

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	transferred		1	AO1 5.2.1.2
01.2	metal – loses an electron non-metal – gains an electron		1	AO1 5.2.1.2
01.3	electrostatic attraction		1	AO1 5.2.1.2
02.1	bottom answer		1	AO2 5.2.1.2
02.2	NaCl		1	AO2 5.2.1.3
02.3	high melting point/high boiling point/do not conduct electricity when solid/conduct electricity when molten/conduct electricity when dissolved in water/soluble in water		1	AO1 5.2.2.3
02.4	<b>Level 3:</b> The comparisons are detailed and accurate. The writing is clear, coherent and logical and comparisons are clearly made.		5–6	AO1 5.2.1.2 5.2.1.3
	<b>Level 2:</b> The comparisons are generally correct, although may lack detail. The writing is mainly clear, although the structure may lack logic and comparisons are not always clear		3–4	6.2.1.5

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	<p><b>Level 1:</b> Some comparisons are correct. The writing lacks clarity, coherence and logic, and the comparisons are not clearly expressed.</p>		1–2	
	<b>No Relevant content</b>		0	
	<p><b>Indicative content</b></p> <ul style="list-style-type: none"> <li>• both have electrons</li> <li>• both have positive parts</li> <li>• plum pudding model has electrons all over the place whereas nuclear model has electrons in distinct shells</li> <li>• plum pudding is positive all over whereas nuclear model has a positive centre</li> <li>• nuclear model has a nucleus whereas plum pudding model does not</li> <li>• nuclear model shows electrons within different energy levels</li> <li>• nuclear model has neutrons whereas plum pudding does not</li> </ul>			
03.1	they conduct electricity in the solid and liquid states		1	
03.2	giant metallic structure ions arranged in regular patterns electrons in outer shells/outermost electrons delocalised		1 1 1	

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03.3	atoms or ions are arranged in layers that can slide over each other		1 1	
03.4	most metals have high melting points/are solid at room temperature		1	AO3
04.1	giant/large electrostatic all		1 1 1	AO1 5.2.1.3
04.2	strong electrostatic forces of attraction between ions/strong ionic bonds require lots of energy to break bonds		1 1	AO1 5.2.2.3
04.3	lithium should have one ring with two dots/crosses, and sit within square brackets showing a positive charge chlorine should have 3 rings, with two crosses/dots on the innermost ring, eight on the next, and seven on the outer most a dot/cross representing the ion from lithium should be present on this outer ring the ion should be in square brackets showing a negative charge	one mark for lithium one mark for chloride  accept lithium with no electrons in the outer shell	2	AO2 5.2.1.3
04.4	lithium: bulb lit up solid lithium chloride: bulb stays out		1 1	AO3 5.2.2.3 5.2.2.8

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04.5	bulb lit up because ions are free to move and carry charge		1 1	AO2 AO3 5.2.2.3
05.1	magnesium		1	AO1 5.2.1.5
05.2	good conductor – delocalised electrons soft – arranged in layers high melting point – lots of energy		1 1 1	AO1 5.2.27 5.2.2.8
05.3	alloy		1	AO1 5.2.2.7
05.4	harder distort/disrupt	accept words to that effect for both marks	1 1	AO1 5.2.2.7
06.1	350	allow between 352 – 358	1	AO2
06.2	A		1	AO2 – 1
06.3	<b>Level 3:</b> The comparisons are detailed and accurate. The writing is clear, coherent and logical and comparisons are clearly made.		5-6	AO2
	<b>Level 2:</b> The comparisons are generally correct, although may lack detail. The writing is mainly clear, although the structure may lack logic and comparisons are not always clear		3-4	

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	<p><b>Level 1:</b> Some identifications are correct. The writing lacks clarity, coherence and logic, and the comparisons are not clearly expressed.</p> <p><b>No relevant content.</b></p> <p><b>Indicative content</b></p> <ul style="list-style-type: none"> <li>• B is mercury <ul style="list-style-type: none"> <li>○ lots of energy required to overcome the metallic bonding</li> <li>○ so high boiling point</li> </ul> </li> <li>• A is ethanol</li> <li>• C is hexanol <ul style="list-style-type: none"> <li>○ both are covalent molecules</li> <li>○ only weak intermolecular forces need to be overcome</li> <li>○ so less energy needed than mercury</li> <li>○ hexanol is a larger molecule than ethanol, so had greater intermolecular forces (more energy required to overcome)</li> </ul> </li> </ul>		1-2	
			0	
07.1	fluorine – covalent lithium – metallic lithium fluoride – ionic	one mark for one correct one mark for all correct	2	AO1 5.2.1.3 5.2.1.4 5.2.1.5

Question	Answers	Extra information	Mark	AO / Specification reference
07.2	positive ions arranged in layers attraction between positive metal ions and delocalised electrons		1 1 1	AO1 5.2.1.5
07.3	lithium should have one ring with two dots/crosses, and sit within square brackets showing a positive charge fluorine should have 3 rings, with two crosses/dots on the innermost ring, and seven on the outer most a dot/cross representing the ion from lithium should be present on this outer ring the ion should be in square brackets showing a negative charge	accept lithium with no electrons in outer shell	1	AO2 5.2.1.5
07.4	does free to move		1 1	AO1 5.2.2.3
08.1	MgCl <sub>2</sub>	the '2' should be subscript	1	AO3 5.2.1.3
08.2	95	allow error carried forward from question 06.1	1	AO2
08.3	covalent		1	AO1 5.2.1..1

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08.4	both have atoms arranged in layers thus, both are soft both have delocalised electrons thus, both can conduct electricity both have strong bonds holding atoms together thus, both have high melting and boiling points		1 1 1 1 1 1	
08.5	<b>Level 3:</b> Answer is detailed and accurate. The writing is clear, coherent and logical and comparisons are clearly made.		5-6	AO1 AO2 5.2.2.7
	<b>Level 2:</b> Answer generally correct, although may lack detail. The writing is mainly clear, although the structure may lack logic and comparisons are not always clear		3-4	
	<b>Level 1:</b> Some correct points. The writing lacks clarity, coherence and logic, and the comparisons are not clearly expressed.		1-2	
	<b>No relevant comment.</b>		0	

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	<p><b>Indicative content:</b></p> <ul style="list-style-type: none"> <li>• pure metals have layers</li> <li>• layers can slide</li> <li>• thus, pure metals are soft</li> <li>• soft metals are not very useful for products</li> <li>• alloys are mixtures of metal with other elements</li> <li>• thus, alloys have distorted layers</li> <li>• thus, no layer can slide</li> <li>• making alloys harder</li> <li>• meaning they can be more useful</li> </ul>			
09.1	calcium: 2+ sulfur: 2-		1 1	AO2 5.2.1.2
09.2	<p>calcium should have the following electron arrangement: 2,8,8,2 (shown as dots/crosses)</p> <p>sulfur should have the following: 2,8,6 (shown as crosses/dots)</p> <p>calcium sulphide should have: calcium have the electron arrangement 2,8,8 with a 2+ positive charge sulfur should have the electron arrangement 2,8,6 (shown as crosses/dots) with 2 additional electrons (shown as dots/crosses) taken from calcium and a 2- negative charge</p>	<p>1 mark for calcium</p> <p>1 mark for sulfur</p> <p>1 mark for calcium sulfide</p>	1 1 1	AO2 5.2.1.2



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09.3	advantage: <ul style="list-style-type: none"> <li>• shows simplest ratio of atoms involved</li> <li>• shows 3D structure</li> </ul> disadvantage: <ul style="list-style-type: none"> <li>• shows bonds acting in one direction (when they act in all directions)</li> <li>• only shows a small fraction of ions involved in ionic structure</li> <li>• not representative – atoms not calls and balls not sticks</li> </ul>	accept any other suitable answers	1  1	AO3 5.2.1.3
10.1	A: gas D: liquid		1 1	AO2
10.2	high melting point conducts electricity when solid and liquid		1 1	AO2
10.3	C sodium chloride is an ionic compound high melting point conducts electricity when liquid but not when solid		1 1 1 1	AO2 AO3
10.4	A		1	AO2
10.5	covalent bonds small molecule gas at room temperature		1 1	AO2