AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	zinc and copper chloride solution		1	AO2 4.4.1.2
01.2	hydrogen		1	AO1 4.1.2.5
01.3	less vigorously		1	AO1 4.1.2.5
01.4	lithium chloride		1	AO2 4.4.1.2
01.5	sodium > lithium > zinc > copper	one mark for one correct two marks for two correct three marks for all correct	3	AO2 4.4.1.2
02.1	reduced loses oxygen		1 1	AO1 4.4.1.3
02.2	$2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$		1	AO2 4.4.1.3
02.3	gold is unreactive so is found as elemental gold in the Earth		1 1	AO1 4.4.1.2

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03.1	**one** from: • steady bubbling from surface of zinc • zinc gets smaller • clear gas is formed		1	AO1 4.4.1.2
03.2	zinc chloride and hydrogen		1	AO2 4.4.1.2
03.3	$Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$	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 4.3.1.1 4.4.1.2
03.4	oxidised as it loses electrons/forms positive ions		1 1	AO2
04.1	Mg or Al does not react with $CaCl_2$, so is below Ca in the reactivity seres reacts with copper sulfate and zinc chloride, so is above these two metals in the reactivity series		1 1 1	AO3 AO2 4.4.1.2

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04.2	$X(s) + CuSO_4(aq) \rightarrow Cu(s) + XSO_4(aq)$	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 4.3.1.1 4.4.1.2
04.3	test tube full of aluminium salt solution add metal X if no observation, then metal is aluminium is displacement reaction occurs, metal is magnesium		1 1 1 1	AO2 4.4.1.2
05.1	mass of lead sulfide in the ore = $\frac{25}{100} \times 240$ kg = 60 kg mass of one mole of PbS = 207 + 32 = 239 g so mass of Pb in 60 kg of PbS = $\frac{207}{239} \times 60 = 52$ kg	one mark for two significant figures	1 1 1 1	AO2 4.4.1.2

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05.2	$2PbS(s) + 3O_2(g) \rightarrow 2PbO(s) + 2SO_2(g)$	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 4.3.1.1
05.3	reduced because oxygen is lost/electrons are gained		1 1	AO1 4.4.1.3
05.4	lead is below carbon in the reactivity series but aluminium is above carbon in the reactivity series		1 1	AO1 4.4.1.3
05.5	**one** from: • iron • copper		1	AO1 4.4.1.3
06.3	**Level 3:** A detailed and coherent comparison is given, demonstrating a sound knowledge and understanding of displacement reactions in halogens and metals.		5-6	AO1 4.1.2.6 4.4.1.2
	Level 2: Correct descriptions of displacements are given for the halogens and in metals. Some comparisons are made, but not all are clearly articulated.		3-4	
	Level 1: Some correct points are made about displacement reactions. Few comparisons are made, and these are not clearly articulated.		1-2	

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	No relevant comment.		0	
	Indicative content: • in both the halogen and metal reactions, a more reactive element displaces a less reactive element from a solution of its salt • in both cases, one of the products is the less reactive halogen or metal • in both cases, the more reactive element ends up in a compound • in the halogen reaction, the more reactive halogen is reduced (its atoms each gain one electron) • in the metal reaction, the more reactive metal is oxidised (its atoms lose electrons) • in the halogen reaction, reactivity is based on tendency to form negative ions • the closer the outer electron is to the nucleus, the more reactive the halogen • in the metal reaction, reactivity is based on the tendency to form positive ions			
07.1	lithium		1	AO2 4.4.1.2
07.2	magnesium oxide		1	AO2 4.4.1.1

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07.3	oxidised magnesium has gained oxygen/lost electrons		1 1	AO1 AO2 4.4.1.1
07.4	magnesium is more reactive than carbon therefore, carbon cannot displace magnesium from magnesium oxide		1 1	AO1 4.4.1.3
08.1	nickel reacts more vigorously than lead with HCl, so it is above lead in the reactivity series. nickel does not react with water, but iron does, so nickel is below iron in the reactivity series. nickel is between iron and lead in the reactivity series		1 1 1	AO3 4.4.1.2
08.2	add nickel to a solution such as iron chloride there should be no reaction because nickel is less reactive than iron add iron to a solution of nickel chloride there should be a reaction because iron is more reactive than nickel	each action, expected observation and reason is worth one mark	1 1 1 1	AO1 4.4.1.2
08.3	$Ni + Cu^{2+} \longrightarrow Ni^{2+} + Cu$ copper	one mark for products, one mark for reactants	2 1	AO2 4.4.1.4
09.1	do not mix a metal with a solution containing the same metal	allow suitable examples here (e.g., do not mix magnesium with magnesium chloride solution)	1	AO3 4.4.1.2

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09.2	copper of the three metals in the experiment, it is the lowest in the reactivity series **or** cannot displace any of the other metals		1 1	AO2 4.4.1.4
09.3	$Mg(s) + Cu^{2+}(aq) \rightarrow Mg^{2+}(aq) + Cu(s)$	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 4.4.1.4
09.4	before: 2,8,2 after: 2,8		2	AO2 4.4.1.7
09.5	reduces (potentially harmful) waste after experiment cheaper, as smaller amounts of metal and solutions are required easier to observe on a white tile than in a test tube		1 1 1	AO3
10.1	there are no gaps/sticks between the nitrogen and the hydrogen atoms		1	AO1 4.2.1.4
10.2	1 N atom and 3 H atoms are drawn with 1 shell each N atom has 5 dots and 3 crosses, each H atom has 1 dot and 1 cross which it shares with the N atom		2	AO1 4.2.1.4

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10.3	the molecules do not have an overall electric charge **or** no charged particles that are free to move		1	AO1 4.2.2.4
10.4	gas		1	AO3 – 4.2.2.1
10.5	hydrazine has bigger molecules and the intermolecular forces between bigger molecules are stronger		1 1	AO1 4.2.2.4
11.1	metal atoms lose outer shell/highest energy level electrons in their reactions as atoms become bigger, their outer electrons are further from the nucleus (or more shielding) and so the electrostatic attraction between the nucleus and outer electrons gets weaker and less energy is required to remove an electron		1 1 1 1	AO1 AO2 4.1.2.5 4.4.1.2
11.2	overall, radius decreases from top to bottom of the reactivity series indicating that the conclusion is true calcium and magnesium do not fit the pattern, with both atoms being bigger than the one/two immediately above them in the reactivity series indicating that the conclusion is not entirely correct overall, the trend identified in the conclusion is correct and the reason is correct		1 1 1 1 1	AO3
12.1	heat in a fume cupboard avoid handling the lead/wash hands		1 1	AO2

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12.2	lead and carbon dioxide	both products required for the mark	1	AO2 4.4.1.2
12.3	carbon dioxide has formed a gas (and escaped from the evaporating basin)		1	AO1 4.3.1.3
13.1	29		1	AO2 4.1.1.5
13.2	36		1	AO2 4.1.1.5
13.3	63		1	AO2 4.1.1.5
13.4	27		1	AO2 4.1.1.5
13.5	relative atomic mass = $\frac{(69.2\times63)+(30.8\times65)}{100}$ = 63.616 = 63.6		1 1 1	AO1 AO2 4.1.1.5