AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	hydrogen		1	AO2 4.4.3.4
01.2	$2Cl^-(aq) \rightarrow Cl_2(g) + 2e^-$	one mark for formulae and state symbols of reactants one mark for formulae and state symbols of reactants **or** one mark for correct formulae one mark for correct state symbols one mark for balancing	3	AO2 4.4.3.5
01.3	independent – concentration of sodium chloride solution dependent – current		1 1	AO2
01.4	distance between electrodes/size of electrodes/volume of solutions		1	AO3
01.5	points plotted at (0.2, 0.20) (0.4, 0.33) (0.6, 0.43) (0.8, 0.47) (1.0, 0.52)	one mark for plotting three points two marks for plotting all points one mark for line of best fit	3	AO2 AO3
01.6	as concentration increases, so does current as concentration increases, more ions present to carry the charge		1 1	AO3 – 2 4.4.3.1
02.1	cathode or negative		1	AO1 4.4.3.1
02.2	chlorine zinc		1	AO2 4.4.3.2

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02.3	in solid zinc chloride ions are not free to move so cannot conduct electricity and move to the electrodes		1 1 1	AO1 4.4.3.1
02.4	$ZnCl_2(l) \rightarrow Zn(s) + Cl_2(g)$		1	AO1 4.4.3.1
03.1	too reactive to extract by reduction (with carbon)/reacts with carbon		1	AO1 4.4.3.3
03.2	cathode or negative		1	AO1 4.4.3.2
03.3	lots of energy needed to melt potassium sulfate		1	AO3 4.4.3.3
03.4	cathode: $2H^+(aq) + 2e^- \rightarrow H_2(g)$ anode: $4OH^-(aq) \rightarrow O_2(g) + 2H_2O(l) + 4e^-$		3 3	AO2 4.4.3.3
03.5	potassium metal is not produced in the electrolysis of potassium solution or potassium would react with the water or is too reactive		1	AO3 4.4.3.3
04.1	aluminium is above carbon in the reactivity series		1	AO1 4.4.3.3
04.2	carbon/graphite		1	AO1 4.4.3.3
04.3	carbon reacts with oxygen produced at the anode, forming carbon dioxide, which burns away the anode		1	AO1 4.4.3.3

Question	Answers	Extra information	Mark	AO / Specification reference
04.4	(liquid) aluminium oxide cryolite	accept bauxite	1 1	AO1 4.4.3.3
04.5	$Al^{3+}(aq) + 3e^- \rightarrow Al(l)$	one mark for formulae and state symbols of reactants one mark for formulae and state symbols of reactants **or** one mark for correct formulae one mark for correct state symbols one mark for balancing	3	AO2 4.4.3.5
04.6	large amounts of energy are required for the electrolysis/to keep the aluminium liquid		1	AO1 4.4.3.3
05.1	unreactive/does not react conductor that carries an electric current into a liquid or solution		1 1	AO1 4.4.3.1
05.2	$PbBr_2$		1	AO2 4.2.1.2 (implied)
05.3	**Level 3:** The description, explanation and names of the products are correct. The account is clearly written and well-structured.		5-6	AO1 4.4.3.1 4.4.3.5
	Level 2: The description, explanation and names of the products are mainly correct, although there might be one or two errors. The account is written fairly clearly, but is somewhat disorganised.		3-4	

Question	Answers	Extra information	Mark	AO / Specification reference
	Level 1: The description, explanation and names of products are partly correct, but there are several errors and the account lacks detail. The account is not written clearly, and consists of isolated facts rather than one flowing piece of work.		1-2	
	No relevant comment.		0	
	Indicative content: • the current causes the ions to move to the electrodes • positive lead ions move to the negative electrode / cathode • negative bromide ions move to the positive electrode / anode • at the positive electrode, positive lead ions gain electrons, so lead atoms are formed • at the negative electrode, negative bromide ions lose electrons, so bromine is formed • cathode: $Pb^{2+} + 2e^- \rightarrow Pb$ • anode: $2Br^- \rightarrow 2e^- + Br_2$			
06.1	row one: does not conduct because ions not free to move row two: positive sodium ions move to the negative electrode, where they pick up electrons to make sodium metal negative chloride ions move to the positive electrode, where they donate electrons to make chlorine gas		1 1 1	AO2 4.2.2.3
06.2	$2H^+(aq) + 2e^- \rightarrow H_2(g)$			
06.3	**Level 3:** The explanation is correct. The account is clearly written and well-structured.		5-6	AO2

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Question	Answers	Extra information	Mark	AO / Specification reference
	Level 2: The explanation is mainly correct. The account is written fairly clearly, but is somewhat disorganised.		3-4	AO3 4.4.3.4
	Level 1: The explanation is partly correct, but there are several errors and the account lacks detail and clarity.		1-2	
	No relevant content.		0	
	Indicative content: • in the solution, water molecules break down, producing hydrogen ions and hydroxide ions • sodium and chloride ions are also present in the solution • the current causes the ions to move to the electrodes • positive sodium and hydrogen ions move to the negative electrode/cathode • negative chloride and hydroxide ions move to the positive electrode/anode • at the positive electrode, positive hydrogen ions gain electrons, so hydrogen is formed • hydrogen gas makes a lit splint give a squeaky pop • at the negative electrode, hydroxide ions react to make oxygen gas. • oxygen gas relights a glowing splint • both chlorine and oxygen are formed because of the relatively low concentration of chloride ions in the dilute solution • also, at the negative electrode, chloride ions react to make chlorine gas, which has a characteristic smell			

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Question	Answers	Extra information	Mark	AO / Specification reference
07.1	too reactive/reacts with carbon or more reactive than carbon		1	AO1 4.4.3.3
07.2	carbon or graphite		1	AO1 4.4.3.3
07.3	aluminium oxide must be molten for electrolysis to take place cryolite reduced the melting point of the mixture therefore, reducing the cost of the electrolysis		1 1 1	AO1 AO2 4.4.3.3
07.4	aluminium ions have a positive charge so they are attracted to the negatively charged cathode		1 1	AO1 4.4.3.3
07.5	because of the high temperatures involved oxygen reacts with the carbon to form carbon dioxide		1 1	AO1 4.4.3.3
08.1	copper		1	AO2 4.4.3.4
08.2	hydrogen		1	AO2 4.4.3.4
08.3	placing lit splint into collected gas gives a squeaky pop		2	AO1
08.4	brown liquid resulting from the formation of bromine from bromide ions $2Br^-(aq) \rightarrow Br_2(aq) + 2e^-$ bubbles (of colour) gas resulting from the formation of oxygen $4OH^-(aq) \rightarrow O_2(g) + 2H_2O(l) + 4e^-$		1 3 1 3	AO2 AO3 4.4.3.4 4.4.3.5

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08.5	**two** from: • smaller quantity of solution required (so cheaper/less waste to dispose of) • easier to make observations at electrodes • bromine is toxic/harmful so safer to generate small amounts	one mark for each correct answer up to a maximum of two marks	2	AO3
09.1	labelled chromatogram two spots drawn at different heights		1 1	AO2 4.1.1.2
09.2	D		1	AO2 4.1.1.2
09.3	water will release vapours before its boiling point or boiling points of water and this substance are quite similar in fractional distillation, these vapours will condense on the glass beads and drop back into the mixture whereas the substance vapours will only evaporate in the condenser swill collect in a separate vessel		1 1 1 1 1	AO1 4.1.1.2