

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	reactants, products ⇌ products, reactants		1 1 1	AO1 5.6.2.1
01.2	combustion of paper		1	AO1 5.6.2.1
01.3	(dynamic) equilibrium		1	AO1 5.6.2.3
01.4	endothermic		1	AO1 5.6.2.3
02.1	ammonium chloride		1	AO3 5.6.2.1
02.2	reaction is reversible therefore, as ammonia and hydrogen chloride gases cool, they react to form ammonium chloride		1 1 1	AO2 5.6.2.1
02.3	crystals turn blue/hydrated copper(II) sulfate is made		1	AO3 5.6.2.1
02.4	test tube would warm up		1	AO3 5.6.2.2
03.1	reaction is reversible		1	AO2 5.6.2.2
03.2	white crystals turn blue test tube gets warm		1 1	AO3 5.6.2.2

Question	Answers	Extra information	Mark	AO / Specification reference
03.3	ionic		1	AO2 5.2.1.1
03.4	one from: <ul style="list-style-type: none"> • fingers don't get burnt • wear goggles to protect eyes • stand back to avoid spitting from basin • use heat proof mat under Bunsen burner • gloves 		1	AO3 5.6.2.2
04.1	endothermic		1	AO1 5.6.1.1
04.2	A and B		1	AO1 5.6.1.1
04.3	$\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$		1	AO2 5.1.1.1
04.4	endothermic		1	AO1 5.6.1.2
04.5	no		1	AO2 5.6.1.2
05.1	reversible	accept equilibrium	1	AO1 5.6.2.1
05.2	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 5.6.2.3

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05.3	when H ₂ and I ₂ react to form HI energy is transferred from the surroundings/the system takes in energy from the surroundings	ignore exothermic the energy transfers need to be explained	1	AO1 5.6.2.1
05.4	increase pressure increased frequency of collisions or increase temperature more frequent collisions with activation energy		1 1 or 1 1	AO2 5.6.1.3
06.1	g, g, s		1	AO2 5.2.2.2
06.2	the products of the reaction can react to produce the original reactants		1	AO1 5.6.2.1
06.3	(dynamic) equilibrium		1	AO1 5.6.1.3
07.1	exothermic		1	AO2 5.5.1.1
07.2	measure temperature increase/change of the surroundings		1	AO3 5.5.1.1
07.3	exothermic, endothermic		1	AO1 5.6.2.3
07.4	4 J		1	AO2 5.6.2.3

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08.1	$\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$		1	AO2 5.1.1.1
08.2	take in energy from the surroundings		1	AO1 5.5.1.1
08.3	more NO_2 gas produced		1	AO3 5.6.2.3
08.4	prevents escape of reactants and products/substances/gases		1	AO1 5.6.2.3
09.1	substances/water/steam/gas can escape from the apparatus		1	AO2 5.6.2.3
09.2	Bunsen burner		1	AO1 5.6.2.2
09.3	steam/water/water vapour		1	AO2 5.6.2.2
09.4	attach bung and delivery tube to test tube feed delivery tube into beaker in icy water		1 1 1	AO3 5.6.2.2
10.1	increase in temperature crushing lump into powder		1 1	AO1 5.6.1.2
10.2	activation energy		1	AO1 5.5.1.2

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10.3	reduce the number of acid particles/reactant particles in a given volume less frequent collisions lower rate of reaction		1 1 1	AO1 5.6.1.3
11.1	two from: <ul style="list-style-type: none"> • moves around on surface of water • fizzing • lilac/mauve/purple flame • if universal indicator has been added to the water, there is a colour change from green to purple/blue 	one for each correct observation up to a maximum of two marks	2	AO1 – 2 4.1.2.5
11.2	reactivity with water increases as you go down the group because the single electron in the outer shell is further away from the nucleus	accept shielding from more shells	1 1	AO1 5.1.2.5
11.3	eye goggles/handle with gloves/safety screen	accept any sensible suggestion	1	
11.4	lithium hydroxide hydrogen		1 1	AO1 – 2 4.1.2.5 4.4.1.2
11.5	no change		1	AO1 – 1 4.4.2.1