

Question number	Answer	Additional guidance	Mark
2(a)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): <ul style="list-style-type: none"> <li>a negative ion must have more electrons than protons in the particle (1)</li> <li>therefore Z will have a 2- charge (1)</li> </ul>	Do not allow any comparison involving neutrons.	(2)

Question number	Answer	Additional guidance	Mark
2(b)	$40 + 2 \times (14 + 16 \times 3)$ (1) = 164 (1)	Award full marks for correct numerical answer without working.	(2)

Question number	Answer	Mark
2(c)	<ul style="list-style-type: none"> <li>Li ion with empty outer shell (1)</li> <li>1+ charge on Li (1)</li> <li>8 electrons on outer shell of F (1)</li> <li>1- charge on F (1)</li> </ul>	(4)

Question number	Answer	Mark
3(a)(i)	C	(1)

Question number	Answer	Mark
3(a)(ii)	C	(1)

Question number	Answer	Mark
3(b)	Any two of the following points. For the acid, use the same: <ul style="list-style-type: none"> <li>volume (1)</li> <li>concentration (1)</li> <li>temperature (1)</li> </ul>	(2)

Question number	Answer	Mark
3(c)(i)	electrolysis (1)	(1)

Question number	Answer	Mark
3(c)(ii)	An answer that combines identification- knowledge (1 mark) and understanding (1 mark) and reasoning/justification- understanding (1 mark) <ul style="list-style-type: none"> <li>aluminium compounds are more stable than iron compounds (1)</li> <li>so carbon is not a strong enough reducing agent to produce aluminium from its ore (1)</li> </ul>	(2)

Question number	Answer	Mark
3(d)	$\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$ <ul style="list-style-type: none"> <li>Correct formulae (1)</li> <li>Balancing of correct formulae (1)</li> </ul>	(2)

Question number	Answer	Mark												
4(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>salt</th> <th>soluble</th> <th>insoluble</th> </tr> </thead> <tbody> <tr> <td>ammonium chloride</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>lithium sulfate</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>magnesium carbonate</td> <td></td> <td style="text-align: center;">✓</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>All three correct (2)</li> <li>Any two correct (1)</li> </ul>	salt	soluble	insoluble	ammonium chloride	✓		lithium sulfate	✓		magnesium carbonate		✓	(2)
salt	soluble	insoluble												
ammonium chloride	✓													
lithium sulfate	✓													
magnesium carbonate		✓												

Question number	Answer	Additional guidance	Mark
4(b)	<ul style="list-style-type: none"> <li>mass values in correct places (1)</li> <li>multiplication by 100 (1)</li> <li>correct final answer to two significant figures (1)</li> </ul>	$\frac{2.53}{2.85} \times 100 = 88.8\%$ 89% (to 2 s.f.) Award full marks for correct numerical answer without working.	(3)

Question number	Answer	Mark
4(c)	An explanation that combines identification – improvement of the experimental procedure (maximum 2 marks) and justification/reasoning, which must be linked to the improvement (maximum 2 marks): <ul style="list-style-type: none"> <li>add excess sodium sulfate solution rather than a few drops (1)</li> <li>so more reaction occurs to form more lead sulfate (1)</li> <li>filter the reaction mixture rather than pour off the liquid(1)</li> <li>so none of the lead sulfate is lost on separation(1)</li> <li>wash the lead sulfate (1)</li> <li>so the impurities are removed (1)</li> <li>place the lead sulfate in an oven/warm place (1)</li> <li>so the lead sulfate is dry (1)</li> </ul>	(4)

Question number	Answer	Mark
4(d)	<ul style="list-style-type: none"> <li>volumes of solution too large for titration method (1)</li> <li>large volumes of liquid need to be heated and then allowed to crystallise (1)</li> </ul>	(2)

Question number	Answer	Mark
5(a)(i)	C	(1)

Question number	Answer	Mark
5(a)(ii)	C	(1)

Question number	Answer	Mark
5(b)	reactants are being used up (1)	(1)

Question number	Answer	Mark
5(c)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): <ul style="list-style-type: none"> <li>aluminium and copper have different size atoms (1)</li> <li>and so this prevents the layers of metal atoms from sliding over one another (1)</li> </ul>	(2)

Question number	Answer	Additional guidance	Mark
5(d)	proportion gold = $9 \div 24$ (= 0.375) (1)  mass = $0.375 \times 12 = 4.5$ (g) (1)	Award full marks for correct numerical answer without working.	(2)

Question number	Answer	Mark
6(a)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): <ul style="list-style-type: none"> <li><b>J</b> and <b>K</b> are electrolytes (1)</li> <li>because their solutions conduct electricity and are decomposed (1)</li> </ul>	(2)

Question number	Answer	Mark
6(b)	D	(1)

Question number	Answer	Mark
6(c)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (3 marks): <ul style="list-style-type: none"> <li>hydrogen (<math>H^+</math>) and sodium (<math>Na^+</math>) ions attracted to cathode, hydroxide (<math>OH^-</math>) ions and sulfate (<math>SO_4^{2-}</math>) ions attracted to anode (1)</li> <li>because the ions are attracted to the oppositely charged electrode (1)</li> <li>2 hydrogen ions/2 <math>H^+</math> accept 2 e to form hydrogen molecule/<math>H_2</math> (1)</li> <li>4 hydroxide ions/4 <math>OH^-</math> lose 4 e to form oxygen molecule/<math>O_2</math> (1)</li> </ul>	(4)

Question number	Answer	Mark
6(d)	$\text{Cu}^{2+} + 2\text{e}^{-} \rightarrow \text{Cu}$ <ul style="list-style-type: none"> <li>• all species (1)</li> <li>• balancing (1)</li> </ul>	(2)

Question number	Answer	Mark
7(a)(i)	<p>An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (2 marks):</p> <ul style="list-style-type: none"> <li>• rate increased/time to reach equilibrium reduced (1)</li> <li>• because gas molecules closer/more concentrated (1)</li> <li>• so increased collision rate/more frequent collisions(1)</li> </ul>	(3)

Question number	Answer	Mark
7(a)(ii)	A	(1)

Question number	Answer	Mark
7(b)	equilibrium position/usefulness of by-products	(1)

Question number	Answer	Marks
2 (a)	<p><b>D</b> a salt + water</p> <p><b>The only correct answer is D</b></p> <p><b>A</b> is not correct because a metal oxide reacting with acid would not produce carbon dioxide as one of the products</p> <p><b>B</b> is not correct because a metal oxide reacting with acid would not produce hydrogen as one of the products</p> <p><b>C</b> is not correct because a metal oxide reacting with acid would not produce oxygen as one of the products</p>	(1)

Question number	Answer	Acceptable answers	Marks
2 (b)	<p>A description to include</p> <ul style="list-style-type: none"> <li>effervesces/fizzes/bubbles (1)</li> <li>(solid) disappears / (colourless) solution (formed) (1)</li> </ul>	<p>ignore gas/carbon dioxide evolved /steam/smoke</p> <p>reject ppt /any colour</p> <p>allow (solid) dissolves/decreases in size /clear</p> <p>Ignore disintegrate/breaks up</p>	(2)

Question number	Answer	Acceptable answers	Marks
2 (c) (i)	<p>An explanation including</p> <ul style="list-style-type: none"> <li>decomposing / breaking down of (compounds/ substance/ electrolyte) (1)</li> <li>direct current / d.c. supply / using electrical energy / electricity (1)</li> </ul> <p>(mark independently)</p>	<p>allow splitting up/breaking up ignore separate reject thermal decomposition reject breaking down of elements/atoms/molecules/metals/bonds</p> <p>reject a.c. supply</p>	(2)

Question number	Answer	Acceptable answers	Marks
2 (c) (ii)	<p>A description to include</p> <ul style="list-style-type: none"> <li>a glowing splint (1) <b>M1</b></li> <li>relights (1) <b>M2</b></li> </ul> <p><b>M2</b> dependent on <b>M1</b></p>	<p>allow smouldering/embering splint (1) ignore blown out reject unlit splint reject other tests</p> <p>lighted splint burns brighter (2)</p>	(2)

Question number	Answer	Acceptable answers	Marks
2 (c) (iii)	<p>A description including the following:</p> <ul style="list-style-type: none"> <li>• lighted/lit splint / ignite gas (1) <b>M1</b></li> <li>• gas burns / with (squeaky) pop (if air present) (1) <b>M2</b></li> </ul> <p><b>M2 dependent on M1</b></p>	allow flame	(2)

**(Total for question 2 = 9 marks)**

GCSE Chemistry 5CH1H/01 Mark Scheme – November 2012

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	electrical (energy) / electricity / direct (electric) current	<b>Reject</b> {ac/ alternating current}	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	hydrogen	H <sub>2</sub>	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	A description including (damp blue or red) litmus (paper) ) (turns red and) bleached / white )	<p><b>Allow</b> use of any suitable indicator (1) with correct result (1) eg Universal Indicator (1) is bleached (1) starch-iodide paper (1) turns blue-black (1)</p> <p><b>Allow</b> bleaches indicator (1)</p> <p><b>Do not allow</b> colourless for {bleached/white} if indicator paper is used</p> <p><b>Ignore</b> indicator gets lighter</p> <p><b>Ignore</b> any incorrect middle colour mentioned</p> <p><b>Ignore</b> smells of swimming pools</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
1(b)	<b>B</b> electrolysis		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
1(c)	carbon dioxide	CO <sub>2</sub>	<b>(1)</b>



Question Number	Answer	Acceptable answers	Mark
<b>1(d)</b>	<p><math>\text{CuO} + 2 \text{HCl} \rightarrow \text{CuCl}_2 + \text{H}_2\text{O}</math></p> <p>2 (1)  <math>\text{H}_2\text{O}</math> (1)</p> <p>Maximum 1 mark if additional incorrect balancing</p>	<p><b>Reject</b> obvious incorrect symbols and subscripts  eg  <math>\text{h}_2\text{O}</math> (0)    <math>\text{H}^2\text{O}</math> (0)  <math>\text{H}_2\text{o}</math> (0)  <math>\text{H2O}</math> (0)  <b>Ignore</b> state symbols</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)(i)</b>	electrical (energy) / electricity / direct (electric) current		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)(ii)</b>	A description including <ul style="list-style-type: none"> <li>{light / ignite} gas / lighted splint (1)</li> <li>gas burns / (squeaky) pop (if air is present) (1)</li> </ul>	reject glowing splint second mark conditional on first	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)</b>	sea water / salt / brine / sodium chloride (solution)		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(i)</b>	<b>D</b> salt and water only		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(ii)</b>	A description to include two from <ul style="list-style-type: none"> <li>(green) solid {disappears / dissolves} (1)</li> <li>effervesces / bubbles (of colourless gas) given off (1)</li> <li>blue (solution) forms (1)</li> </ul>	ignore references to names of products fizz goes blue ignore incorrect colours of solution ignore temperature rise	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)</b>	B hydrochloric acid		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(i)</b>	magnesium nitrate	<b>Ignore</b> any symbols or formulae	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(ii)</b>	A carbon dioxide		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(i)</b>	A description including the following litmus <b>(1)</b> turns <u>white</u> /bleaches <b>(1)</b> second mark is dependent on the first	<b>Allow</b> UI paper <b>Ignore</b> any colour (changes) before bleaching; but <b>reject</b> further colour changes after bleaching	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(ii)</b>	use fume cupboard / well ventilated room	<b>Allow</b> open windows <b>Ignore</b> gas mask / breathing apparatus etc / any other general safety precautions	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)(iii)</b>	$2\text{HCl} \rightarrow \text{H}_2 + \text{Cl}_2$ LHS formula <b>(1)</b> RHS formulae <b>(1)</b> balancing correct formulae <b>(1)</b>	<b>Allow</b> correct multiples <b>Ignore</b> state symbols/ word equations <b>Reject</b> lower case h or c or upper case L/ incorrect subscripts e.g. $\text{H}^2$ , $\text{H}_2$ <b>Allow</b> = for $\rightarrow$	<b>(3)</b>

**Total for Question 3 = 9 marks**