AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	92 kJ		1	AO2 4.6.2.2
01.2	if a system is an equilibrium and a change is made to any of the conditions, the system responds to counter the change		1	AO2 4.6.2.4
01.3	it shifts to the right		1	AO2 4.6.2.7
02.1	2 O atoms are drawn with 1 shell each 1 O atom has 6 dots and 2 crosses, the other 6 crosses and 2 dots O atoms share 2 dots and 2 crosses		2	AO2 4.2.1.4
02.2	a reaction that transfers energy to the surroundings		1	AO1 4.5.1.1
02.3	more SO_3 is added – shifts to the left pressure is increased – shifts to the right temperature is increased – shifts to the left more O_2 is added – shifts to the right		1 1 1 1	AO2 4.6.2.5 4.6.2.6 4.6.2.7
03.1	methanol gas is the product in unsealed container, product would escape (into surroundings) therefore, forward reaction would continue (to produce methanol) or continue to completion		1 1 1	AO1 4.6.2.3
03.2	**Level 3:** Three conditions identified with matching description of how the change will affect the position of the equilibrium. Full explanation of why change occurs provided.		5-6	AO1 4.6.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
	Level 2: At least two conditions identified with a matching description of how the change will affect the position of the equilibrium. Attempt at explanations given, with some accurate points given.		3-4	4.6.2.5 4.6.2.6 4.6.2.7
	Level 1: At least one condition identified, thought description of how the change will affect position not given, incorrect, or incomplete. No attempt at explanation provided.		1-2	
	No relevant comment.		0	
	Indicative content: <u>increasing (total) pressure</u> • shifts equilibrium to the right/results in a greater relative amount of product • because there is a smaller number of molecules on this side of the equation <u>decreasing temperature</u> • shifts the equilibrium to the right / results in a greater relative amount of product • because the reaction is exothermic in the reaction shown <u>increase the amount/concentration of reactant</u> • the equilibrium shifts to the right / results in a greater relative amount of product until equilibrium is established again • because there is a smaller number of molecules shown in the equation on the left and the concentrations of all substances will change until equilibrium is reached again			

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03.3	mass of one mole of CO = 12 + 16 = 28 g 10 g of CO is $\frac{10}{28}$ = 0.3571 mol from the equation, 0.3571 mole of CO makes 0.3571 mole of methanol mass of one mole of methanol = 12 + 16 + (4 × 1) = 32 g mass of 0.3571 mol of methanol = 0.3571 × 32 = 11.4 g		1 1 1 1 1 1	AO2 4.3.2.1 4.3.2.2
04.1	reversible		1	AO1 4.6.2.1
04.2	H_2 and I_2 react together to make HI at the same rate that HI reacts to form H_2 and I_2		1	AO2 4.6.2.3
04.3	when H_2 and I_2 react together to make HI energy is transferred from the surroundings/the system takes in energy from the surroundings		1 1	AO1 4.5.1.1 4.6.2.1
05.1	reactants and products can escape from the apparatus		1	AO2 4.6.2.3
05.2	Bunsen burner		1	AO1
05.3	steam/water/water vapour		1	AO2 4.6.2.2
05.4	attach bung and delivery tube to test tube feed delivery tube into beaker in ice water		1 1 1	AO3

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06.1	place it in a bigger water bath/ensure that the level of the solution is below the level of the water or stir it		1	AO3
06.2	heating the mixture shifts the equilibrium towards the blue cobalt ion solution/right hand side/product solution		1 1	AO3 4.6.2.6
06.3	pink to blue		1	AO3 4.6.2.5
06.4	concentration of chloride ions is increased so a change occurs to counteract the change and the equilibrium shifts to the right/relative amount of product increases		1 1 1	AO2 4.6.2.5
07.1	increases the pressure so more of the colourless N_2O_4 is formed because the system is responding to counteract the change by shifting the position of the equilibrium to the side with the smaller number of molecules		1 1 1 1	AO3 4.6.2.4 4.6.2.7
07.2	the temperature of the mixture is decreased so the relative amount of product at equilibrium decreases **or** position of equilibrium moves to left hand side so the colour change gets lighter/colourless/clear		1 1 1	AO3 4.6.2.4 4.6.2.7
07.3	no effect because there are the same number of molecules shown in the equation in both the products and reactants		1 1 1	AO2 4.6.2.6
08.1	three (minutes) the amounts of both X and Y are constant from this time onwards		1 1	AO2 4.6.2.7

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08.2	they are the same		1 1	AO3
08.3	forward		1	AO1 4.6.2.3
09.1	$ICl(l) + Cl_2(g) \rightleftharpoons ICl_3(s)$ **or** $ICl_3(s) \rightleftharpoons Cl_2(g) + ICl(l)$	one mark for identifying ICl and Cl_2 as the reactants one mark for state symbols one mark for reversible arrow	3	AO3 4.6.2.2
09.2	exothermic		1	AO3 4.6.2.2
09.3	ice bath reduces the temperature of the system in exothermic reactions, energy is transferred to the surroundings so increasing the temperature/minimising the change		1 1 1	AO3 4.6.2.1
10.1	ammonium chloride		1	AO2 4.6.2.2
10.2	reaction is reversible therefore, as ammonia and hydrogen chloride gases cool, they react to form ammonium chloride		1 1 1	AO3 4.6.2.6
10.3	crystals turn blue		1	AO3 4.6.2.1
10.4	test tube would warm up		1	AO3 4.6.2.2

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Question	Answers	Extra information	Mark	AO / Specification reference
11.1	three		1	AO2 4.3.2.1
11.2	14 + (3 × 1) = 17		1 1	AO2 4.3.1.2
11.3	$\frac{68}{17}$ = 4		1 1	AO2 4.3.2.1
11.4	$4 \times 6.02 \times 10^{23}$ $= 2.41 \times 10^{24}$	one mark for correct number of significant figures	1 1 1	AO2 4.3.2.1
12.1	Any **two** from: • moves around on surface of water • fizzing • lilac/mauve/purple flame	one mark for each correct answer up to two marks	2	AO1 4.1.2.5
12.2	lithium hydroxide hydrogen		1 1	AO1 4.1.2.5 4.4.1.2
12.3	no change		1	AO1 4.4.1.2

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Question	Answers	Extra information	Mark	AO / Specification reference
13.1	use a pipette to transfer the sodium hydroxide because its resolution is higher / it measures more accurately add a few drops of indicator only so it is easier to detect the colour change / to avoid wasting indicator		1 1 1 1	AO3 4.4.2.3
13.2	repeat without indicator so that the crystals are not contaminated with indicator		1 1	AO3 4.4.2.3
13.3	0.025 mol of sodium hydroxide makes 0.025 mol of sodium chloride molar mass of sodium chloride is 23 + 35.5 = 58.5 mass of 0.025 mol = 0.025 × 58.5 = 1.4625 = 1.5 (g)	answer given to two significant figures	1 1 1 1	AO2 4.3.2.1 4.3.2.2
14.1	$2SO_2$ g two		1 1 1	AO2
14.2	forward reaction		1	AO2 4.6.2.2
14.3	more energy transferred to break reactant bonds than is transferred to surroundings on formation of product bonds		1	AO3 4.5.1.3
14.4	decrease yield		1	AO2 4.6.2.6
14.5	higher/increase rate of reaction		1	AO2 4.6.1.2

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14.6	provide an alternative reaction pathway with a lower activation energy so more frequent collisions with enough energy to react		1 1 1	AO1 4.6.1.4
14.7	increase pressure fewer molecules in the products so equilibrium position will shift right to minimise change	accept answer that matches with students' balanced equation	1 1 1	AO1 4.6.2.7
14.8	expensive/dangerous		1	AO3