AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	increases reaction rate by providing a pathway with a lower activation energy		1	AO1 4.6.1.4
01.2	B		1	AO1 4.6.1.4
01.3	$2H_2O_2 \rightarrow 2H_2O(l) + O_2$	one mark for balancing one mark for state symbol	2	AO1 4.2.2.2 4.3.1.1
01.4	it is not used up/it is a catalyst/regenerated at the end		1	AO2 4.6.1.4
02.1	points plotted (0, 0) (30, 22) (60, 38) (90, 52) (120, 58) (150, 61) (150, 61)	one mark for half points plotted correctly two marks for all points plotted correctly	2	AO2 4.6.1.1
02.2	line of best fit drawn correctly	must be a curve	1	AO3 4.6.1.1
02.3	rate = gradient of graph at 100 s $= \frac{18}{80} = 0.23\ (cm^3/s)$	one mark for correctly drawn tangent one mark for correct calculation one mark for correct answer (allow ± 0.1) one mark for correct number of significant figures	4	AO2 4.6.1.1
02.4	concentration of acid is less at 100 seconds		1	AO3 4.6.1.1

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03.1	start the timer and add the acid at the same time		1	AO3 4.6.1.2
03.2	the temperature will be the actual temperature at which the reaction occurs		1	AO3 4.6.1.2
03.3	judging exactly when the cross disappears varies slightly from person to person		1	AO3 4.6.1.2
03.4	45 °C		1	AO2 4.6.1.2
03.5	as temperature increases, rate also increases		1	AO1 4.6.1.2
03.6	increasing the temperature increases the frequency of collisions/more particles have the activation energy increasing the temperature makes the collisions more energetic		1 1	AO1 4.6.1.3
04.1	one of the products (carbon dioxide) is a gas which escapes from the flask		1	AO1 4.3.1.3
04.2	do not remove the paper because doing this makes the mass lower than it would be as a result of loss of carbon dioxide gas alone		1 1	AO3 4.6.1.2
04.3	the smaller the calcium carbonate pieces, the faster the reaction powder has higher surface area to volume ratio so collisions are more frequent		1 1 1	AO1 AO2 4.6.1.2 4.6.1.3

Question	Answers	Extra information	Mark	AO / Specification reference
05.1	hydrogen		1	AO1 4.4.2.1
05.2	decreasing the acid concentration		1	AO1 4.6.1.2
05.3	rate decreases		1	AO1 4.6.1.2
06.1	$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$	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
06.2	**Level 3:** The variables are correctly identified and the account is clearly written and well-structured.		5-6	AO1 × 2 AO2 × 2 AO3 × 2 4.6.1.1 4.6.1.2
	Level 2: The variables are mainly correct, although there might be one or two errors. The account is written fairly clearly, and may be somewhat disorganised.		3-4	
	Level 1: One or two of the variables are correctly identified. The account is not written clearly, and consists of isolated points rather than one coherent piece of work.		1-2	
	No relevant comment.		0	

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	Indicative content:
	• temperature increased **or** size of pieces decreased **or** acid concentration increased **or** surface area of magnesium increased
	  ○ because in P, more gas is produced in a given time at first (than Q)
	• kept constant: correct two from: acid concentration, size of magnesium pieces, acid concentration
	  ○ because these are the control variables
	• kept constant: mass and volume of both substances/amount of limiting reactant
	  ○ because total volume of hydrogen gas produced is the same			

07.1	move delivery tube so that its end is not in the acid to avoid acid going up the delivery tube	allow other suitable reason	1 1	AO3 4.6.1.2
07.2	$\frac{91}{5} = 18.2$ = 18 cm^3/min		1 1 1	AO2 4.6.1.1
07.3	increase powder has bigger surface area		1 1	AO3 4.6.1.4
08.1	**Level 3:** The method is clear and variables are correctly explained.		5-6	AO1 4.6.1.2
	Level 2: The method is clear but variables are absent or incorrect **or** the method is attempted but not clear and some variables correctly provided		3-4	

Question	Answers	Extra information	Mark	AO / Specification reference
	Level 1: Either an unclear method (perhaps with some steps missing) or a few variables correctly identified.		1-2	
	No relevant content.		0	
	Indicative content: • in the solution, water molecules break down, producing hydrogen ions • put nitric acid into conical flask • prepare a bung with gas syringe attached • add sodium carbonate • put bung in as soon as sodium carbonate is added • measure time taken to produce a set volume of carbon dioxide/measure the volume of carbon dioxide produced in set time • repeat with different concentrations of nitric acid <u>control variables:</u> • same mass of sodium carbonate used • same surface area sodium carbonate/always use solid pieces or powder • same volume of nitric acid used • independent variable: concentration of nitric acid • dependent variable: rate or volume of CO_2	accept an upside-down measuring cylinder as an appropriate method accept a method that involves measuring the change in mass of sodium carbonate.		
08.2	as the concentration of nitric acid increases, the rate of reaction increases the higher the concentration the more acid particles are available so frequency of successful collisions will increase		1 1 1	AO1 AO3 4.6.1.2

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Question	Answers	Extra information	Mark	AO / Specification reference
08.3	cm^3/s		1	AO2 4.6.1.1
08.4	$\frac{500}{42} = 11.904$ $= 11.9$		1 1	AO2 4.6.1.1
08.5	catalyst/temperature		1	AO1 4.6.1.2
09.1	increases the number of hydrochloric acid particles so frequency of collision increased		1 1	AO1 4.6.1.3
09.2	particles move faster so increases the frequency of collisions increases the energy of the particles so more particles have energy greater than the activation energy so more collisions are successful		1 1 1 1	AO2 4.6.1.2
09.3	time on x-axis, turbidity on y-axis curve starts high and decreases higher temperature has steeper curve both curves finish at the same point		1 1 1 1	AO2 4.6.1.2