AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	12 + (4 × 1) = 16		1	AO2 4.3.1.2
01.2	the reactant that is completely used up when the other reactant is present in excess		1	AO1 4.3.2.1
01.3	$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$		2	AO2 4.3.1.1
01.4	Oxygen		1	AO2 4.3.2.4
01.5	0.25		1	AO2 4.3.2.4
02.1	6.02×10^{23} x 6 $= 3.61 \times 10^{24}$		1 1	AO1 4.3.2.1
02.2	164		1	AO2 4.3.1.2
02.3	gaseous products leave the test tube as a gas	allow named gas (oxygen or nitrogen dioxide)	1	AO2 4.3.1.3
02.4	CaO: (40 + 16) = 56 $\frac{22.4}{56}$ = 0.4 mol 0.4 x 164 = 65.6g		1 1 1 1 1	AO1 AO2 4.3.2.2

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
03.1	1 mole = 18 g 18 cm^3		1 1	AO2 4.3.2.1
03.2	$\frac{18}{6.02 \times 10^{23}}$ $= 2.99 \times 10^{-23}$		1 1	AO2 4.3.2.1
03.3	answer assumes that all of the space in the 18cm^3 is taken up by water particles but water is a liquid, so has space between the particles		1 1	AO3 4.3.2.1
04.1	there are three atoms of oxygen for every one atom of sulfur		1	AO2 4.1.1.1
04.2	2 + (2 × 16) = 64	correct answer scores the mark without working shown	1	AO2 4.3.1.1
04.3	1.68 - 1.28 = 0.4 g	correct answer scores the mark without working shown	1	AO2 4.3.1.1
05.1	the number of atoms, molecules or ions in a mole of a given substance	accept 'particles' in place of 'atoms, molecules or ions' accept mention of just one or two of atoms, molecules or ions	1	AO1 4.3.2.1

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
05.2	M_r of water = (2 × 1) + 16 = 18 number of moles of water = $\frac{232}{18}$ = 12.89 mol number of molecules = 12.89 × 6.02×10^{23} per mole = 7.76×10^{24}		1 1 1 1 1	AO2 4.3.2.1
05.3	$\frac{464}{232} = 2$ $2 \times 7.76\times10^{24} = 1.55\times10^{25}$		1 1	AO2 4.3.2.1
06.1	**one** from: • wear eye protection • work in a fume cupboard	accept any other reasonable answer	1	AO3
06.2	$2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$	one mark for balancing one mark for state symbols	2	AO2 4.2.2.2 4.3.1.1
06.3	**Level 3:** The description is detailed and accurate. The writing is clear, coherent and logical.		5-6	AO1 4.2.1.2 4.2.1.3
	Level 2: The description is correct, although lacks detail. The writing is mainly clear, although the structure may lack logic.		3-4	
	Level 1: Some aspects of the description are correct. The writing lacks clarity, coherence and logic.		1-2	
	No relevant comment.		0	

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content: • sodium atoms each lose one electron to make Na^+ ions • chlorine atoms each gain one electron to make Cl^- ions • the oppositely charged ions are held together • in a lattice • by strong electrostatic forces of attraction • that act in all directions			
07.1	$\frac{52+49+48+56+55}{5} = 52$		1	AO2
07.2	56 - 48 = 8		1	AO2 4.3.1.4
07.3	*uncertainty range* = $\frac{\text{range}}{2} = \frac{8}{2} = 4$ mean ± 4		1	AO2 4.3.1.4
07.4	7.3 x $\frac{25}{1000}$ = 0.1825 = 0.18		1 1 1	AO3 4.3.2.5
08.1	$HNO_3(aq) + KOH(aq) \rightarrow KNO_3(aq) + H_2O(l)$		1	AO2 4.2.2.2
08.2	$\frac{14}{700}$ x 1000 = 20 g/dm^3	allow 0.02 g/cm^3 is the units are specified	1 1	AO2 4.3.2.5

Question	Answers	Extra information	Mark	AO / Specification reference
08.3	$22 \times \frac{30}{1000}$ $= 0.66g$		1 1	AO2 4.3.2.5
08.4	$20 \times \frac{35}{1000} = 0.7$ g moles $HNO_3 = \frac{0.66}{63}$ $= 0.01$ moles $KOH = \frac{0.7}{56}$ $= 0.0125$ limiting reagent = nitric acid		1 1 1 1 1 1	AO2 4.3.2.5
09.1	2 N atoms are drawn with 1 shell each 1 N atom has 5 crosses and 3 dots, the other 5 dots and 3 crosses N atoms share 3 crosses and 3 dots		2	AO2 4.2.1.4
09.2	gas would build up in the tube, as it had nowhere to escape to this might result in the bung being forced out of the test tube		1 1	AO3

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
09.3	number of moles of Mg = $\frac{2.16}{24} = 0.09$ number of moles of nitrogen gas = $\frac{0.84}{2 \times 14} = 0.03$ number of moles of Mg_3N_2 = $\frac{3.00}{(3 \times 24) + (2 \times 14)} = 0.03$ 0.09 Mg + 0.03 $N_2 \rightarrow$ 0.03 Mg_3N_2 $3Mg + N_2 \rightarrow Mg_3N_2$		1 1 1 1 1	AO2 AO3 4.3.2.3
10.1	1 dm^3 = 1000 cm^3 $\frac{1000}{5} = 200$ 500 × 5 = 2500 mg in 1 dm^3 0.5 g/dm^3		1 1 1	AO2 4.3.2.5
10.2	(8 × 12) + (9 × 1) + 14 + (2 × 16) = 151 g		1	AO2 4.3.1.2
10.3	M_r of ibuprofen = (13 × 12) + (18 × 1) + (2 × 16) = 206 number of moles in 5.0 cm^3 of solution = $\frac{0.1}{206} = 0.000\ 485$ number of moles in 1000 cm^3 of solution = 0.000 485 × 200 = 0.0971 moles	**or** 9.71x10^{-2} mol in standard form	1 1 1 1	AO2 4.3.2.1 4.3.2.5
11.1	(4 × 12) + (2 × 1) + 56 + (4 × 16) = 170		1	AO2 4.3.1.2

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
11.2	M_r = 56 + 32 + (4 × 16) =152 number of moles = $\frac{0.065}{152}$ = 4.3×10^{-4} moles	one for two significant figures one mark for correct expression in standard form	1 1 1+1	AO2 4.3.2.1
11.3	M_r = (12 × 12) + (24 × 1) + 56 + (14 × 16) = 448 number of moles of iron gluconate = $\frac{0.3}{448}$ = 0.000 670 number of moles of iron = 0.000 670 mass of iron = 0.00 673 × 56 = 0.0 375 g	**or** 37.5 mg	1 1 1 1	AO2 AO3 4.3.2.1
12.1	M_r of iron oxide = (56 × 2) + (3 × 16) = 160 16 g = $\frac{16}{160}$ = 0.10 mol 0.10 mol Fe_2O_3 reacts with 0.15 mol C 12 x 0.15 = 1.8 g		1 1 1 1 1	AO2 4.3.2.2
12.2	number of moles of CO_2 = number of moles of C = 0.15 M_r of CO_2 = 12 + (2 × 16) = 44 g mass of CO_2 = 0.15 × 44 g = 6.6 g		1 1 1 1	AO2 4.3.2.2

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
12.3	3.7 tonnes = 3700kg $\frac{3700}{160}$ = 23.125 moles 23.125 x 2 = 46.25 moles of Fe 46.25 x 56 = 2590 kg		1 1 1 1 1 1	AO2 4.3.2.2
12.4	$\frac{2590}{3700} \times 100$ = 70 %	allow $56 \times \frac{2}{160} \times 100$		
13.1	wear eye protection work in a fume cupboard		1 1	AO1
13.2	fill the glass jar with chlorine gas first so that the chlorine does not escape before the sodium is added to it		1 1	AO3
13.3	Na ion is drawn with 2 shells, 2 dots on first shell, 8 dots on second shell. Inside square brackets with a superscript + to the right of the brackets Cl ion is drawn with 3 shells, 2 crosses on first shell, 8 crosses on second shell, 7 crosses and 1 dot on third shell. Inside square brackets with a superscript – to the right of the brackets		2	AO1 4.2.1.2

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
13.4	**three** from: • ionic bonding • sodium atom transfers one electron to chlorine atom • forming 1+ sodium ion and -1 chloride ion • electrostatic attraction between opposite charged ions	one mark for each correct answer up to a maximum of three marks	3	AO1 4.2.1.2
13.5	sodium conducts electricity because it contains delocalised electrons that can move chlorine does not conduct electricity because it does not contain charged particles that can move sodium chloride conducts electricity when in solution or molten but not when solid because ions are free to move		1 1 1 1 1 1	AO1 4.2.1.3 4.2.1.4 4.2.1.5
13.6	at the start, orange-brown liquid instead of green gas during/reaction would be less vigorous		1	AO1 4.1.2.6
14.1	P atom is drawn with 3 shells, 2 crosses in first shell, 8 crosses in second shell and 5 crosses in third shell		1	AO1 4.1.1.7
14.2	five		1	AO2 4.1.2.1
11.2	**Level 3:** The properties and locations are correctly given. The comparisons are clear, coherent and logically expressed.		5-6	AO1 4.1.1.4 4.1.1.5
	Level 2: The properties and locations are mainly correct. The comparisons are mainly clear, but there is a lack of logic in the answer.		3-4	

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
	Level 1: Some of properties and/or locations are correct. The writing lacks clarity, coherence and logic, and only one or two comparisons are made.		1-2	
	No relevant content.		0	
	Indicative content: • protons have a charge of +1 and a relative mass of 1 • neutrons have no charge and a relative mass of 1 • electrons have a charge of −1 and a very small relative mass • protons and neutrons are found in the nucleus of an atom • electrons are found outside the nucleus • electrons are in orbits/shells/levels			