Question Number	Answer	Acceptable answers	Mark
1(a)(i)	**A** calcium ion, Ca^{2+}		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	A description including • white (1) • precipitate/ppt/ppte/solid **(1)**	Maximum 1 mark if bubbles / fizzing / effervescence also mentioned Ignore colour of solution Ignore cloudy Ignore off white/milky Allow crystals **(1)** Ignore powder Ignore name of precipitate	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)	**B** lead chloride		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	(barium chloride (aq) + sodium sulfate (aq) →) sodium chloride (aq) + barium sulfate (s) • sodium chloride (1) • (sodium chloride) (aq) **and** barium sulfate (s) both state symbols matched to the correct product (1)	 Allow NaCl **(1)** Do not allow sodium chlorine Accept $BaSO_4$ for barium sulfate Accept (aq) if sodium chlorine given Do not allow (solid) Do not allow (AQ)	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	An explanation linking • {barium sulfate/it} is {insoluble / does not dissolve} **(1)** • so it {cannot enter/cannot mix with/is not absorbed} into the {blood(stream)/body} **or** it passes through the body (unchanged) **(1)**	{barium sulfate/it} does not dissolve into the blood(stream) **(2)** Allow barium is insoluble / does not dissolve **(1)** Ignore barium sulfate is a precipitate Ignore it cannot be digested	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	**C** iodide, I^-		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	A description linking two points from • flame test / description of flame test mentioning **in** flame (1) • sodium gives a **yellow** flame (1) • potassium gives a {lilac/purple/violet} flame (1)	description can be using (nichrome) wire or damp splint Ignore: hold over/ around/under/above flame Ignore: yellow-orange, orange or any other colour	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	A description linking • blue (1) • precipitate / solid (1) Marked independently. If further, incorrect observations given, use list principle	allow appropriate qualifiers: e.g. 'light blue' but **not** other colours eg green-blue allow ppt	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	$Cu^{2+} + 2OH^- \rightarrow Cu(OH)_2$ (3) Identifies Cu^{2+} on **LHS <u>and</u>** $Cu(OH)_2$ on **RHS** in equation format (1) OH^- formula on **LHS** (1) These two marks are independent and can be scored even if additional ions, correct or incorrect, are given balancing correct symbols (1) This mark is only awarded for a fully correct ionic equation with no additional ions	allow multiples accept $Cu^{2+}(OH^-)_2$ allow Cu^{++}/ Cu^{+2} reject incorrect symbols such as cu^{2+}, Oh^- etc. ignore: state symbols allow = instead of →	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	A description linking • add dil nitric acid then silver nitrate solution (1) • yellow precipitate/solid (1)	 allow silver nitrate solution alone(1) reject if wrong reagent / acid mentioned colour and form both required reject cream reject yellow-orange	 **(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	A description linking • add to sodium hydroxide (solution) and warm (1) • test gases with (moist) (red) litmus paper (1) • (litmus paper) turns blue (1)	 allow sodium hydroxide (solution) alone (1) allow heat solid alone (1) allow Universal Indicator paper/ pH paper(1) allow correct colour change for named indicator	 **(3)**

Question Number	Answer	Acceptable answers	Mark
3(a)(iii)	**C** iron(III), Fe^{3+}		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	A description to include • **white** {precipitate/solid} with calcium (ions) (1) • **white** {precipitate/solid} with aluminium (ions) (1) • (precipitate/solid) dissolves in **excess** for aluminium ions / (precipitate/solid) remains in **excess** for calcium ions (1) 3rd mark dependent on first and/or second mark being awarded	<u>both</u> (ions) form a **white** (1) {precipitate/solid} (1) allow 'both will turn white' for 1 mark allow 'more' for 'excess' ignore clear	**(3)**

Question number	Answer	Mark
4(a)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • the flame test only confirms the presence of lithium ions/Li^+ (1) • but another test is needed to confirm the identity of the anion/negative ion/CO_3^{2-} (1) OR • the red flame test shows the presence of calcium ions Ca^{2+} and not lithium ions/Li^+ (1) • the student did not test for carbonate ions (1)	**(2)**

Question number	Answer		Mark
4(b)	• name: sodium sulfate (1) • formula: Na_2SO_4 (1)	Allow formula consequential on incorrect name	**(2)**

Question number	Answer	Mark
4(c)	C	**(1)**

Question number	Answer	Additional guidance	Mark
4(d)(i)	An answer that provides a description by making reference to: • test gas with moist (red) litmus paper (1) • turns blue (1)	Allow universal indicator paper/pH paper and yellow to blue/purple	**(2)**

Question number	Answer	Additional guidance	Mark
4(d)(ii)	An answer that provides a description by making reference to: • iron(II) – green/pale green/grey-green **and** precipitate /solid (1) • iron(III) – red-brown/brown **and** precipitate /solid (1)	Allow two correct colours (1)	**(2)**

Question number	Answer	Mark
4(d)(iii)	$(Fe^{3+} + 3OH^-) \rightarrow Fe(OH)_3$	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	$CuCl_2$	ensure that 2 is subscript at most half the size of Cl and cases are correct ignore correct charges reject an overall charge	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(d)	A description including the following • put/mix/react (sodium) carbonate and acid in (conical) flask (1) • put limewater in test tube(1) • (carbon dioxide produced) turns lime water {milky/cloudy/white precipitate} (1)	2 max if reactants and limewater are in the wrong vessels with the correct test marks can be awarded for the first two marking points by labelling the diagram "reactants" for sodium carbonate and acid	**(3)**

Question Number	Answer	Acceptable answers	Mark
5(e)	A description including three of the following • make {solutions/dissolve}/ {mix/react} <u>solutions</u> (1) • precipitate (of copper carbonate) (1) • filter (1) • wash (with water) (1) • leave to dry/dry in oven/dry between filter paper (1)	max 2 marks if clear error in process, e.g. heat/add acid/evaporate ignore colours of precipitate accepts forms a solid for precipitate	**(3)**