a high melting point Fluorine <ul style="list-style-type: none"> simple molecule / molecular structure covalent bonds between atoms weak intermolecular forces between molecules (no/weak attraction / bonds between molecules) forces are easily broken (by low levels of energy) low boiling point therefore a gas at room temperature 			

Paper 2

Question	Answer(s)	Mark(s)	AO/Spec ref.
01.1	To make food look more appealing	1	AO2 4.8.1.2
01.2	chromatography	1	AO1 4.8.1.3
01.3	any two from: start line should be drawn in pencil water level must be below start line/colouring dots start line should be drawn with a ruler	2	AO1 4.8.1.3
01.4	3	1	AO2 4.8.1.3
01.5	any two from: additive 1 has three dyes additive 2 has two dyes additive 1 has two different dyes additives 1 and 2 have one dye that is the same	allow additive 1 has more dyes than additive 2 allow dyes, pigments, spots or colours	2 AO3 4.8.1.3

Question	Answer(s)		Mark(s)	AO/Spec ref.
01.6	Distance travelled by dye spot = 34 mm Distance from start line to solvent front = 43 mm $34 \div 43 = 0.7907$ $= 0.791$	allow values 32–36	1	AO2 4.8.1.3
		allow values 41–45	1	
		allow ecf from table	1	
		0.791 with no working	1	
		should be awarded 5 marks	1	
02.1	Nitrogen		1	AO2 4.9.1.1
02.2	>1%		1	AO1 4.9.1.1
02.3	any two from: burn / use less fossil fuels increase renewable energy use switch off electrical appliances ensure we have double glazing have your thermostat set low use low energy / more efficient appliances / light bulbs (allow any other sensible suggestion to reduce carbon footprint)	accept any suitable answer but both answers must be different; for example: 'walk to school' and 'use car less' are the same, so only 1 mark	2	AO1 4.9.2.4
02.4	any three from: used for photosynthesis dissolves in oceans and seas locked up in limestone / carbonates locked up as a fossil fuel used by plants used to form shells		3	AO1 4.9.1.4
03.1	(it is a) reversible (reaction)		1	AO1 4.6.2.1
03.2	turns blue		1	AO2 4.6.2.2
03.3	exothermic		1	AO1 4.6.2.2
03.4	Green		1	AO1 4.8.3.1
03.5	Blue precipitate		1	AO1 4.8.3.2

Question	Answer(s)	Mark(s)	AO/SPEC ref.
03.6	Method: add barium chloride... ...in the presence of dilute HCl Result: White precipitate	1 1 1	AO1 4.8.3.5
03.7	a mixture of chemicals that has been designed for a specific product... ...so that each tablet provides the same amount of active ingredient / is safe to use / produces predictable effects	1 1	AO1 4.8.1.2
04.1	a single element or compound (not mixed with anything else)	1	AO1 4.8.1.1
04.2	84.85	1	AO2 4.10.3.2
04.3	alloys have distorted layers therefore the layers cannot slide as easily	1 1	AO1 4.2.2.7
04.4	low carbon steel — car body parts, lunchboxes gold alloy — jewellery high carbon steel — cutting tools stainless steel — cutlery	4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark 0/1 correct = 0 marks	AO2 4.10.3.2
04.5	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$	both numbers required	AO1 4.1.1.1
04.6	Temperature = 450 °C Pressure = 200 atmospheres	1 1	AO1 4.10.4.1
05.1	any four from: crude oil is heated most of the oil evaporates vapours / gases (cool and) condense at their own boiling point substances that don't evaporate are tapped off at the bottom substances that don't condense flow out of the top (must be in this order as question asks for steps in the process)	4	AO2 4.7.1.2
05.2	A	1	AO2 4.7.1.2

Question	Answer(s)	Mark(s)	AO/SPEC ref.
05.3	D	1	AO2 4.7.1.3
05.4	the longer the carbon chain length, the higher the boiling point of the fraction	1	AO1 4.7.1.3
05.5	each fraction is a mixture	1	AO2 4.8.1.1
05.6	<p>Level 3 Detailed response with statements regarding three types of pollution and their impact on the environment.</p> <p>Level 2 Response contains statements about two types of pollution and links to their impact on the environment.</p> <p>Level 1 Response is weak, with only a statement regarding a type of pollution or an impact of one type of pollution.</p> <p>No indicative content</p> <p>Indicative content</p> <ul style="list-style-type: none"> carbon monoxide: incomplete combustion / insufficient oxygen to react with fuel; carbon monoxide gas is formed which is toxic carbon dioxide: complete combustion; greenhouse gas linked with global rise in temperatures carbon particles: incomplete combustion / insufficient oxygen to react with fuel; can cause global dimming, global dimming makes the Earth darker. oxides of nitrogen: at high temperatures in car engine, oxygen and nitrogen in the air react causing acid rain; acid rain can damage statues / wildlife sulfur and oxygen react to form acid rain; acid rain can damage statues / wildlife 	5–6 3–4 1–2 0	AO1 4.9.2.1 4.9.3.1 4.9.3.2
06.1	any two from: volume of acid concentration of acid length / size of magnesium	2	AO2 4.6.1.2
06.2	use measuring apparatus with a higher resolution OR weigh the magnesium	1	AO3 4.6.1.2
06.3	ignore anomaly (70 s) calculate mean $(60 + 57 \div 2) = 58.5$	1 1	AO2 4.6.11

Question	Answer(s)	Mark(s)	AO/Spec ref.
06.4	all points plotted correctly line of best fit drawn correctly	one error for 1 mark no marks for more than one error	2 1
06.5	as temperature increases, so does the rate of reaction any two from: particles gain energy they move faster more frequent and successful collisions	1 mark for conclusion 2 marks for collision theory ignore 'particles move more' accept 'more chance of particle collision'	3
07.1	C ₃ H ₈	numbers cannot be more than halfway up the letter	1
07.2	propane		1
07.3	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{C} = \text{C} - \text{C} - \text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $		1
07.4	high temperature catalyst or steam		1 1
07.5	Test: bromine water Result: bromine water turns colourless		1 1
07.6	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{---} \text{C} \text{---} \text{C} \text{---} \\ \quad \\ \text{H} \quad \text{H} \end{array} $	1 mark for brackets 1 mark for single bond between carbon atoms 1 mark for <i>n</i> and bonds leaving the brackets	3
08.1	a resource which will run out	or words to that effect	1
08.2	Resource is recycled Resource is reused	each additional (wrong) tick negates 1 mark	1 1

Question	Answer(s)	Mark(s)	AO/Spec ref.
08.3	Level 3 An answer which contains some comparison of limestone and copper in the manufacture of statues. The answer should contain some consideration of extracting processes, availability of raw material, the energy required to produce 1 kg of the substance, whether it can be recycled, the substance's resistance to corrosion and the average cost. The answer should differentiate between quantifiable data and data requiring judgement. It should develop conclusions from the information given in the question.	5–6	AO3 4.10.2.1 4.10.2.2
	Level 2 An answer which contains some comparison of limestone and copper in the manufacture of statues. The answer should contain some consideration of extracting processes, availability of raw material, the energy required to produce 1 kg of the substance, whether it can be recycled, the substance's resistance to corrosion and the average cost, but may not be complete.	3–4	
	Level 1 An answer which contains some relevant points, but does not draw conclusions from the data given.	1–2	
	No relevant content	0	
	Indicative content <ul style="list-style-type: none"> Limestone only has two extracting processes. Copper has four extracting processes. Quarrying and mining can both create jobs and increase local economy. Quarrying and mining also have negative aspects. Lots of limestone available. Running out of copper quickly, (phytomining/ bioleaching). Limestone uses 1/10 of the energy compared to copper. Only small amounts of limestone can be recycled in the end. Lots of copper is recycled, so disposal will not waste resource. Limestone is prone to corrosion, especially from acid rain. Copper is very unreactive. Limestone is cheaper than copper. 		
09.1	screening	accept filtration	1
09.2	Using ultraviolet light		1

Question	Answer(s)	Mark(s)	AO/Spec ref.
09.3	Test: use damp blue litmus (or any other pH indicator) paper Result: it bleaches	1 1	AO2 4.8.2.4
09.4	<div> <div> Solution X = potassium carbonate Solution Y = iron(III) sulfate Metal ion in Z = aluminium </div> <div> 1 mark for potassium carbonate 1 mark for carbonate 1 mark for iron(III) 1 mark for sulfate </div> </div>	2 2 1	AO2 4.8.3.1 4.8.3.2 4.8.3.3 4.8.3.5
09.5	any one from: more rapid/quicker more accurate more sensitive	1	AO1 4.8.3.6
10.1	a compound made from hydrogen and carbon atoms... ...only	1 1	AO1 4.7.1.1
10.2	<div> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & \text{OH} & \text{H} & \text{H} \end{array}$ </div> <div> 1 mark for single C–C bond 1 mark for addition of OH and H across double bond </div>	2	AO2 4.7.2.1 4.7.2.2
10.3	–OH / hydroxyl	1	AO1 4.7.2.3
10.4	Reactant: oxygen or oxidising agent Type of reaction: oxidation	1 1	AO2 4.7.2.4