

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

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

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

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

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

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

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

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

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

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

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

Question Number	Answers	Acceptable Answers	Mark
3 (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>	(2)

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

Question Number	Answers	Acceptable Answers	Mark
3(c) (ii)	<p>BaSO₄ + 2KCl (2)</p> <p>OR</p> <p>BaSO₄ + KCl (1)</p>	<p>SO₄Ba / ClK</p> <p>Ignore incorrect use of case, or use of superscript or large number 4</p>	(2)

Question Number	Answers	Acceptable Answers	Mark
3(d)(i)	C K ⁺		(1)

Question Number	Answers	Acceptable Answers	Mark
3 (d) (ii)	<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>M3 dep on M2</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>	(3)

Question Number	Answer	Acceptable answers	Mark
4(a)	D aq l		(1)

Question Number	Answer	acceptable answers	Mark
4(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, Na^+ and Cl^- , if shown on both sides for one mark max	(2)

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

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

Link 4ci and 4cii together on e-Pen

Question Number	Answer	Acceptable answers	Mark
4(d)	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^{-3}) without working (2)	(2)

Question Number	Answer	Acceptable answers	Mark
4(e)	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 ⁻³)) 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 ⁻³))	0.0375 (1) – without working shown conc of HCl = 1.25 (mol dm ⁻³)(3) without any working shown allow ecf conc = $\frac{30.0 \times 1.50}{25.0} = 1.80$ (2) (mol dm ⁻³) allow 0.00125 /0.125 / 12.5 max 2	(3)