AQA GCSE Chemistry

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	whether or not it conducts electricity		1	AO3 4.1.3.1
01.2	B iron is a transition metal B has properties that are typical of a transition metal (forms a coloured compound/reacts less vigorously with water).		1 1 1	AO2 × 2 AO3 × 1 4.1.3.1 4.1.3.2
01.3	FeO contains the Fe^{2+} ion and Fe_2O_3 contains the Fe^{3+} ion so iron forms ions with different charges/transition metals can have different oxidation states		1 1	AO1 × 1 AO2 × 1 4.1.3.2
02.1	fine particles: 100 to 250 nm nanoparticles: 1 to 100 nm coarse particles: 2.5×10^{-6} m to 1×10^{-5} m		3	AO1 4.2.4.1
02.2	3.4×10^{-6} m		1	AO2 4.2.4.1
02.3	coarse particle	accept if the coarse particle range was assigned to another particle type in question **02.1**, and that particle type is given here accept 'coarse particle' if answer to question **02.1** is incorrect	1	AO2 4.2.4.1
02.4	high surface area to volume ratio which means that a greater proportion of atoms are at the surface		1 1	AO1 4.2.4.1

Question	Answers	Extra information	Mark	AO / Specification reference
03.1	independent: metal dependent: diameter of indentation		1 1	AO2
03.2	so that the test is fair/is a fair comparison		1	AO1
03.3	so that it can make indentations in hard metals	one mark for each correct match	1	AO2
03.4	measure the diameter of the indentation in different places and calculate the mean	allow 'average' rather than 'mean'	1	AO3
03.5	A gave the smallest indent and is therefore the hardest metal		1 1 1	AO3
04.1	nanoparticles have high surface area to volume ratio nanoparticles are smaller, so can enter cells more easily		1 1	AO2 4.2.4.1
04.2	nanoparticles may enter human cells and cause harm		1	AO3 4.2.4.2
04.3	at concentrations up to and including 1.2 μg/cm^3, silver nanoparticles do not kill bacteria/minimal effect of bacteria from a concentration of 1.2 μg/cm^3 upwards, as concentration increases, the percentage of bacteria that survive decreases		1 1	AO2

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04.4	**two** from: • sun creams • deodorants • catalysts • electronics • cosmetics	allow any other valid answer	2	AO1 4.2.4.2
05.1	8.9 g/cm^3	one for correct value one for correct unit	2	AO2
05.2	7 (g/cm^3)	one for correct value ignore units	1	AO2
05.3	B and C	both letters required for the mark	1	AO2 4.1.3.1
05.4	use a measuring cylinrer instead of a beaker.		1	AO3
05.5	lithium reacts with water		1	AO2 4.1.2.5
5.6	volume of sample = 56 - 50 = 6 cm^3 density = $\frac{41}{6}$ = 6.8 g/cm^3	one for correct calculation of volume one for correct substitution and answer one for giving answer to two significant figures.	3	AO2
06.1	rhodium		1	AO2 4.1.3.2

Question	Answers	Extra information	Mark	AO / Specification reference
06.2	lithium		1	AO2 4.1.3.1
06.3	iron		1	AO2 4.1.3.1
06.4	vanadium		1	AO2 4.1.3.1
06.5	copper		1	AO2 4.1.3.2
07.1	E and F	both letters required for the mark	1	AO1 4.1.2.4 4.1.2.6
07.2	A and E	both letters required for the mark	1	AO2 4.1.2.5 4.1.2.6
07.3	**Level 3:** A detailed and coherent comparison is given, demonstrating a sound knowledge of the properties of Group 1 elements and transition metals.		5-6	AO1×5 AO2×1 4.1.2.5 4.1.3.1
	Level 2: Correct properties are listed for element B/Group 1 elements and element D/transition elements. Some comparisons are made, but not all are clearly articulated.		3-4	

Question	Answers	Extra information	Mark	AO / Specification reference
	Level 1: Some properties are listed for element B/Group 1 elements and element D/transition metals. Few comparisons are made, and these are not clearly articulated.		1-2	
	No relevant content		0	
	Indicative content • both elements conduct electricity • B has a lower melting point than D • B has a lower density than D • D is stronger than B • D is harder than B • B reacts more vigorously than D with oxygen • B reacts with water to make hydrogen and an alkaline solution/hydroxide • B reacts more vigorously than D with halogens • D does not react with water			
08.1	surface area = 3 nm × 3 nm × 6 = 54 (nm^2) volume = 3 nm × 3 nm × 3 nm = 27 (nm^3) surface area to volume ratio = 54:27 = 2 (nm^{-1})	units are not required.	1	AO1 × 1 AO2 × 2 4.1.2.4
08.2	because of the high surface area to volume ratio of the nanoparticle material/a greater number of atoms are exposed		1	AO1 4.2.4.1
09.1	its diameter is not in the range of 1 to 100 nm		1	AO1 4.2.4.1

Question	Answers	Extra information	Mark	AO / Specification reference
09.2	2.75×10^{-10} m	one for correct answer one for correctly writing answer in standard form	2	AO2
09.3	number of particles along an edge of a cube = $\frac{50}{0.174}$ = 287 number of particles on one face = 287^2 = 82 574 to one significant figure in standard form, answer = 8×10^4	one for working one for correct answer one for giving answer to one significant figure one for standard form	4	AO2
10	**Level 3:** Data that support the statement and data that do not support the statement are identified, and a judgement made and justified.		5-6	AO2×1 AO3×5 4.1.2.5 4.1.3.1
	Level 2: Data that that support the statement and data that do not support the statement are identified, but no overall judgement is made.		3-4	
	Level 1: Some data that support the statement and some data that do not support the statement are identified.		1-2	
	No relevant content.		0	

Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content • caesium, lithium and sodium are in Group 1, while copper, gold and iron are transition metals • all the transition elements have much higher melting points than the Group 1 elements, supporting the statement • two of the transition elements, copper and gold, have relative conductivities that are at least twice as high as those of the three Group 1 elements, supporting the statement • the relative conductivity of iron is less than the conductivities of two of the Group 1 elements (lithium and sodium), which does not support the statement	allow 'conductivity' for 'relative conductivity' throughout.		
11.1	electron: -1 neutron: 0 proton: +1		1 1 1	AO1 4.1.1.4
11.2	proton		1	AO1 4.1.1.4
11.3	8		1	AO1 4.1.1.5
11.4	chlorine exists as multiple isotopes with different numbers of neutrons		1 1	AO1 4.1.1.5
11.5	2,8,5		1	AO1 4.1.1.7

Question	Answers	Extra information	Mark	AO / Specification reference
12.1	giant structure, so higher melting and boiling points delocalised electrons mean that it can conduct electricity chlorine is made of small molecules with weak intermolecular forces, so lower melting and boiling points no electrical charge/electrons or ions are not free to move, so cannot conduct electricity		1 1 1 1 1	4.1.2.5 4.2.1.3 4.2.2.3 4.2.2.4 4.2.2.7
12.2	**Level 3:** The descriptions of structure and bonding is correct, clear, detailed and coherent. The reason for its high melting point is clearly explained.		5-6	AO1 4.2.1.3 4.2.2.3
	Level 2: The descriptions of structure and bonding are correct, but lack some detail and clarity. The reason for its high melting point is outlined.		3-4	
	Level 1: Some correct points about the structure and bonding are made, but they lack detail and clarity. The reason for its high melting point is outlined.		1-2	
	No relevant content.		0	

Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content • sodium chloride consists of sodium ions with a single positive charge and chloride ions with a single negative charge • the ions are arranged in a regular lattice. • there are strong electrostatic forces of attraction between oppositely charged ions • the electrostatic forces of attraction act in all directions • it has a high melting point because of the large amount of energy needed to break the many strong bonds			
12.3	$2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$		3	AO2 4.1.1.1