PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



MARK SCHEME

TOPIC 3: CHEMICAL CHANGES: ACIDS (PAPER 1)

SCORE	PERCENTAGE
/139	%

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(**Q06b 1SC0/1CF, Nov 2020**)

Mark Scheme

Q1.

	Answer	Acceptable answers	Mark
	yellow / orange /red (1)	Combinations of yellow/orange/red pink	**(1)**

(**Q38 1SC0/1CF, June 2013**)

Q2.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	neutralisation (1)	accept recognisable spelling	**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**D** acid + base → salt + water		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	17.12 – 7.02 (1) (=10.10/10.1) (g)	10.10/10.1 (g)	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	$\frac{17.12 - 7.02}{2}$ (1) (=5.05) (g dm^{-3})	5.05 (g dm^{-3}) allow error carried forward from bi	**(1)**

(**Q07 1SC0/1CF, June 2015**)

Q3.

	Answer	Acceptable answers	Mark
(a)(i)	electrolysis	Allow any phonetically correct spelling	**(1)**

(a)(ii)	A description including **two** of the following • Burns/ ignites (1) • Squeaky (1) • pop/explodes (1) • water formed (1)	Ignore references to splint	**(2)**
(b)(i)	**B**hydrochloric acid		**(1)**
(b)(ii)	**C** calcium carbonate		**(1)**
(b)(iii)	An explanation linking **two** of the following • alkali/ base (1) • (remedy) reacts with/ reduces/ removes (acid) (1) • (that is in) excess (1) • neutralises (acid) / pH raised/ forms water (1) • pain {removed/relieved} (1)		**(2)**
(c)	magnesium nitrate / $Mg(NO_3)_2$ (1) water /H_2O (1)	Reject hydrogen oxide	**(2)**

(**Q01 1SC0/1CF, June 2013**)

Q4.

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

Question Number	Answer	Acceptable answers	Mark
(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	*** (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	**0**	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	

(**Q01 1SC0/1CH, June 2014**)

Q5.

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

Question Number	Answer	Acceptable answers	Mark
(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)**

(**Q02 5CH1H/01, June 2015**)

Q6.

	Answer	Acceptable answers	Mark
(a)	A – air		**(1)**
(b)(i)	gas	ignore g alone	**(1)**
(b)(ii)	reaction is reversible / reaction goes both ways	reaction is in /reaches equilibrium	**(1)**
(c)	ammonia + sulfuric acid → ammonium sulfate (2) left hand side (1) right hand side (1)	Allow = for →	**(2)**
(d)	improve crop yields / promote plant growth	 crops grow faster adds essential elements / OWTTE	**(1)**
(e)(i)	burette		**(1)**
(e)(ii)	indicator / any named acid-base indicator	ignore Universal indicator	**(1)**

(**Q28 1SC0/1CF, June 2013**)

Q7.

Question number	Answer	Mark
(i)	ten (times) / 10 (x) / (x) 10	AO1 1 (1)

Question number	Answer	Additional guidance	Mark
(ii)	0.05 (g) OR 0.005 x factor from (i)	0.05 scores whether (i) correct or not. if answer **not** 0.05, only then apply ecf and no working is required e.g x2 AND 0.01 (1); x100 AND 0.5 (1)	AO3 1 (1)

(**QU02c 1SC0/1CH, June 2023**)

Q8.

Question number	Answer	Additional guidance	Mark
(i)	A description to include • bubbles formed {slowly / steadily / quite quickly} / some bubbles form (1) • some metal remains (1)	allow bubbling faster than F / more bubbles than F/ bubbling slower than D / fewer bubbles than D allow some metal has reacted allow metal looks changed mark anything written in table **only** if answer lines blank	(2) AO3-1a/1b

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking dilute: • low concentration (1) • of the {solute / acid / (hydrogen) ions / H^+} (1) strong acid • acid fully {dissociated / ionised} (1) • forming {hydrogen/ H^+} ions (1)	MP2 depends MP1 allow low {mass/ amount} ignore 'not concentrated' ignore 'weak concentration' if no MP1 or MP2. allow 'dilute acid has more water in it'/ 'has had water added' for 1 mark only mark MP3 and MP4 independently ignore all references to pH	(4) AO1-1

(**QU06a 1SC0/1CH, June 2024**)

Q9.

Question number	Answer	Additional guidance	Mark
(i)	pH meter	allow pH probe ignore pH paper / data logger / pH scale	(1) AO3-3b

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking • to ensure that the mixture is evenly spread (1) • to make substances {react/ dissolve} / to speed up the {reaction / dissolving} (1)	allow to mix the reactants allow so pH (in mixture) is uniform / concentration is uniform / to get an accurate pH ignore more accurate / valid / fair test allow 'so the reaction is complete' / 'to dissociate all the hydroxide ions'	(2) AO2-2

Question number	Answer	Additional Guidance	Mark
(iii)	all points plotted correctly (± half a small square) (2) OR 7/8 points plotted correctly (1) S-shaped line of best fit (1)	line of best fit must go through 7 points if the points are not visible a line going through **all** correct values scores 3 reject dot-to-dot line / line starting from origin tramlines allowed here but rejected in (b)(iv) bar chart scores 0	**(3) AO2-1**

Question number	Answer	Additional guidance	Mark
(iv)	pH reading at 4.5 spatula measures from their line on graph	allow ± half a small square on the **y**-axis ignore any candidate working allow ECF from (iii) but if no graph line or multiple lines, cannot score. if bar chart has been drawn for (iii), then mark for biv cannot be awarded	**(1) AO3 -2a**

(**QU01b 1SC0/1CH, June 2024**)

Q10.

Question number	Answer	Additional guidance	Mark
(i)	measuring cylinder	allow burette / pipette / syringe	**AO3-3 (1)**

Question number	Answer	Additional guidance	Mark
(ii)	2.4 + 2.4 + 2.7 (= 7.5) (1) $\frac{7.5}{3}$ = 2.5 (1)	2.5 with or without working scores 2 marks allow ECF for an incorrect evaluation divided by 3 allow 2.4 + 2.4 = 4.8, 4.8/2 = 2.4 (1) 2.4 + 2.4 + 2.7 ÷ 3 = 5.7 (1) 2.4 + 2.7 + 2.4 ÷ 3 = 5.9 (1)	**AO2-2 (2)**

Question number	Answer	Additional guidance	Mark
(iii)	a description to include the following points **First mark** Filter (the mixture) (1) **Second and third marks** A description including two of the following Calcium carbonate / the solid / the residue / precipitate is left on (filter) paper / on the funnel (1) Wash / rinse (the solid/residue/calcium carbonate with distilled water) (1) any method of drying the solid (1)	maximum 1 mark if heat or evaporate or crystallisation method used on mixture or filtrate description or diagram of filtering or diagram of filtering ie (filter) funnel and filter paper do not allow sieving/sifting/draining/decanting do not allow separating funnel pour water over/through solid (in filter paper) clean solid with water do not allow this mark if washing is done after drying eg in an oven / on a windowsill / on a radiator / with filter paper warm it heat it (but not with a Bunsen burner) evaporate the water allow 'leave to dry' do not allow just 'dry it (out/off)'	**AO2-2 (3)**

Question number	Answer	Additional guidance	Mark
(iv)	any one of the following • volume / concentration of {potassium carbonate / carbonate / potassium solution} • concentration of (calcium) nitrate • time allowed for settling	 allow amount of (potassium) carbonate ignore 'volume' alone ignore {amount / volume} of calcium nitrate ignore time (alone) allow temperature allow diameter of test tube	**AO3-3b (1)**

(**Q03b 1SC0/1CF, June 2023**)

Q11.

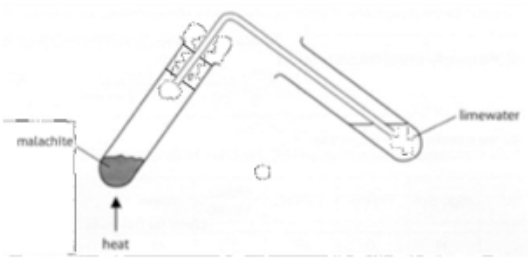
Question number	Answer	Additional guidance	Mark
(i)	pH meter	allow pH probe ignore pH paper / data logger / pH scale	**(1)** **AO 3-3**

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking: • to ensure that the mixture is evenly spread (1) • to make substances {react / dissolve} / to speed up the {reaction / dissolving} (1)	 allow to mix the reactants allow so pH (in mixture) is uniform / concentration is uniform / to get an accurate pH ignore more accurate / valid / fair test allow 'so the reaction is complete' / 'to dissociate all the hydroxide ions'	**(2)** **AO 2-2**

Question number	Answer	Additional Guidance	Mark
(iii)	all points plotted correctly (± half a small square) (2) OR 7/8 points plotted correctly (1) S- shaped line of best fit (1)	 line of best fit must go through 7 points if the points are not visible a line going through **all** correct values scores 3 reject dot-to-dot line / line starting from origin tramlines allowed here but rejected in bar chart scores 0	**(3)** **AO 2-1**

Question number	Answer	Additional guidance	Mark
(iv)	pH reading at 4.5 spatula measures from their line on graph	allow ± half a small square on **y**-axis ignore any candidate working allow ECF from (iii) but if no graph line or multiple lines, cannot score. if bar chart has been drawn for iii, then mark for iv cannot be awarded	**(1)** **AO 3-2**

Q12.

Question number	Answer	Mark
(i)	**C**  **B** and **D** are not correct as the carbon dioxide would escape **A** is not correct as the bung would pop out and the carbon dioxide would escape	**(1)** **AO3.3**

Question number	Answer	Additional guidance	Mark
(ii)	calcium carbonate	allow $CaCO_3$	**(1)** **AO2.2**

Question number	Answer	Additional guidance	Mark
(iii)	formula mass of $Cu_2CO_3(OH)_2$: (63.5×2)+12+(16×3)+((16+1)x 2) = 221 (1) $\frac{22.1}{221}$ = 0.1 (1) 0.1 x 2 = 0.2 (1) 0.2 x 79.5 = 15.9 (1)	15.9 gains 4 marks with or without working allow ECF throughout alternative method: (63.5×2)+12+(16×3)+((16+1)x 2) = 221 (1) mole ratio 1 mole: 2 moles CuO (1) 221g malachite : 2 x 79.5 =159g CuO (1) 22.1 malachite : 159 x 22.1/221 = 15.9g (1) 31.8 (g) scores 3 7.95 (g) scores 3	**(4)** **AO2.1**

Q13.

Question number	Indicative content	Mark
	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 (3 marks) AO3 (3 marks)** • solid **A** is powdered zinc • metal + acid → metal salt + hydrogen • zinc + sulfuric acid → zinc sulfate + hydrogen • bubbles seen so gas is produced • does not turn limewater cloudy so gas is not carbon dioxide • test for hydrogen is lit splint • lit splint makes squeaky pop • so gas produced is hydrogen • solid **B** is copper oxide • metal oxide + acid → metal salt + water • copper oxide + sulfuric acid → copper sulfate + water • no gas is produced • copper oxide is black • some left in excess at bottom of test tube • copper sulfate solution is blue • solid **C** is sodium carbonate • metal carbonate + sulfuric acid → metal sulfate + carbon dioxide + water • sodium carbonate + sulfuric acid → metal sulfate + carbon dioxide + water • bubbles seen so gas is produced • test for carbon dioxide is limewater • limewater turned cloudy so gas produced is carbon dioxide • no reaction with lit splint • so no hydrogen gas produced	**(6)** **AO1;** **AO3**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• The plan attempts to link knowledge and understanding of scientific enquiry, techniques and procedures, flawed or simplistic connections made between elements in the context of the question. (AO1) • Analyses the scientific information but understanding and connections are flawed. An incomplete plan that provides limited synthesis of understanding. (AO3)
Level 2	3–4	• The plan is mostly supported through linkage knowledge and understanding of scientific enquiry, techniques and procedures, some logical connections made between elements in the context of the question. (AO1) • Analyses the scientific information and provides some logical connections between scientific enquiry, techniques and procedures. A partially completed plan that synthesises (AO3)
Level 3	5–6	• The plan is supported throughout by linkage knowledge and understanding of scientific enquiry, techniques and procedures, logical connections made between elements in the context of the question. (AO1) • Analyses the scientific information and provide logical connections between scientific concepts throughout. A well-developed plan that synthesises relevant understanding coherently. (AO3)

Level	Mark	Descriptor	Additional Guidance
	0	No rewardable material.	Read whole answer and ignore all incorrect material and any references to other metals / discard any contradictory material then:
Level 1	1–2	Additional Guidance Correctly identifies at least 1 solid or product Identifies product with correct test Gives at least 1 general observation Gives at least 1 general word equation Identifies all 3 substances	Possible candidate response (all examples, not a definitive list) solid A – zinc (1) reaction with solid A gives off hydrogen (1) limewater cloudy so is carbon dioxide (1) gas is released so must be bubbles (1) metal + acid → salt + hydrogen (2) solid A is zinc and the gas given off is hydrogen (2) A – zinc, B – copper oxide, C – sodium carbonate (2)
Level 2	3–4	Additional Guidance Correctly identifies at least 2 solids with at least one linked explanation Correctly identifies at least 1 solid and 1 product with at least one linked explanation Gives at least one correct word equation Identifies one solid with correct word equation Correctly identifies all 3 solids with linked explanations for just 1 solid	Possible candidate response solid A is zinc and solid B is copper oxide. Copper oxide is black (3) solid C is sodium carbonate as carbon dioxide turned limewater cloudy (3) solid B is copper oxide, which is black. It produces copper sulfate, which is blue (4) zinc + sulfuric acid → zinc sulfate and hydrogen (3) Solid B: copper oxide + sulfuric acid → copper sulfate + water (4) A – zinc, B – copper oxide, C – sodium carbonate; and hydrogen is produced when zinc reacts with an acid as zinc is a metal (4)
Level 3	5–6	Additional Guidance Correctly identifies 2/3 solids with linked explanations for at least two Fully identifies one solid with all products and a linked explanation Identifies all 3 solids backed by relevant information	Possible candidate response solid A is zinc as hydrogen is produced. Solid B is copper oxide as it is black. (5) Solid B: copper oxide + sulfuric acid → copper sulfate (blue solution) + water (5) solid A is zinc because hydrogen is produced. Solid B is copper oxide, which forms blue copper sulfate solution. Solid C is sodium carbonate as it is the only solid that could produce carbon dioxide (6)

(**Q06c 1SC0/1CF, June 2024**)

Q14.

Question number	Answer	Additional guidance	Mark
(i)	ACID use measuring cylinder / pipette / burette (1) BASE balance / scales / weigh out amount (1)	must name apparatus ignore weigh the liquid allow use portion of known mass / use measured amount **in g** / specific mass given [from 0.1 to 10g] allow weight for mass	**(2)**

Question number	Answer	Additional guidance	Mark
(ii)	START colourless END pink / magenta	ignore clear	**(1)**

Question number	Answer	Additional guidance	Mark
(iii)	An explanation linking • {hydrogen **ions**/ H^+} {reacted / neutralised} (1) • {concentration falls/ fewer} H^+ / {concentration rises/ more} OH^- (1)	allow $H^+ + OH^- \longrightarrow H_2O$ for MP1	**(2)**

(**Q06b 1SC0/1CH, June 2019**)

Q15.

Question Number	Answer	Mark
(i)	**A** a balance The only correct answer is **A**. **B** is incorrect because a pipette is used to measure out a volume of liquid and is not used to find the mass of a metal. **C** is incorrect because a stopwatch is used to measure time and is not used to find the mass of a metal. **D** is incorrect because a thermometer is used to measure temperature and is not used to find the mass of a metal.	**(1)**

Question Number	Answer	Additional guidance	Mark
(ii)	Any two from the following • (same) volume of acid (1) • (same) concentration of acid (1) • (same) size of metal (pieces) (1) • (same) temperature (1)	 allow amount / mass of acid allow strength / pH allow surface area ignore references to time	(2)

Question Number	Answer	Additional guidance	Mark
(iii)	copper is {not reacting / no reaction / unreactive / low in reactivity series / not reactive enough}	allow less reactive (than hydrogen) ignore inert (alone)	(1)

Question Number	Answer	Additional guidance	Mark
(iv)	$MgCl_2$ (aq) (1) H_2 (g) (1) $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$	allow AQ allow G	(2)

(**Q03a 1SC0/1CF, June 2019**)

Q16.

Question number	Answer	Additional guidance	Mark
(i)	aq (1) KNO_3 (1)	allow AQ / Aq / aQ reject aqueous allow NO_3K / $K(NO_3)$ / $(NO_3)K$ reject any other formula all letters must be capitals. The 3 must be a subscript.	(2) AO2-1

Question number	Answer	Additional guidance	Mark
(ii)	silver chlor**ide**	reject silver chlor**ine** ignore solid / precipitate / ppt	(1) AO2-1

Question number	Answer	Additional guidance	Mark
(iii)	An explanation including any 3 from • filtration (1) • pour mixture through {filter funnel / filter paper} (1) • {precipitate / residue / solid / AgCl} stays on the paper (1) • {solution / filtrate / liquid} goes through (the paper) • (1)	allow to filter (mixture) allow pour mixture through {filter / funnel} allow precipitate left behind (in filter / funnel) allow particles too big to go through ignore mixture goes through ignore any additional processes **after** filtration step if filtration occurs **after** any other process, e.g. heating, MP1 and MP2 do not score but MP3 and MP4 can be scored diagram can score all MPs	**(3)** **AO3-3a**

(**QU06a 1SC0/1CF, June 2025**)

Q17.

Question number	Answer	Additional guidance	Mark
(i)	aq (1) KNO_3 (1)	allow AQ / Aq / aQ reject aqueous allow NO_3K / $K(NO_3)$ / $(K)NO_3$ reject any other answer all letters must be capitals. The 3 must be a subscript. ignore any brackets in formula	**(2)** **AO2-1**

Question number	Answer	Additional guidance	Mark
(ii)	silver chlor**ide**	reject silver chlor**ine** ignore solid / precipitate / ppt	**(1)** **AO2-1**

Question number	Answer	Additional guidance	Mark
(iii)	An explanation including any 3 from • filtration (1) • <u>pour mixture through</u> {filter funnel / filter paper} (1) • {precipitate / residue / solid / AgCl} stays on the paper (1) • {solution / filtrate / liquid} goes through (the paper) • (1)	allow to filter (mixture) allow <u>pour mixture through</u> {filter / funnel} allow precipitate is left behind (in filter / funnel) allow particles too big to go through ignore mixture goes through ignore any additional processes **after** filtration step if filtration occurs **after** any other process, e.g. heating, MP1 and MP2 do not score but MP3 and MP4 can be scored diagram can score all MPs	**(3)** **AO3-3**

(**QU02a 1SC0/1CH, June 2025**)

Q18.

	Answer	Acceptable answers	Mark
(a)	A description including excess magnesium oxide (1) filter (to remove excess solid / magnesium oxide) (1)		**(2)**
(b)	$MgCO_3 + H_2SO_4 \rightarrow MgSO_4 + H_2O + CO_2$ (2) left hand side (1) right hand side (1)	max 1 if incorrect balancing	**(2)**
(c)	A calculation involving mass of solid = 258.515 – 258.450 (1) (= 0.065 g) concentration = $0.065 \times {}^{1000}/_{500}$ (1)	allow TE from mass of solid for second mark	**(2)**

	(= 0.130 (g dm^{-3}))		

			Indicative Content	
QWC		***(d)**	A description including some of the following points • hardness caused by dissolved calcium and/or ions • boiling water • removes temporary hardness only / not perma hardness • ions removed • by formation of limescale / calcium carbonate • ion exchange resin • run tap water through resin • calcium and / or magnesium ions are exchang ions • which do not cause hardness allow full credit for use of other correct methods such washing soda	
Level	**0**	No rewardable content		
1	**1 - 2**	• a limited description e.g. temporary hardness by boiling water / permanent hardness (& temporary hardness) by ion exchange • 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. use of ion exchange and boiling water removes ions causing hardness • 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 simple description and explanation e.g. boiling water removes only temporary hardness, ion exchange resin removes both types of hardness, by removing calcium and/or magnesium ions from hard water • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors		

(**Q32 1SC0/1CF, June 2013**)

Q19.

Question number	Answer	Additional guidance	Mark
(i)	<table><tr><th>metal</th></tr><tr><td>H</td></tr><tr><td>E</td></tr><tr><td>F</td></tr><tr><td>G</td></tr></table> (2)	score 1 for H F E G all other combinations score 0	**(2)** **AO3-2**

Question number	Answer	Mark
(ii)	**B** put a lighted splint into the gas – the gas ignites with a squeaky pop is the only correct answer **A**, **C** and **D** are not correct because they are not the test for hydrogen	**(1)** **AO1-2**

(**QU03b 1SC0/1CF, June 2025**)

Q20.

Question Number	Answer	Acceptable answers	Mark
(a)	$H_2 + Cl_2 \rightarrow 2HCl$ M1 correct formulae on LHS and RHS **(1)** M2 correctly balanced **(1)**	In M1 do not allow incorrect use of upper/lower case/subscripts but M2 can be awarded for correct balancing dependent on M1 being awarded (but note special case above) accept multiples	**(2)**

Question Number	Answer	Acceptable answers	Mark
(b)	M1 shared pair of electrons between one H and one Cl **(1)** M2 remaining outer electrons correct **(1)**	Accept all permutations of dots and crosses for electrons If any indication of ionic bonding including charges 0/2 symbols not required ignore incorrect symbols eg C/CL M2 dependent on M1 electrons do not need to be in pairs ignore inner shells electrons can be on/in ring or no ring	**(2)**

(**Q17 1SC0/1CF, June 2015**)

Q21.

		Indicative Content	
QWC	*	A description including some of the following points **reactants** • dissolve reactants (in water) • mix reactants / solutions • use of appropriate apparatus • stir **separate product** • filter • use of filter funnel and paper **making pure dry salt** • solid on filter paper • wash with water • dry in oven / leave to dry / in a warm place	
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. mix the two reactants in a beaker OR wash solid and leave to dry. • 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. mix solutions of the reactants in a beaker and then filter. • 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. mix solutions of the reactants in a beaker then filter, wash solid and leave to dry. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(**Q25 1SC0/1CF, June 2013**)

Q22.

	Answer	**Acceptable answers**	**Mark**
(a)(i)	$BaSO_4$	SO_4Ba ignore charges unless incorrect	**(1)**
(a)(ii)	charged particle	charged atom / {particle/atom(s)} that has gained or lost electrons ignore any stated charges	**(1)**
(b)	An explanation linking two of the following points: • barium sulfate does not dissolve (in water) (1) • is not absorbed into blood / body (1) • passes through body (unchanged) (1)	ignore barium sulfate is insoluble in water {mix with / enter} blood allow 'barium sulfate does not dissolve into the bloodstream' for 2 marks allow 'it is insoluble so it is nontoxic' for one mark	**(2)**

		Indicative Content	
QWC	***(c)**	A description including some of the following points **reactants** • dissolve reactants (in water) • mix reactants / solutions • use of appropriate apparatus • stir **separate product** • filter • use of filter funnel and paper	

		making pure dry salt • solid on filter paper • wash with water • dry in oven / leave to dry / in a warm place	
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. mix the two reactants in a beaker OR wash solid and leave to dry. • 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. mix solutions of the reactants in a beaker and then filter. • 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. mix solutions of the reactants in a beaker then filter, wash solid and leave to dry. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

	Answer	**Acceptable answers**	**Mark**
(d)	$Ba + Cl_2$ (→) (1) → BaC_{l2} (1) reactants = 1 product = 1	max 1 for any incorrectly balanced equation	**(2)**

(**Q11 1SC0/1CF, June 2013**)

Q23.

	Answer	**Acceptable answers**	**Mark**
(a)	sodium carbonate + calcium nitrate → sodium nitrate + calcium carbonate (2) LHS (1) RHS (1)	ignore solution / state symbols ignore incorrect attempts at balanced equation ignore mixtures of words and formulae	**(2)**
(b)(i)	C orange-red		**(1)**
(b)(ii)	A description including two points from CLEAN • clean (flame test) wire with (hydrochloric) acid (1) SAMPLE	• moisten splint • put splint into solid • hold splint in (Bunsen) flame ignore : hold <u>over</u> flame use of tongs / spatula etc for equipment, max 1	**(2)**

	• put (wire) into solid (1) TEST • hold (wire) in (Bunsen) flame (1)		
(c)(i)	40/44 (1) (= 0.909) (any fraction) x 100 (1) (= 90.9 / 90.91 / 91(%))	correct answer (2) Ignore 90(%)	**(2)**
(c)(ii)	reaction is incomplete / not hot enough / not heated for long enough / use of impure calcium carbonate	ignore {gas escaping / not all collected / incorrect measurement}	**(1)**
(d)	D have high melting points		**(1)**

(**Q10 1SC0/1CF, June 2013**)

Q24.

	Answer	**Acceptable answers**	**Mark**
	sodium carbonate + calcium nitrate → sodium nitrate + calcium carbonate (2) LHS (1) RHS (1)	ignore solution / state symbols ignore incorrect attempts at balanced equation ignore mixtures of words and formulae	**(2)**

(**Q22 1SC0/1CF, June 2013**)

Q25.

Question number	Answer	Additional guidance	Mark
(i)	189 with or without working scores 2 65 + (14 x 2) + (16 x 6) = (1) = 189 (1)	**one** error i.e incorrect Ar / **one** error in x2 or x3 in expression, but correctly evaluated scores 1 examples (**working needed if not 189)** 65 + (14 + 16) x 2 = 125 (1) 65 + 14 + 6 x 16 = 175 (1) 64 + (14 x 2) + (16 x 6) = 188 (1) (65 x 2) + (14 x 2) + (16 x 6) = 254 (1)	**(2)** **AO2-1**

Question number	Answer	Additional guidance	Mark
(ii)	a description including any 2 from • no change in mass / mass remains constant / (reading on) balance stays the same (1) • no {bubbles / effervescence / fizzing} (1) • {metal / solid / named reactive metal} has gone (1)	allow weight for mass allow stops decreasing ignore mass has decreased allow no (more) {gas / hydrogen} allow has 'dissolved' allow <u>all of the metal</u> has reacted ignore the metal has melted	**(2)** **AO2-2**

(**QU03c 1SC0/1CF, June 2025**)

Q26.

Question Number	Answer	Additional guidance	Mark
(i)	$C_4H_8 + 6O_2 \rightarrow \mathbf{4}CO_2 + \mathbf{4}H_2O$ $4CO_2$ (1) $4H_2O$ (1)		**(2)** AO 2 1

Question Number	Answer	Additional guidance	Mark
(ii)	A description linking • (bubble gas through) limewater (1) • (limewater) turns {milky / cloudy / white precipitate} (1)	second mark dependent on first ignore lit splint goes out	(2) AO 1 1

(**Q06 1SC0/1CF, June 2018**)

Q27.

Question number	Answer	Additional guidance	Mark
(i)	$Cl_2(g) + H_2O(l) \rightleftharpoons HCl(aq) + HClO(aq)$ (3)	all three formulae (only) on correct sides of equation with no incorrect balancing (2) two formulae correct regardless of any other error (1) all three state symbols (1) Do not allow incorrect symbols or non subscripts eg CL^2	(3) AO2

Question number	Answer	Additional guidance	Mark
(ii)	H^+	if any other ions included 0 marks	(1) AO1

Question number	Answer	Additional guidance	Mark
(iii)	neutralisation	allow exothermic reject endothermic	(1) AO1

Question number	Answer	Additional guidance	Mark
(iv)	A description including any two from: • powder disappears (1) • effervescence/ bubbles/ fizzing (1) • blue solution forms (1)	allow dissolves	(2) AO2

(**Q05c 1SC0/1CF, Nov 2021**)

Q28.

Question number	Answer	Additional guidance	Mark
(i)	$Cl_2(g) + H_2O(l) \rightleftharpoons HCl(aq) + HClO(aq)$ (3)	all three formulae (only) on correct sides of equation with no incorrect balancing (2) two formulae correct regardless of any other error (1) all three state symbols (1) Do not allow incorrect symbols or non subscripts eg CL^2	(3) AO2

Question number	Answer	Additional guidance	Mark
(ii)	H^+	if any other ions included 0 marks	(1) AO1

Question number	Answer	Additional guidance	Mark
(iii)	neutralisation	allow exothermic reject endothermic	(1) AO1

(**Q01c 1SC0/1CH, Nov 2021**)

Q29.

Question number	Answer	Mark
(i)	$Ba(OH)_2(s) + 2HCl(aq) \rightarrow BaCl_2(aq) + 2H_2O(l)$	(1) AO 2-1

Question number	Answer	Additional guidance	Mark
(ii)	barium hydroxide {disappears / gets smaller} / (it) becomes clear	allow 'solid' for barium hydroxide allow barium hydroxide dissolves ignore any colours mentioned / colour change/ any incorrect observations ignore becomes a {liquid / solution} reject bubbles	(1) AO 2-2

(**Q05a 1SC0/1CF, June 2024**)

Q30.

Question number	Answer	Mark
(i)	$Ba(OH)_2(s) + 2HCl(aq) \rightarrow BaCl_2(aq) + 2H_2O(l)$	(1) AO2-1

Question number	Answer	Additional guidance	Mark
(ii)	barium hydroxide {disappears / gets smaller} / (it) becomes clear	allow 'solid' for barium hydroxide allow barium hydroxide dissolves ignore any colours mentioned / colour change / any incorrect observations ignore becomes a {liquid/solution} reject bubbles	(1) AO2-2

(**QU01a 1SC0/1CH, June 2024**)

Q31.

Question number	Answer	Additional guidance	Mark
(i)	Left : H_2SO_4 (1) Right : $CuSO_4$ (1)	reject superscript numbers reject superscript numbers incorrect balancing max 1	(2)

Question number	Answer	Mark
(ii)	63.5 + 12 + 3x16 (1) = 123.5 (1)	(2)

Question number	Answer	Mark
(iii)	**A** bubble gas through limewater, limewater turns cloudy **The only correct answer is A** **B** is not correct because test shows only an acidic gas **C** is not correct because test shows only that the gas does not support combustion **D** is not correct because test shows only an acidic gas	**(1)**

(**Q06a 1SC0/1CF, Nov 2020**)

Q32.

Question number	Answer	Additional guidance	Mark
(i)	Left : H_2SO_4 (1) Right : $CuSO_4$ (1)	reject superscript numbers reject superscript numbers incorrect balancing max 1	**(2)**

Question number	Answer	Mark
(ii)	63.5 + 12 + 3x16 (1) = 123.5 (1)	**(2)**

(**Q02a 1SC0/1CH, Nov 2020**)

Q33.

Question number	Answer	Additional guidance	Mark
	$MgCO_3 + 2HCl \rightarrow MgCl_2 + H_2O + CO_2$ (1)	reject any number in front of $MgCl_2$ reject upper case {G / L} / lower case m allow non- subscript 2 but reject superscript 2. ignore correct charges	**(1)** AO2-1

(**QU02c 1SC0/1CH, June 2022**)

Q34.

Question number	Answer	Mark
(i)	ON LEFT: potassium chloride **AND** ON RIGHT: potassium nitrate	**AO2-1** **(1)**

Question number	Answer	Mark
(ii)	**D** is the correct answer **A, B** and **C** are the hazard symbols for corrosive, flammable and harmful	**AO2-1** **(1)**

(**Q03a 1SC0/1CF, June 2023**)

Q35.

Question number	Answer	Additional guidance	Mark
	in either order: calcium chloride (1) water (1)	allow phonetic spellings but reject calcium chlor**ine** allow $CaCl_2$ but formula must be correct for the mark ignore 'solution'/ any state symbols allow H_2O but formula must be correct for the mark if three products given, allow (1) **only** if both correct products are given. four or more products scores (0)	**AO2-1** **(2)**

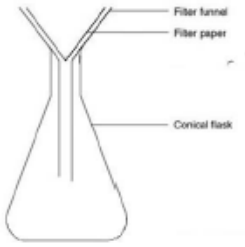
(**Q05b 1SC0/1CF, June 2023**)

Q36.

Question number	Answer	Additional guidance	Mark
	in either order: calcium chloride (1) water (1)	allow phonetic spellings but reject calcium chlor**ine** allow $CaCl_2$ but formula must be correct for the mark ignore 'solution'/ any state symbols allow H_2O but formula must be correct for the mark if three products given, allow (1) **only** if both correct products are given. four or more products scores (0)	**AO2 1 (2)**

(**QU01b 1SC0/1CH, June 2023**)

Q37.

Question number	Answer	Additional guidance	Mark
(i)	 (2) OR diagram: funnel with separate filter paper and (conical) flask (1) labels: (filter) **funnel and filter paper and** (conical) flask (1)	reject diagram with funnel 'closed' at bottom/top but can score MP2 allow 'closed' filter paper allow any suitable apparatus for conical flask e.g. beaker 'flask' label should be appropriate to apparatus drawn ignore labelling of filtrate/residue etc	**(2)**

Question number	Answer	Additional guidance	Mark
(ii)	a description including any three from: • heat solution (to concentrate) (1) then either • leave solution {in warm place / to crystallise} (1) • scrape crystals (from container) / pat dry between filter papers (1) OR • leave solution {to crystallise / to cool} (1) • filter off crystals / decant liquid from the crystals / pat dry between filter papers / dry in oven (1)	if no other marks are scored , allow max 1 for crystallisation (1)	(3)

(**Q03a 1SC0/1CH, Nov 2020**)

Q38.

Question number	Answer	Additional guidance	Mark
	A description to include • heat solution (to evaporate water and concentrate the salt solution) (1) • leave to cool (1)	evaporating all water loses MP1 allow leave {in warm place/on window sill} (for water to evaporate slowly) (1) for several days (1)	(2) AO1

(**Q04b 1SC0/1CH, Nov 2021**)

Q39.

Question number	Answer	Additional guidance	Mark
	A description to include any two for each substance copper hydroxide • filter (off the copper hydroxide) (1) • wash the copper hydroxide with distilled water (1) dry the solid (1) sodium sulfate • pour {sodium sulfate solution /filtrate} into evaporating basin (1) • heat to evaporate water from solution (1) • dry the solid (1)	 ignore sieve allow any suitable means of drying except heating allow 'crystallisation' allow any suitable means of drying eg leave on side to evaporate (1)	**(4) AO 2–2**

(**Q04b 1SC0/1CF, June 2024**)

Q40.

Question number	Answer	Additional guidance	Mark
(i)	Any TWO from • no more bubbles / fizzing (1) • no further change in colour (1) • {solid / copper carbonate} remains at bottom of flask / no more {solid / copper carbonate} dissolves (1)	 ignore references to pH allow cloudy/opaque liquid ignore no more copper carbonate will react	**(2)**

Question number	Indicative content	Mark
(ii)	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO2 and A03 (6 marks)** • filter mixture • using filter funnel and paper • collect filtrate / copper sulfate solution • in conical flask / suitable (named) container • pour into an evaporating basin • heat on water bath / on tripod over Bunsen • until half volume / concentrated / partially evaporated / crystals start to appear around the edge • remove from heat and cover with filter paper • allow to cool • and crystallise • separate crystals using a suitable method • put/place crystals onto absorbent/filter paper • dry in a warm place	**(6)**

Level	Mark	Additional Guidance	General additional guidance – the decision within levels Eg - At each level, as well as content, the scientific coherency of what is stated backed up by planning detail will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance Identifies relevant practical operations	Possible candidate responses • filter the mixture (alone) • allow solution to crystallise (alone) • filter mixture using filter paper - upper part of level
Level 2	3–4	Additional guidance Some correct sequencing of correct operations	Possible candidate responses • filter mixture and collect solution/liquid • evaporate solution and leave to cool • sequence with detail – upper part of level
Level 3	5–6	Additional guidance Sequence of operations to include two from filter to remove excess copper carbonate, crystallise (includes heating & cooling), separate crystals & dry	Possible candidate responses • filter mixture then cool and crystallise • evaporate/heat solution then allow to cool and crystallise • sequence with detail – upper part of level

(**Q06b 1SC0/1CF, Nov 2020**)