

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	carbon (is oxidised)	Just 'carbon dioxide' (0)	(1)

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	<p style="text-align: center;">1 mark if answer only mentions one of the metals.</p> <p>An explanation linking two of iron is lower in reactivity than aluminium/OR A (1)</p> <p>carbon can remove the oxygen from iron oxide (1)</p> <p>electrolysis is a more powerful method (than using carbon) / electrolysis is needed to {remove the oxygen from/reduce} aluminium oxide (1)</p> <p>iron compounds less stable than aluminium compounds/OR A (1)</p>	<p>Allow carbon is more reactive than iron /OR A(1)</p> <p>Allow aluminium is more reactive than carbon /OR A (1)</p> <p>Ignore carbon can reduce iron oxide</p> <p>Ignore electrolysis is used to extract aluminium</p>	(2)

Question Number	Answer	Acceptable answers	Mark
1(b)	<p>An explanation linking three of atoms of gold all the same (size) (1)</p> <p>in pure gold {layers/rows/sheets/lines} of the {gold / metal} atoms slide over each other (when force is applied) (1)</p> <p>copper atoms are {smaller / different size} (1)</p> <p>(copper atoms) {disrupt / distort /disturb} the {structure / layers} (1)</p> <p>stops {layers/rows/sheets/lines} of gold atoms from sliding over each other (1)</p>	<p>Reject the use of the word molecule once only</p> <p>Allow particles</p> <p>If layers/rows/sheets/lines is omitted twice, you can award one mark.</p>	(3)

Question Number	Indicative Content	Mark																												
QWC	<p>*1(c)</p> <p>An explanation including some of the following points</p> <table border="1"> <thead> <tr> <th>Use</th> <th>Relevant properties</th> </tr> </thead> <tbody> <tr> <td colspan="2">Aluminium</td> </tr> <tr> <td>aeroplanes, cars, bicycles, trains, trucks, ladders, window frames, door frames, greenhouses, pylons, ship masts, walking poles, golf clubs, baseball bats</td> <td>low density (allow light), strong, resistant to corrosion</td> </tr> <tr> <td>(overhead) power/electricity cables</td> <td>low density (allow light), good conductor of electricity, resistant to corrosion</td> </tr> <tr> <td>foil, food packaging, cans, sweet wrappers, saucepans, blister packs for pills</td> <td>low density (allow light), resistant to corrosion</td> </tr> <tr> <td colspan="2">Copper</td> </tr> <tr> <td>electrical wires/cables, lightning conductors, electromagnets</td> <td>good conductor of electricity</td> </tr> <tr> <td>water pipes, roofing, coins, jewellery, statues, musical instruments</td> <td>resistant to corrosion</td> </tr> <tr> <td colspan="2">Gold</td> </tr> <tr> <td>jewellery, coins, in dentistry</td> <td>excellent resistance to corrosion, valuable, low strength</td> </tr> <tr> <td>electronic devices, circuit boards, switch contacts</td> <td>excellent conductor of electricity</td> </tr> <tr> <td colspan="2">Silver</td> </tr> <tr> <td>jewellery, cutlery, coins</td> <td>very good resistance to corrosion, valuable, low strength</td> </tr> <tr> <td>electronic devices, circuit boards, switch contacts</td> <td>excellent conductor of electricity</td> </tr> </tbody> </table> <p> General points A property must be relevant to the use and from the table in the question. Ignore additional properties. Look for the use first, then the relevant property. Candidates who just re-write or compare the properties with no uses score no marks. Ignore non-specific uses such as building materials/structures, making alloys </p>	Use	Relevant properties	Aluminium		aeroplanes, cars, bicycles, trains, trucks, ladders, window frames, door frames, greenhouses, pylons, ship masts, walking poles, golf clubs, baseball bats	low density (allow light), strong, resistant to corrosion	(overhead) power/electricity cables	low density (allow light), good conductor of electricity, resistant to corrosion	foil, food packaging, cans, sweet wrappers, saucepans, blister packs for pills	low density (allow light), resistant to corrosion	Copper		electrical wires/cables, lightning conductors, electromagnets	good conductor of electricity	water pipes, roofing, coins, jewellery, statues, musical instruments	resistant to corrosion	Gold		jewellery, coins, in dentistry	excellent resistance to corrosion, valuable, low strength	electronic devices, circuit boards, switch contacts	excellent conductor of electricity	Silver		jewellery, cutlery, coins	very good resistance to corrosion, valuable, low strength	electronic devices, circuit boards, switch contacts	excellent conductor of electricity	(6)
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Level	0	No rewardable content
1	1 - 2	a limited explanation e.g. states correct uses of two metals / explains a use of one of the metals related to a property in the table the answer communicates ideas using simple language and uses limited scientific terminology spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	a simple explanation e.g. states correct uses of three metals and relates one use to a property / explains uses of two metals related to their properties in the table the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately spelling, punctuation and grammar are used with some accuracy
3	5 - 6	a detailed explanation e.g. explains uses of three metals and relates use to property in the table in each case the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately spelling, punctuation and grammar are used with few errors

Question number	Answer	Mark
2(a)(i)	An explanation that makes reference to: identification – knowledge (1 mark) and reasoning /justification – knowledge (1 mark): <ul style="list-style-type: none"> • a strong acid is completely ionised in solution/exists completely as ions (1) • but a weak acid is only partly ionised/exists mainly as molecules with very few ions present (1) 	(2)

Question number	Answer	Mark
2(a)(ii)	hydroxide ions react with hydrogen ions and reduce the hydrogen ion concentration therefore increase pH (1)	(1)

Question number	Answer	Mark
2(b)	ZnO + 2HNO ₃ → Zn(NO ₃) ₂ + 2H ₂ O <ul style="list-style-type: none"> • zinc nitrate formula (1) • full, balanced equation (1) 	(2)

Question number	Answer	Additional guidance	Mark
2(c)	mass = $50 \times \frac{40}{1000}$ (1) = 2 (g) (1)	Award full marks for correct numerical answer without working.	(2)

Question Number	Indicative content
2(d)	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.</p> <p>The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <p style="text-align: center;">AO2 (3 marks)</p> <ul style="list-style-type: none"> • suitable acid: sulfuric acid • suitable substance : magnesium oxide / magnesium carbonate / magnesium hydroxide / magnesium • equation for reaction: $MgO + H_2SO_4 \rightarrow MgSO_4 + H_2O/$ $Mg(OH)_2 + H_2SO_4 \rightarrow MgSO_4 + 2H_2O/$ $MgCO_3 + H_2SO_4 \rightarrow MgSO_4 + H_2O + CO_2/$ $Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$ <p style="text-align: center;">AO3 (3 marks)</p> <ul style="list-style-type: none"> • add solid to warmed acid until in excess solid remains (oxide and hydroxide) / add solid a little at a time until no more bubbles (carbonate/metal) • filter off the excess solid, pour remaining solution into an evaporating basin • {heat solution / leave the water to evaporate} • until pure salt crystals form and then dry salt crystals with absorbent paper/leave to dry.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> • The plan attempts to link and apply knowledge and understanding of scientific enquiry, techniques and procedures, flawed or simplistic connections made between elements in the context of the question. (AO2) • Analyses the scientific information but understanding and connections are flawed. An incomplete plan that provides limited synthesis of understanding. (AO3)
Level 2	3–4	<ul style="list-style-type: none"> • The explanation is mostly supported through linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, some logical connections made between elements in the context of the question. (AO2) • Analyses the scientific information and provides some logical connections between scientific enquiry, techniques and procedures. A partially completed plan that synthesises mostly relevant understanding, but not entirely coherently. (AO3)
Level 3	5–6	<ul style="list-style-type: none"> • The explanation is supported throughout by linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, logical connections made between elements in the context of the question. (AO2) • Analyses the scientific information and provide logical connections between scientific concepts throughout. A well-developed plan that synthesises relevant understanding coherently. (AO3)