Pearson
Edexcel

Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCSE
In Chemistry (1CH0)
Paper 1H

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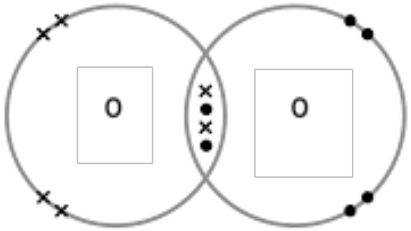
General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer		Mark
1(a)(i)	ionic	allow containing ions accept (soluble) salt ignore names and formulae of ions even if correct ignore molten / aqueous	**(1)** **AO1 1**

Question number	Answer	Mark
1(a)(ii)	**C** magnesium **A** is incorrect as no voltage would be produced **B** is incorrect as there is a bigger difference in reactivity between magnesium and copper than gold and copper **D** is incorrect as there is a bigger difference in reactivity between magnesium and copper than zinc and copper	**(1)** **AO3 2a**

Question number	Answer		Mark
1(a)(iii)	(drops to) zero	allow decreases /stops ignore references to current	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
1(b)(i)	 (2) OR two shared pairs of electrons between two oxygen atoms (1) rest of molecule correct (1)	allow dots, crosses or a mixture of both ignore any inner electrons shown MP2 dependent on MP1	**(2) AO1 1**

Question number	Answer	Additional guidance	Mark
1(b)(ii)	can reuse water produced / water is the only product / produces (constant) voltage (as long as reactants supplied)	ignore does not produce CO_2 / greenhouse gases allow does not make toxic products ignore references to clean energy / less pollution etc.	**(1) AO1 1**

Total for Question 1 = 6 marks

Question number	Answer	Additional guidance	Mark
2(a)(i)	<table><tr><td>proton</td><td>+1 (1)</td><td>1</td></tr><tr><td>neutron</td><td>0</td><td>1 (1)</td></tr><tr><td>electron</td><td>-1 (1)</td><td>negligible</td></tr></table>	allow 1(+) / +, reject -1 reject +1, -1 allow (1)-, reject +1 / 1	**(3)** **AO1 1**

Question number	Answer	Additional guidance	Mark
2(a)(ii)	A description including • 10 protons (1) • 10 electrons (1)	allow {'how many'/ 'number of'} protons allow {'how many'/ 'number of'} electrons / (electronic configuration) 2.8 allow 'number of protons and (number of) electrons' (2) ignore any reference to location of subatomic particles ignore neutrons	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
2(a)(iii)	An explanation linking • <u>same number of</u> protons and electrons (1) • (so) the (+ and -) <u>charges</u> cancel (1)	ignore reference to neutrons allow <u>charge</u> (on neon atom) = <u>0</u> +10 plus -10 = 0 (2)	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
2(b)	90.48x20 + 0.27x21 + 9.25x22 = 2018.77 (1) $\frac{2018.77}{100}$ = 20.1877 (1)	20.2 / 20.19 with or without working scores 2 marks 20.18 / 20.187 with or without working scores 1 mark 2018.77 with or without working (1) allow 90.48x20 + 0.27x21 + 9.25x22 unevaluated (1) or 90.48x0.20 + 0.27x0.21 + 9.25x 0.22 unevaluated (1) incorrect / early rounding loses MP2 allow 3 or more sf	**(2)** **AO2 1**

Total for Question 2 = 9 marks

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

Question number	Answer	Additional guidance	Mark
3(a)(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 3a**

Question number	Answer	Additional guidance	Mark
3(b)	A description including • {silver nitrate / solution} has **ions** (1) • {silver / solid / metal} has **delocalised electrons** (1) • {ions / electrons} move (1)	reject silver nitrate has electrons {that move / delocalised} for MP1 allow {free / sea of} electrons reject <u>silver</u> has ions {that move / delocalised} for MP2 allow charged particles move MP3 for idea of movement of charge (even if, for example, MP1 and/or MP2 reversed or wrong)	**(3)** **AO2 1**

Total for Question 3 = 9 marks

Question number	Answer	Additional guidance	Mark
4(a)(i)	**D** red **A** is incorrect as litmus does not turn colourless **B** is incorrect as litmus is red in acid **C** is incorrect as litmus is red in acid		**(1)** **AO2 2**

Question number	Answer	Additional guidance	Mark
4(a)(ii)	does not give a {number / value} / does not give a range of colours (1)	allow not precise, 'can't tell the pH **value**/ **number**, does not say **how** acidic/ alkaline, only says if acid or alkali, only has 2 (or 3) colours, only red or blue ignore not accurate, 'you can't tell the pH' ignore how pH should be measured	**(1)** **AO2 2**

Question number	Answer	Additional guidance	Mark
4(b)	• provides minerals / phosphorus / phosphates / potassium / nitrogen / nitrates (1) • helps crops grow / grow faster / increase crop yield (1)	allow to provide nutrients allow to prevent mineral deficiencies or specific minerals allow grow more food ignore to keep crops healthy / kills pests	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
4(c)(i)	76(%) with or without working scores 2 $\frac{18.62}{24.50} \times 100$ (1) = 76 (1)	**No ECF on this question** 0.76 scores 1	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
4(c)(ii)	numerator: 3 x 98 = 294 (1) denominator: 502 + (5 x 98) = 992 / (3 x 98) + (5 x 136) + 18 = 992 (1) $\frac{294}{992}$ x 100 = 29.63709677 (1)	**29.64/ 29.6/ 30 shown with no working, scores 1 only** **If working shown mark as indicated** For MP3: allow 2 or more s.f., answer must be correctly rounded allow ecf for MP3 only if all Mr values from either reactants **or** products have been used and answer **<**100%	**(3)** **AO2 1**

Question number	Answer	Additional guidance	Mark
4(c)(iii)	an explanation linking • find a use for calcium sulfate / water / waste product(s) / all products (1) • so the formula **mass** of the <u>desired product</u> increases (1) OR • find a use for **all** products / calcium sulfate **and** water (1) • so atom economy is 100% (1)	MP2 dependent on MP1 in both options ignore find an alternative reaction allow specified use, even if incorrect allow 'amount' ignore references to increasing yield	**(2)** **AO3 2**

Total for Question 4 = 11 marks

Question number	Answer	Additional guidance	Mark
5(a)	An explanation linking • period 2 (1) • (because) 2 (electron) shells (1)	 accept 'row', <u>horizontal</u> line allow electron configurations for each element ignore same number of shells reject 2 outer shells if no other mark awarded period = number of electron shells (1)	**(2)** **AO1 1**

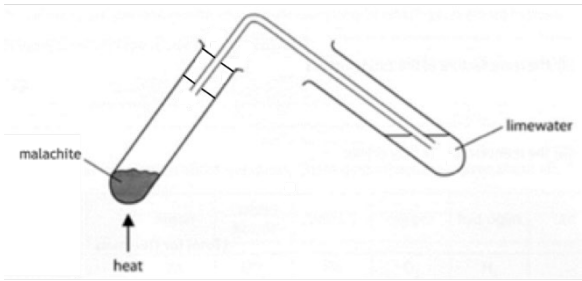
Question number	Answer	Additional guidance	Mark
5(b)(i)	An explanation linking • simple covalent / simple molecular (1) • (because) <u>weak</u> intermolecular forces (of attraction) (1) • (so) only a small / low amount of {energy/heat} is needed (to break these forces) (1)	reject ionic / ions for MP1 & MP2 only ignore covalent alone allow weak intermolecular bonds reject weak covalent bonds reject hydrogen bonds reject weak (intermolecular) forces between bonds ignore less {energy / heat} reject breaking {covalent / ionic} bonds	**(3)** **AO1 1**

Question number	Answer	Mark
5(b)(ii)	**C** less less is the only correct answer **A** is incorrect as the particles will have less energy **B** is incorrect as the particles will move less **D** is incorrect as the particles will have less energy and move less	**(1)** **AO1 1**

Question number	Answer	Mark
5(b)(iii)	**B** Fractional distillation **A**, **C** and **D** are not correct as they would not separate oxygen and nitrogen	**(1)** **AO2 2**

Question number	Answer	Additional guidance	Mark
5(c)	$N_2 + 2O_2 \rightarrow 2NO_2$ (2) all formulae correct (1) balancing of <u>correct formulae</u> for the reaction (1)	do not penalise incorrect cases accept = / ⇌ ignore state symbols reject superscripts allow multiples	**(2)** **AO2 1**

Total for Question 5 = 9 marks

Question number	Answer	Mark
6(a)(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 3b**

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

Question number	Answer	Additional guidance	Mark
6(a)(iii)	formula mass of $Cu_2CO_3(OH)_2$: (63.5×2)+12+(16×3)+((16+1)x2) = 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)x2) = 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**

Question number	Answer	Additional guidance	Mark
6(b)	comments to include three from: method 1 - mixing - strength - means more will react OR method 2 - not mixing - weakness - less will react (1) method 1 and / or method 2 - quantity of carbon not given – weakness - may not be in excess (1) method 1 - use of a metal crucible - strength - conducts more heat (1) method 1 - use of a metal crucible – weakness – metal crucible might react (1) method 1 – transfers reactants between containers – weakness – loss of reactants (1) method 1 and / or method 2 - roaring flame - strength - gives enough energy for reaction to occur (1) method 1 and / or method 2 – separation of copper – weakness - no method given (1)	Note: implication of strength/weakness and method can be obtained from the way in which the candidate gives the answer eg using the metal crucible is better as it conducts more heat Only Method 1 is using the metal crucible so the method has been identified. 'is better' would be another way of saying that it is a strength	**(3)** **AO3 1**

Total for Question 6= 9 marks

Question number	Answer	Additional guidance	Mark
7(a)	Both **C** it is a transition metal it has a high melting point and **D** it is a transition metal it forms coloured compounds are correct **A** and **B** are incorrect as copper is a transition metal	allow 1 mark for any of the following: • **C** only is marked • **D** only is marked • **C** and **D** only are marked all other responses score 0	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
7(b)	An explanation linking • sacrificial (protection) (1) • (because) zinc is more reactive than iron (1) • (so) zinc has a greater tendency to produce ions than iron (1)	ignore galvanise allow zinc reacts {more readily / before iron will react / instead of iron} reject zinc rusts for MP3 only allow steel for iron	**(3)** **AO1 1**

Question number	Answer	Additional guidance	Mark
7(c)(i)	• scales linear (1) • scales chosen give points that extend over half way in both directions (1) • 6 points plotted correctly (± half a square) (1) • curve of best fit (1)	ignore dot to dot line curve must go through / close to all points do not accept obvious tramlines for MP4 if numbers taken directly from table, only MP2 and MP4 can score	**(4)** **AO2 1**

Question number	Answer	Additional guidance	Mark
7(c)(ii)	value taken from candidates graph at 30% (1)	± half a square	**(1)** **AO3 1**

Question number	Answer	Additional guidance	Mark
7(c)(iii)	An explanation linking: • as the % of nickel increases the strength of the alloy increases then decreases (at higher % of nickel) (1) • (therefore) the alloy is strongest when the alloy is most disrupted / ratio of different sized atoms is lowest (1) • (because) when nickel is added to pure copper {layers/sheets/atoms} are prevented from {slipping/sliding/moving} (1)	allow more difficult (to slide / move etc)	**(3)** **AO2 1**

Total for Question 7= 12 marks

Question number	Answer	Mark
8(a)	**D** sodium sulfate **A**, **B** and **C** are incorrect as they are not soluble in water	**(1)** **AO1 2**

Question number	Answer	Additional guidance	Mark
8(b)(i)	64.0 = 0.533333 (1) 120 0.533333 x 100 = 53.333 (1) (%) 53.3 (1)	53.3 with or without working gains 3 marks 53(.33)% with or without working gains 2 marks allow ecf for MP3 only if appropriate Ar values have been used and answer <100% ignore any dot above the 3 13.3 scores 2 marks 16.0 x 100 unevaluated scores 1 120	**(3)** **AO2 1**

Question number	Answer	Additional guidance	Mark
8(b)(ii)	7.20 = 0.06 (1) 120 0.06 x 4 = 0.24 (1) 0.24 x $6.02 \times 10^{23} = 1.444(8) \times 10^{23}$ (1)	$1.444(8) \times 10^{23}$ with or without working gains 3 marks Allow any number of sig figs except 1 allow ECF throughout MP3 only awarded ECF if numbers from the question are multiplied by *L* 120/7.2 = 16.67 (0) 16.67 x 4 = 66.67 (1) 66.67 x *L* = 4.01×10^{25} (1) ie scores 2 (missed mp1) 0.06 x *L* = 3.612×10^{22} scores 2 (missed mp2)	**(3)** **AO2 1**

Question number	Indicative content	Mark
8(c)	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 (6 marks)** • Mg^{2+} and SO_4^{2-} ions are present in magnesium sulfate solution • water splits to form H^+ and OH^- ions • negative ions / anions move positive electrode / anode • sulfate ions / SO_4^{2-} and hydroxide / OH^- ions move to anode • can credit ions shown on diagram • hydroxide ions / OH^- lose electrons • loss of electrons is oxidation • hydroxide ions are oxidised • $4OH^- \rightarrow O_2 + 2H_2O + 4e^-$ • positive ions / cations move to negative electrode / cathode • magnesium ions / Mg^{2+} and hydrogen ions / H^+ move to cathode • hydrogen forms as it's less reactive than magnesium • hydrogen ions / H^+ gain electrons • gain of electrons is reduction • hydrogen ions are reduced • $2H^+ + 2e^- \rightarrow H_2$	**(6)** **AO1 1**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of chemical understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates chemical understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Total for Question 8 = 13 marks

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 Identifies ions from magnesium sulfate Identifies ions from water Identifies correct movement of ions Oxidation & reduction	Possible candidate response (all examples, not a definitive list) Mg^{2+} / SO_4^{2-} / H^+ / OH^- ions (any one ion) present (1) Identifies at least two ions present (2) Negative ions move to anode (1) Negative ions move to {anode/positive electrode} and positive ions move to {cathode/negative electrode} (2) Oxidation at anode and reduction at cathode (2)
Level 2	3–4	Additional Guidance Identifies one ion and states where it moves to during electrolysis Identifies at least 2 ions present and their movement during electrolysis Identifies H^+ or OH^-, states direction of movement and product formed Describes oxidation and reduction	Possible candidate response Mg^{2+} present and moves to cathode (3) Mg^{2+} and SO_4^{2-} ions are present, Mg^{2+} moves to negative electrode, SO_4^{2-} moves to the positive electrode (4) Hydrogen ions present, move to negative electrode / cathode and form hydrogen (4) Oxidation is loss of electrons at anode; reduction is gain of electrons at cathode (4)
Level 3	5–6	Additional Guidance Identifies both H^+ and OH^-, states direction of movement and products formed Identifies all ions present and gives the direction of movement to correct electrodes Identifies at least one cation **and** at least one anion, states direction of movement of ions, what happens at electrode (loss/gain of electrons) for one ion and identifies product Identifies at least one cation **and** at least one anion, states direction of movement of both ions, what happens at electrode (loss/gain of electrons or reduction/oxidation) for both ions and identifies products; MAY attempt half equations, but not essential Correctly write both half equations	Possible candidate response Hydrogen ions and hydroxide ions present, H^+ move to negative electrode form hydrogen, OH^- move to anode and form oxygen (5) Magnesium, sulfate, hydrogen and hydroxide ions are present, the magnesium and hydrogen ions move towards the negative electrode, sulfate and hydroxide move towards the positive electrode (5) Mg^{2+} ions are present; H^+ move to cathode, the H^+ gain electrons OR are reduced to form H_2. (5) Mg^{2+} and SO_4^{2-} are present from the magnesium sulfate, H^+ and OH^- are present from the water. Mg^{2+} and H^+ move to cathode, the H^+ gains electrons and is reduced to form H_2. (6) Mg^{2+} and SO_4^{2-} are present from the sodium sulfate, H^+ and OH^- are present from the water. Na^+ and H^+ move to cathode, the hydrogen is reduced to form H_2. OH^- and SO_4^{2-} move to anode and oxygen is produced; $4OH^- \rightarrow O_2 + 2H_2O + 4e^-$ (6) $2H^+ + 2e^- \rightarrow H_2$ and $4OH^- \rightarrow O_2 + 2H_2O + 4e^-$ (6)

Question number	Answer	Additional guidance	Mark
9(a)	An answer linking any two from • so that the ammonia can {react with / dissolve in} the water (1) • (so) colour change seen (1) • hydroxide ions form (1)	allow 'dampness' for water allow ammonia is absorbed by water ignore ammonia condenses on / sticks to paper ignore any colour even if incorrect but reject bleach for MP2 allow alkaline / basic solution formed	**(2)** **AO2 2**

Question number	Answer	Additional guidance	Mark
9(b)(i)	An explanation linking • both reactions happen at the same rate (1) • (because) there is no overall change in the system (1)	 ignore both reactions happen at the same time allow total amount/concentration of products and reactants are <u>constant</u> ignore reference to amounts/concentration of products and reactants being <u>equal</u> ignore closed system	**(2)** **AO1 1**

Question number	Answer	Mark
9(b)(ii)	**A** 200 1000 **B** , **C** and **D** are incorrect as a temperature of 200ºC and a pressure of 1000 would give the highest percentage yield of ammonia.	**(1)** **AO3 1**

Question number	Answer	Additional guidance	Mark
9(b)(iii)	An explanation linking: • equilibrium would move {backwards / to left} (1) • (because) there are more moles on {left hand side / reactants} (1)	 allow references to low**er** yield / less product formed / more reactant formed. allow particles / molecules for moles allow RA throughout if no other mark scored, 'equilibrium shifts to the side with more moles / molecules' scores 1 mark. ignore all references to temperature / heat / exothermic / endothermic. ignore all references to rate.	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
9(c)	An explanation linking: • ammonia and hydrogen chloride / gas**es** form (in the forward reaction) (1) • the gas / gases rise to the top of the container (1) • where it is cooler / the gas(es) cool (1) • the reverse reaction takes place / **reaction** forms {white solid/ammonium chloride} (at the top of tube) (1)	allow formula throughout allow endothermic reaction takes place reject ammonium chloride gas / hydrochloric acid forms for MP1 only allow exothermic reaction takes place allow hydrogen chloride and ammonia react (at the top of the tube)	**(4)** **AO3 2**

Total for Question 9 = 11 marks

Question number	Answer	Mark
10(a)(i)	**D** **A**, **B** and **C** are incorrect because hydrogen ions concentration decreases and the pH increases	**(1)** **AO2 1**

Question number	Answer	Mark
10(a)(ii)	**C** 24.5 **A, B** and **D** are incorrect as the concentration g dm^{-3} is 24.5 g dm^{-3}	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
10(b)(i)	an explanation linking • (left over water will) decrease the concentration of the sulfuric acid (1) • so **more** acid would be needed / concentration of sodium hydroxide will appear **higher** (1)	allow dilute the acid (more) ignore references to changing pH allow H^+ (ions) for acid	**(2)** **AO3 2**

Question number	Answer	Additional guidance	Mark
10(b)(ii)	rinse (inside of burette) with (sulfuric) acid	ignore any reference to drying ignore use a different burette	**(1)** **AO3 3b**

Question number	Indicative content	Mark
***10(c)**	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 6 marks** • add white tile under apparatus • so that colour change can be seen clearly • run sulfuric acid into sodium hydroxide • swirl the mixture in the flask • to ensure all the reactants react • phenolphthalein is pink in alkali but colourless in acid • add acid dropwise towards the end point • so the exact amount of acid can be obtained • rinse the end of the burette and the inside of the conical flask • to ensure all the acid is in the mixture • repeat until results are concordant • average concordant results • the exact volume of acid is now known, so with concentration of acid no of mols can be found • no of mols = concentration x volume • H_2SO_4 reacts in a 1:2 ratio with NaOH / ORA • so number of mols of alkali = 2 x number of mols of acid / ORA • volume of sodium hydroxide is known so with no of mols of alkali, concentration can be determined • concentration = number of moles divided by volume	**(6)** **AO1 2**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of chemical understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates chemical understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

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 Gives simple statements about the titration or the calculation OR Gives a simple description of the titration or the calculation	Possible candidate response: (examples) phenolphthalein will go from pink to colourless (1) moles = concentration x volume (1) Add sulfuric acid to sodium hydroxide. Stop when the phenolphthalein loses its colour (2) The acid will neutralise the alkali. The number of moles of acid can be calculated knowing the volume used (2)
Level 2	3–4	Additional Guidance Gives a simple explanation of the titration AND the calculation with at least 1 linked statement OR Gives a detailed explanation of the titration OR the calculation with at least 1 linked statement plus other simple statements	Possible candidate response: The acid will react with the alkali in a neutralisation reaction, the phenolphthalein will change colour when all alkali has been neutralised, we can then read off the exact amount of acid needed to neutralise the sodium hydroxide. (3) Calculate the number of moles of sulfuric acid. Then multiply by 2 to calculate moles of sodium hydroxide (3) Acid reacts with alkali to form salt + water in neutralisation reaction. The indicator has a sharp end point which will change colour at equivalence point, so the volume of acid is now known so with the concentration of acid the number of mols of sodium hydroxide can be found (4)
Level 3	5–6	Additional Guidance Gives a explanation of the titration AND the calculation with at least 3 linked statements	Possible candidate response: The acid will react with the alkali in a neutralisation reaction, the phenolphthalein will go from pink to colourless when all alkali has been neutralised, we can then read off the exact amount of acid needed to neutralise the sodium hydroxide. the number of mols of acid used = concentration x volume (5) Acid reacts with alkali to form salt + water in neutralisation reaction, $H^+ + OH^- \rightarrow H_2O$, the indicator has a sharp end-point which will change colour at equivalence point, so the volume of acid is now known this along with the concentration of acid, the no of mols of sodium hydroxide can be found. When the volume of sodium hydroxide is known and the number of mols of alkali known, concentration can be determined using concentration = number of moles divided by volume (6)

Total for Question 10 = 11 marks

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