

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

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

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

Question Number	Answer	Acceptable answers	Mark
<b>1(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>1(d)(i)</b>	<p>An explanation linking</p> <ul style="list-style-type: none"> <li>• tablet C (1)</li> <li>• because it neutralises greatest volume of acid (1)</li> </ul>	ignore references to rate	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(d)(ii)</b>	<ul style="list-style-type: none"> <li>• {crushed tablets / chewed tablets} have a shorter reaction time (than whole tablets) (1)</li> </ul>	ignore crushed because times are quicker / larger surface area / do not need to break down	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(a)</b>	magnesium nitrate water carbon dioxide  all three correct (2) magnesium nitrate + one other correct (1)	allow correct formulae	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)(i)</b>	C – neutralisation		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)(ii)</b>	$\text{ZnO} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2\text{O}$ (3)  LHS (1) RHS (1) balancing of correct formula (1)	correct multiples ignore state symbols	<b>(3)</b>

Question Number	Indicative Content	Mark	
<b>QWC</b>	<b>* 2(c)</b>	<p>A description including some of the following points</p> <p>experiment set up</p> <ul style="list-style-type: none"> <li>• hydrochloric acid in container</li> <li>• carbon rods in acid</li> <li>• attach rods to electrical supply</li> <li>• d.c. supply(or reference to positive and negative)</li> <li>• test tubes to collect gases</li> </ul> <p>test hydrogen</p> <ul style="list-style-type: none"> <li>• lighted splint</li> <li>• squeaky pop (with air)/burns</li> </ul> <p>test chlorine</p> <ul style="list-style-type: none"> <li>• (damp blue) litmus paper</li> <li>• (turns red then) bleaches/white</li> </ul>	<b>(6)</b>
<b>Level</b>		No rewardable content	
<b>1</b>	<b>1 – 2</b>	<ul style="list-style-type: none"> <li>• a limited description e.g. simple description/diagram of electrolysis set up OR description of test for one of the gases.</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
<b>2</b>	<b>3 – 4</b>	<ul style="list-style-type: none"> <li>• a simple description e.g. a full description of electrolysis OR test for both gases OR simple description of electrolysis and the test for one of the gases.</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>	
<b>3</b>	<b>5 – 6</b>	<ul style="list-style-type: none"> <li>• a detailed description e.g. description of electrolysis and test for both gases OR a full description of electrolysis and of one gas test.</li> <li>• The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>	

Question Number	Answers	Acceptable Answers	Mark
<b>3 (a)</b>	A aluminium nitrate and lead sulfate		<b>(1)</b>

Question Number	Answers	Acceptable Answers	Mark
<b>3 (b)</b>	<p>An explanation linking two of the following</p> <p>strong (forces of / electrostatic) attraction (1)</p> <p>(between) oppositely charged <u>ions</u> (1)</p> <p>requires lot of heat/energy { to separate ions/overcome forces/break bonds} (1)</p>	<p>Any reference to molecules/molecular/intermolecular/covalent scores 0 marks overall</p> <p>strong bonds ignore "between atoms" for this mark ignore strong lattice / giant structure</p> <p>positive and negative <u>ions</u> reject between bonds reject charged atoms for this mark</p> <p>{ high / more} { heat / energy}</p> <p>ignore hard to melt/high temperature needed</p>	<b>(2)</b>

Question Number	Answers	Acceptable Answers	Mark
<b>3 (c) (i)</b>	<b>white</b> { precipitate /solid}	<b>white</b> powder	<b>(1)</b>

Question Number	Answers	Acceptable Answers	Mark
<b>3(c) (ii)</b>	<p>BaSO<sub>4</sub> + 2KCl (2)</p> <p>OR</p> <p>BaSO<sub>4</sub> + KCl (1)</p>	<p>SO<sub>4</sub>Ba / ClK</p> <p>Ignore incorrect use of case, or use of superscript or large number 4</p>	<b>(2)</b>

Question Number	Answers	Acceptable Answers	Mark
<b>3(d)(i)</b>	C K <sup>+</sup>		<b>(1)</b>

Question Number	Answers	Acceptable Answers	Mark
<b>3 (d) (ii)</b>	<p>A description linking three of the following</p> <p>(sequence has to be correct for full marks)</p> <p>M1 add/mix/react only sodium carbonate (solution) and lead nitrate (solution) (1)</p> <p>M2 filter (off precipitate) (1)</p> <p><b>M3 dep on M2</b></p> <p>M3 wash/rinse (solid/residue with distilled water)</p> <p>OR</p> <p>dry using {filter paper/paper towel/in a (warm/drying) oven} (1)</p>	<p>add/mix/react the (two) solutions/them</p> <p>for M1 ignore warm/heat mixture</p> <p>if any indication of heating to evaporate anywhere only M1 can be scored</p> <p>if any other reagent added eg acid can score max 2 for question</p> <p>decant (off the solution)</p> <p>reject if wash with acid or other reagent</p> <p>leave to dry / in the sun / on a radiator / near a window</p> <p>reject heat/hot oven</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)</b>	D aq l		<b>(1)</b>

Question Number	Answer	acceptable answers	Mark
<b>4(b)</b>	$\text{H}^+ + \text{OH}^- (1) \rightarrow \text{H}_2\text{O} (1)$	LHS (1) RHS (1) ignore state symbols, even if incorrect. allow inclusion of spectator ions, $\text{Na}^+$ and $\text{Cl}^-$ , if shown on both sides for one mark max	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(i)</b>	suitable acid-base indicator eg methyl orange, phenolphthalein	litmus reject universal indicator allow recognisable phonetic spelling	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(ii)</b>	correct colour change for suitable indicator in 4(c)(i):  methyl orange : yellow → orange/pink/red  phenolphthalein : magenta/pink → colourless	litmus : blue → red  ignore clear	<b>(1)</b>

Link 4ci and 4cii together on e-Pen

Question Number	Answer	Acceptable answers	Mark
<b>4(d)</b>	rel mass NaOH = 23.0 + 16.0 + 1.00 (1)  concentration = $\frac{20.0}{\text{formula mass}} \times 1$ (1)	(= 40.0) (1)  0.5 (mol dm <sup>-3</sup> ) without working (2)	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(e)</b>	moles of NaOH = $\frac{25.0 \times 1.50}{1000}$ (1) (= 0.0375 moles) ratio 1 : 1 / moles NaOH = moles HCl (1)  conc of HCl = $\frac{0.0375 \times 1000}{30.0}$ (1) (= 1.25 (mol dm <sup>-3</sup> )) OR 25.0 x 1.50 = 30.0 x conc acid (2)  conc of HCl = $\frac{25.0 \times 1.50}{30.0}$ (1) (=1.25 (mol dm <sup>-3</sup> ))	0.0375 (1) – without working shown  conc of HCl = 1.25 (mol dm <sup>-3</sup> )(3) without any working shown allow ecf  conc = $\frac{30.0 \times 1.50}{25.0} = 1.80$ (2) (mol dm <sup>-3</sup> )  allow 0.00125 /0.125 / 12.5 max 2	<b>(3)</b>