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 • {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 • (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 • 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)	• {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)	$ZnO + 2HCl \rightarrow ZnCl_2 + H_2O$ (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 • 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 • lighted splint • squeaky pop (with air)/burns test chlorine • (damp blue) litmus paper • (turns red then) bleaches/white	**(6)**
Level		No rewardable content	
1	**1 – 2**	• 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**	• 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**	• 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)	An explanation linking two of the following strong (forces of / electrostatic) attraction (1) (between) oppositely charged <u>ions</u> (1) requires lot of heat/energy {to separate ions/overcome forces/break bonds} (1)	Any reference to molecules/molecular/intermolecular/covalent scores 0 marks overall strong bonds ignore "between atoms" for this mark ignore strong lattice / giant structure positive and negative <u>ions</u> reject between bonds reject charged atoms for this mark {high / more} {heat / energy} ignore hard to melt/high temperature needed	**(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)	$BaSO_4$ + 2KCl (2) OR $BaSO_4$ + KCl (1)	SO_4Ba / ClK Ignore incorrect use of case, or use of superscript or large number 4	**(2)**

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

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

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

Question Number	Answer	acceptable answers	Mark
4(b)	$H^+ + OH^-$ (1) → H_2O (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 → orange/pink/red phenolphthalein : magenta/pink → colourless	 litmus : blue → 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 = $\frac{20.0}{\text{formula mass}}$ x 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)**