AQA GCSE Chemistry

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	they conduct electricity in the solid and liquid states		1	AO1 4.2.2.8
01.2	giant structure ions arrange in regular pattern electrons in outer shells/outermost electrons delocalised	reject 'atoms'	1 1 1	AO1 4.2.1.5
01.3	atoms/ions are arranged in layers that can slide over each other	do not penalise 'atoms' again here	1 1	AO1 4.2.2.7
01.4	most metals have high melting points/most metals are solid at room temperature		1	AO1 4.2.2.7
02.1	the ions/particles are arranged in layers that can slide over each other	do not penalise 'atoms' again here	1 1	AO1 4.2.2.7
02.2	strong metallic bonding because shared delocalised electrons can move through the whole structure large amounts of energy are needed to overcome the strong metallic bonding		1 1 1	AO1 4.2.2.7
02.3	less likely to be damaged by scratching (since harder)		1	AO2 4.2.2.4

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02.4	other atoms have a different size to platinum atoms so the layers of atoms are distorted so they cannot slide over each other so easily		1 1 1	AO1 4.2.2.7
03.1	350	allow between 352-358	1	AO2 4.2.2.3 Maths
03.2	A		1	AO2 4.2.2.7
03.3	B		1	AO2 4.2.2.3
03.4	A: ethanal, C: hexanol hexanol is a larger molecule than ethanol so hexanol will have a higher boiling point		1 1 1	AO3 4.2.2.4
04.1	each circle has 2+ charge 16 minus charges/electrons/e^- around the circles	for one mark, accept a '+' charge put in every circle and any number of '-' charges put around the circle.	1 1	AO1 4.2.1.5
04.2	Mg ion should have one ring with 8 dots. This should be inside square brackets with an uppercase 2+ outside the brackets. O ion should have one ring with 2 dots and 6 crosses. This should be inside square brackets with an uppercase 2-outside the brackets.	one mark for correct magnesium ion one mark for correct oxygen ion	1 1	AO2 4.2.1.2

Question	Answers	Extra information	Mark	AO / Specification reference
04.3	magnesium oxide – conducts electricity in the liquid state only because its ions are then free to move magnesium – conducts electricity in the solid and liquid states because its delocalised electrons are free to move		1 1	AO1 × 2 4.2.2.3 4.2.2.8
04.4	$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$		3	AO2 4.1.1.1 4.2.2.2
04.5	alloy is harder than pure metal so will be more durable/last longer		1 1	AO1 × 1 AO2 × 1 4.2.2.3 4.2.2.8
05.1	metal ions arranged in a regular structure surrounded by delocalised electrons from outer shells.		1 1	AO1 4.2.1.5
05.2	**Level 3:** A detailed and coherent answer is given, including points that support and do not support the statement that are clearly linked to the data in the table. A conclusion is provided and justified using the data.		5-6	AO2 × 2 AO3 × 4 4.2.2.8
	Level 2: Points that support and do not support the statement are made, but these are not always clearly linked to the data in the table. A conclusion may be provided, but it is not justified.		3-4	
	Level 1: Some correct points are made that support and do not support the conclusion.		1-2	
	No relevant content		0	

Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content • for the elements in Period 2 conductivity increases from Li (one delocalised electron per atom) to Be (two delocalised electrons per atom) • for the elements in Period 3, conductivity increases from Na (one delocalised electron per atom) to Mg (two delocalised electrons per atom) to Al (three delocalised electrons per atom) • Zn has two delocalised electrons per atom, but its conductivity is less than those of Li and Na (one delocalised electron per atom each) • the first two pieces of evidence above support the statement, but the third does not • reasoned decision, drawing on all of the above evidence			
06.1	**Level 3:** A detailed and coherent answer is given, using suitable examples and the data in the table. A conclusion is provided and justified using the data.		5-6	AO1 × 3 AO3 × 3 4.2.2.3
	Level 2: A detailed and coherent answer is given, using suitable examples and the data in the table. Some electron configurations maybe be incorrect. A conclusion is provided and justified using the data.		3-4	
	Level 1: Some correct points are made that support the conclusion**.**		1-2	
	No relevant content		0	

Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content • calcium and magnesium are in Group 2, so form ions with +2 charge • oxygen and sulfur are in Group 6, so form ions with -2 charge • bromine is in Group 7, so form ions with -1 charge • sodium is in Group 1 and forms ions with +1 charge • compounds with two ions with double-charges have higher melting points than those with single-charges • compounds with +1 and -2 ions have higher melting points than compounds with +2 and -1 ions • compounds with two ions with single charges have higher melting points that those with +2 and -1 ions			
06.2	in general, the greater the charge of the ions of a compound, the higher the melting point because there is a greater electrostatic attraction between the ions/more energy is needed to break the bonds		1 1	AO3 4.2.2.3
07.1	electrons transferred from magnesium to bromine magnesium atom loses 2 electrons 2 bromine atoms gain 1 electron each		1 1 1	AO1 4.2.1.2
07.2	Mg^{2+} ions Br^{-} ions		1 1	AO2 4.2.1.2

Question	Answers	Extra information	Mark	AO / Specification reference
07.3	$MgBr_2$		1	AO1 4.2.1.2
07.4	**three** from: • solid at room temperature • high melting and boiling points • conducts electricity when molten or in solution • soluble in water		3	AO1 4.4.2.3
08.1	ionic compound conducts in the liquid state, but not the solid state high melting point		2	AO1 × 1 AO2 × 1 4.2.2.3
08.2	B and D both can conduct electricity in the solid and liquid states		1 1	AO1 × 1 AO2 × 1 4.2.2.8
08.3	melting point is low metals have giant structures of atoms bonded with strong metallic bonding so normally lots of energy needed to separate the atoms/most metals have a high melting point		1 1 1	AO2 4.2.2.7
09.1	Cl atoms should have 7 dots and 1 cross. O atom should have 6 crosses and 2 dots. the O atom should be in between 2 Cl atoms. The Cl atoms should be sharing 1 cross and 1 dot each with the O atom.		2	AO2 4.2.1.4

Question	Answers	Extra information	Mark	AO / Specification reference
09.2	in dichlorine monoxide, an electron from each chlorine atom joins with an electron the the oxygen atom to form two shared pairs of electrons or two covalent bonds in caesium oxide, the one electron from the outermost shell of two caesium atoms is transferred to the oxygen atom creating a strong electrostatic attraction between the two ions		1 1 1 1 1	AO1 4.2.1.3 4.2.1.4
09.3	CsO has high melting and boiling points because large amounts of energy are needed to break the multiple strong ionic bonds Cl_2O has low melting and boiling points because only weak intermolecular forces must be overcome when the substance melts or boils, so little energy is required **or** CsO conducts electricity in the liquid state and when dissolved in water because its charged particles/ions are then free to move Cl_2O does not conduct electricity in any state because the molecules do not have an overall electric charge		1 1 1 1 **or** 1 1 1 1	AO2 4.2.2.3 4.2.2.4
09.4	barium ions have a larger/double charge/are 2+ ions so the attraction between the Ba^{2+} and O^{2-} ions is greater than the attraction between Cs^{+} and O^{2-} ions (or reverse argument)		1 1	AO3 4.2.2.3

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10.1	K ion should be in square brackets with a '+' in superscript after the brackets. There should be a 2 before the brackets O ion should have 6 crosses and 2 dots in square brackets with a '+' in superscript after the brackets. K^+ and O^{2-}	two marks for diagram one mark for both formulae	3	AO2 4.2.1.2
10.2	regular structure (giant ionic lattice) strong electrostatic forces of attraction in all directions between oppositely charged potassium and oxygen ions		1 1 1	AO1 4.2.1.3
10.3	oxygen is a simple molecule mare held together by weak intermolecular forces so lower amounts of energy are needed to separate them potassium oxide ions are held together by strong electrostatic forces so greater amounts of energy are needed to separate them.		1 1 1 1 1	AO1 4.2.2.3 4.2.2.4
10.4	metallic bonds are weaker than ionic bonds		1	AO3
11.1	RbCl		1	AO3 4.2.1.3
11.2	add another layer of ions above or below the given cube there would then be 18 of each type of ion.		1 1	AO3 4.2.1.3

Question	Answers	Extra information	Mark	AO / Specification reference
11.3	**two** from: • assumes ions are spheres • assumes there is a large amount of space between each ion • assumes ions do not overlap			AO2 4.1.1.5
12.1	Ca^{2+}		1	AO2 4.2.1.2
12.2	O^{2-}	one mark for charge one mark for formula written correctly	2	AO2 4.2.1.2
12.3	**Level 3:** The properties are clearly described, and correct reasons are given for each of these properties. The descriptions and reasons are coherently written.		5–6	AO1 4.2.2.3
	Level 2: All the properties are clearly described, but reasons are not given for them **or** some of the properties are clearly described and reasons are given for each of them.		3–4	
	Level 1: Some correct points are made. The answer lacks coherence and explanations are not clearly linked to descriptions of properties.		1–2	
	No relevant content		0	

Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content • high melting point – large amounts of energy needed to break the many strong bonds/strong electrostatic forces of attraction • high boiling point – large amounts of energy needed to break the many strong bonds/strong electrostatic forces of attraction • conducts electricity in liquid state or in solution – has charged particles/ions that are then free to move (so that charge can flow) • does not conduct electricity in solid state – its charged particles/ions are not free to move (so charge cannot flow)			
13.1	A: gas D: liquid		1 1	AO2 4.2.2.1
13.2	high melting and boiling point conducts electricity when solid and liquid		1 1	AO2 4.2.2.7
13.3	C sodium chloride is an ionic compound high melting point only conducts electricity when liquid		1 1 1 1	AO2 4.2.2.3
13.4	A		1	AO2 4.2.2.4
13.5	covalent bonds small molecule/simple molecular		1 1	AO2 4.2.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
14.1	29		1	AO2 4.1.1.5
14.2	36		1	AO2 4.1.1.5
14.3	63		1	AO2 4.1.1.5
14.4	27		1	AO2 4.1.1.5
14.5	$M_R = \frac{(69.2 \times 63) + (30.8 \times 65)}{100}$ = 63.616 = 63.6		1 1 1	AO1 × 1 AO2 × 3 4.1.1.5