# Mark Scheme (Results)

# Summer 2026

Pearson Edexcel GCSE in Chemistry
1CH0/ 1F

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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.

## Subject specific marking guidance

*Symbols,termsused in the markscheme*

- Round brackets ( ): words inside round brackets are to aid understanding of the marking point but are not required to award the point
- Curly brackets { }: indicate the beginning and end of a list of alternatives (separated by obliques) where necessary to avoid confusion
- Oblique /: words or phrases separated by an oblique are alternatives to each other and either answer should receive full credit.
- ecf: indicates error carried forward which means that a wrong answer given in an early part of a question is used correctly to a later part of a question.

You will not see owtte (or words to that effect). Alternative correct wording should be credited in every answer unless the ms has specified specific.

The Additional Guidance column is used for extra guidance to clarify any points in the mark scheme. It may be used to indicate:

- what will not be accepted for that marking point in which case the phrase ‘do not accept’ will be alongside the relevant marking point
- it might have examples of possible acceptable answers which will be adjacent to that marking point

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **1(a)** | 3/ three | | **(1)** | **AO2 1 0.1** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **1(b)(i)** | (graph) B | | **(1)** | **AO2 1 5.27C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **1(b)(ii)** | • hydrogen + oxygen (1)<br>• → water (1) | allow $O_2$ for oxygen but not O, $O^2$<br>reject additional reactants for MP1<br>allow $H_2O$ for water but not $H^2$ O<br>do not allow hydrogen oxide etc.<br>reject additional products for MP2<br>if words and formulae, ignore formulae | **(2)** | **AO2 1 5.26C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **1(c)(i)** | • KCl: potassium chlori**d**e (1)<br>• $H_2O$: **water** (1) | reject potassium chlori**n**e<br>reject hydrogen oxide etc. | **(2)** | **AO1 1 0.1** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **1(c)(ii)** | • $\frac{74.5}{92.5}$ x 100 (1)<br>• =80.5 % (1) | 81/ 80.5(405405) with or without working scores 2<br>0.8054.... with or without working scores 1<br>ignore recurring dot<br>allow two sig. fig. or more<br>allow ECF for MP2 for one transcription error only | **(2)** | **AO2 1 5.14C** |

**(Total for Question 1 = 8 marks)**

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **2(a)** | **The only correct answer is C a mixture**<br><br>***A*** *is not correct because the ink is a mixture*<br>***B*** *is not correct because the ink is a mixture*<br>***D*** *is not correct because the ink is a mixture* | **(1)** | **AO1 1**<br><br>**1.17**<br>**2.5 3.9** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **2(b)(i)** | • heated using: Bunsen burner (1)<br>• The liquid labelled C: water (1)<br>• Liquid C is collected in: test tube (1) | allow $H_2O$ | **(3)** | **AO1 2**<br>**2.11** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **2(b)(ii)** | • 119.3 – 114.8 (1)<br>• = 4.5 (1) | 4.5 with or without working scores 2<br>-4.5 with or without working scores 1<br><br>No ECF for MP2<br><br>Iffinal answer incorrect, allow 1 for 119.3-114.8 OR 4.5 seen | **(2)** | **AO1 2**<br>**1.47**<br>**2.11** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **2(c)(i)** | A description including any two from:<br>• mixture (1)<br>• 2 {dyes/ substances/ inks} (1)<br>• (dyes / Q) soluble (1)<br>• contains P (1)<br>• does not contain R (1)<br>• contains an unknown (1) | ignore references to Rf values<br>allow impure<br><br>allow contains two colours/ has most colours<br>ignore has {2/ most} spots / dots / molecules<br><br>allow contains most soluble {dye / colour}<br>allow contains P and one other (2) | **(2)** | **AO2 2**<br>**2.10a** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **2(c)(ii)** | larger | allow large | **(1)** | **AO2 2 2.10c** |

**(Total for Question 2 = 9 marks)**

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **3(a)** | alloys are compounds: <br> alloys are found in the periodic table: <br> alloys are mixtures of metals: ✓ (1) <br> alloys always contain iron: <br> alloys are often stronger than pure metals: ✓ (1) | 1-2 ticks: score 1 for each correct tick <br><br> 3 ticks: score 1 only if the two correct ticks shown <br> 4 or 5 ticks: score 0 <br><br> allow any other symbol for a tick | **(2)** | **AO1 1** <br> **5.5C** <br> **5.6C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **3(b)(i)** | • 25.5 + 6.0 + 3.5 + 1.8 + 1.0 = 37.8 (1) <br><br> • 100-37.8 = 62.2 (1) | 62.2 with or without working scores 2 <br><br> 37.8 seen will score MP1 <br><br> ECF for MP2 | **(2)** | **AO2 1** <br> **5.6C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **3(b)(ii)** | resistant to corrosion/ unreactive/ inert | ignore strong | **(1)** | **AO2 1** <br> **5.6C** <br> **5.7C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **3(c)(i)** | An explanation linking any two from: <br> • {bigger/ larger} (plant)/ grown more (1) <br> • {more/ bigger} leaves (1) <br> • {more/ longer/ bigger} roots (1) <br> • thicker stems (1) <br> • grown faster (1) <br> • fertilisers add nutrients (1) | | **(2)** | **AO2 2** <br> **5.22C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **3(c)(ii)** | Any two factors (being the same) from : <br> • {mass/ volume/ amount} of {fertiliser/solution} (1) <br> • concentration of fertiliser (1) <br> • light/ sunlight/ temperature (1) <br> • soil (1) <br> • watering/ volume of water/ watering time (1) | ignore $CO_2$, time, number of plants, same place, same plants | **(2)** | **AO3 3a** <br> **5.22C** |

**(Total for Question 3 = 9 marks)**

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **4(a)(i)** | copper + oxygen → copper oxide (2)<br>LHS: copper + oxygen only (1)<br>RHS: copper oxide only (1) | allow $2Cu + O_2 \rightarrow 2CuO$ (2)<br>allow $Cu + O_2 \rightarrow CuO$ (1)<br>ifwords and symbols then ignore symbols<br>ignore state symbols | **(2)** | **AO2 1**<br>**0.2**<br>**1.46** |

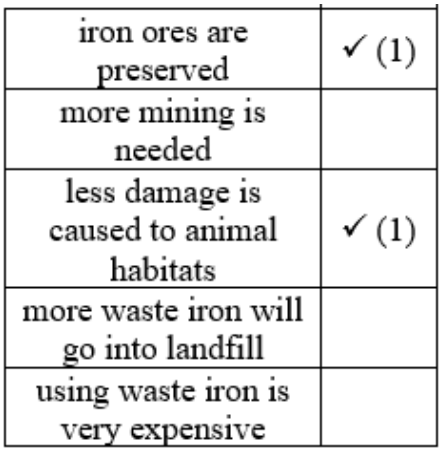
| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **4(a)(ii)** | iron / magnesium | allow symbols<br>reject answers with any other metal mentioned | **(1)** | **AO2 1**<br>**4.3** |

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **4(b)** | **The only correct answer is B the atoms have the same number of protons but different number of neutrons**<br>***A****is incorrect because isotopes of atoms of the same element have the same number of electrons*<br>***C****is incorrect because isotopes of atoms of the same element have the have same number of protons*<br>***D****is incorrect because isotopes of atoms of the same element have the have same number of protons* | **(1)** | **AO1 1**<br>**1.9** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **4(c)(i)** | (covalent) bond/<br>(shared) electrons | reject ionic bond/ ions<br>reject answer including protons or neutrons | **(1)** | **AO3 2b**<br>**1.31e** |

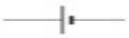
| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **4(c)(ii)** | **O2** | ignore any words<br>reject 2O, O2, $O^2$, O=O, $O_3$ | **(1)** | **AO1 1**<br>**0.1** |

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **4(d)(i)** | **The only correct answer is D reduced**<br><br>***A*** *is incorrect because this is not a salt preparation*<br>***B*** *is incorrect because this is not an acid base reaction*<br>***C*** *is incorrect because this is not a salt preparation* | **(1)** | **AO2 1**<br><br>**4.5 4.6** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **4(d)(ii)** |  | 1-2 ticks: score 1 for each correct tick<br><br>3ticks: score 1 only if the two correct ticks shown<br>4or 5 ticks: score 0<br><br>allow any other symbol for atick | **(2)** | **AO2 1**<br><br>**4.10** |

**(Total for Question 4 = 9 marks)**

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **5(a)** | **The only correct answer is A aluminium**<br><br>***B****is incorrect because carbon is a non-metal*<br>***C****is incorrect because gold is found as a free metal*<br>***D****is incorrect because sulfur is a non-metal* | **(1)** | **AO1 1**<br><br>**4.7b** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **5(b)(i)** | power pack | allow cell / battery / power supply / direct current / dc (supply)<br>allow symbols e.g <br><br>reject alternating current / ac<br>ignore electricity/ power alone | **(1)** | **AO1 2**<br><br>**3.23**<br>**3.25e** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **5(b)(ii)** | wire(s) | allow specified wire, e.g. 'copper **wire**'<br><br>allow (power) lead | **(1)** | **AO1 2**<br><br>**3.31** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **5(b)(iii)** | An explanation linking :<br><br>• to melt (the lead bromide) / (free the) ions (1)<br><br>• so the **ions** can move (1) | <br><br>allow to make liquid/ molten<br>allow anions/cations<br>ignore to make aqueous<br><br>reject electrons<br><br>allow (as a solid/ if not molten) the **ions** are **not** free to move (2) | **(2)** | **AO1 2**<br><br>**3.25e** |

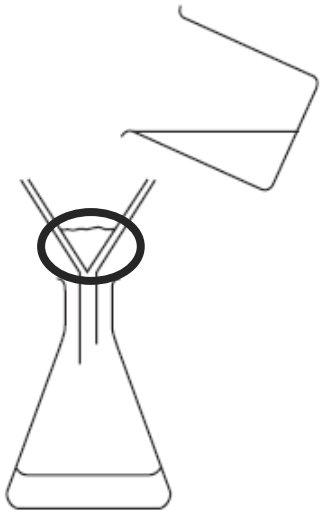
| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **5(b)(iv)** | • lead/ Pb (1)<br>• brom**i**n**e**/ $Br_2$ (1) | allow Br/ br/ BR<br>reject bromi**d**e / $Br^-$<br>allow 1 mark for substances reversed | **(2)** | **AO1 1**<br>**3.22, 3.24, 3.25e** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **5(c)** | • $\frac{200}{1000}$ = 0.2 (1)<br>• $\frac{8.6}{0.2}$ = 43 (1) | 43 with or without working scores 2<br>0.043 / 43 to any power of 10 with or without working scores 1<br>must have at least 2 sig. fig.<br>0.000001075 / $1.075 \times 10^{-6}$ scores 1 | **(2)** | **AO2 1**<br>**1.49** |

**(Total for Question 5 = 9 marks)**

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **6(a)** | s | allow (s), S<br>ignore 'solid'<br>reject any other letters | **(1)** | **AO1 1**<br><br>**0.3** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **6(b)(i)** | filtration | allow filtering, filter<br><br>ignore any other words | **(1)** | **AO3 1b**<br><br>**2.7c 2.8** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **6(b)(ii)** | ring around residue in filter paper<br> | | **(1)** | **AO3 1b**<br><br>**2.7c**<br>**2.8** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **6(b)(iii)** | {it/ solid/ residue/ precipitate/ barium sulfate} cannot pass through/ particles are too large | allow only {liquids/ solutions} pass through<br><br>allow because it is a {solid/ insoluble} | **(1)** | **AO3 2b**<br><br>**2.7c**<br>**2.8** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **6(b)(iv)** | leave in {warm place/ oven/ window ledge/ desiccator} | allow leave (to air dry)<br>allow pat dry/ use absorbent material<br><br>ignore heat gently alone<br><br>reject heat with Bunsen/ hair dryer/ crystallisation | **(1)** | **AO3 3a**<br><br>**2.7c**<br>**2.8** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **6(c)(i)** | goes {milky/ white/ cloudy} / white precipitate/ white solid | ignore bubbles<br>reject effervescence / fizzing | **(1)** | **AO1 2**<br><br>**3.12b** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **6(c)(ii)** | MASS IN G<br>• $\frac{370.5 \times 44}{123.5} = 132$ (2)<br><br>CONVERSION TO KG<br>• $\frac{132}{1000} = 0.132$ (1) | 0.132withorwithoutworking scores 3<br>132 withorwithoutworking scores 2<br>allowecf<br><br>allowalternativemethods including<br>$\frac{370.5}{123.5} = 3$(1) 44 x 3 = 132 (1)<br><br>OR<br><br>370.5x44=16302(1) $\frac{16302}{123.5} = 132$ (1)<br><br>OR<br><br>$\frac{44}{123.5} = 0.356...$(1) 0.356...x 370.5 = 132 (1) | **(3)** | **AO2 1**<br><br>**1.48** |

**(Total for Question 6 = 9 marks)**

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **7(a)** | **The only correct answer is D a transition metal**<br><br>***A*** *is incorrect because iron is an element*<br>***B*** *is incorrect because iron is an element*<br>***C*** *is incorrect because iron is a metal* | **(1)** | **AO2 1**<br><br>**1.18**<br>**5.1C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **7(b)(i)** | to improve appearance /<br>to reduce corrosion | allow to prevent {rust/ oxidation}/ prevent reaction with {oxygen/ air/ water/ food}<br>ignore 'make stronger' | **(1)** | **AO1 1**<br><br>**5.4C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **7(b)(ii)** | • 258.75–240.00=18.75 (1)<br><br>• $\frac{18.75}{5}=3.75$(1)<br><br>OR<br><br>• $\frac{240}{5}=48$ AND $\frac{258.75}{5}=51.75$ (1)<br><br>• 51.75–48=3.75(1) | 3.75/ 3.8 with or without working scores 2<br><br>allow rounding to 4 but working required<br><br>ECF for MP2<br>for a **subtraction** / 5<br>OR<br>numbers / 5 then a **subtraction** | **(2)** | **AO1 2**<br><br>**5.4C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **7(c)(i)** | cork/ stopper/bung | ignore plug | **(1)** | **AO1 1**<br>**5.3C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **7(c)(ii)** | measuring cylinder/ burette | allow pipette / syringe<br>no other answers accepted<br>ignore 'gas syringe' | **(1)** | **AO1 2**<br><br>**5.3C** |

| Question Number | Indicative Content | Mark | AO Spec |
|---|---|---|---|
| ***7(c)(iii)** | Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlines in the generic mark scheme.<br>The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.<br><br>**AO1 (3 marks) AO3 (3 marks)**<br>TUBE W<br>• nail rusts<br>• brown solid seen<br>TUBE X<br>• nail does not rust<br>• no change observed<br>TUBE Y<br>• nail does not rust<br>• no change observed<br>RUSTING<br>• {oxygen/ air} and water needed for rusting<br>• Whas air and water so rusts<br>• Xhas no water so no rust<br>• Yhas no air so no rust | **(6)** | **AO1**<br>**AO3**<br><br>**5.3a**<br>**5.3bC** |

| 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)<br>• Interpretation and evaluation of the information attempted but will be limited with a focus on mainly just one variable. Demonstrates limited synthesis of understanding. (AO3) |
| 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)<br>• Interpretation and evaluation of the information on both variables, synthesising mostly relevant understanding. (AO3) |
| Level 3 | 5-6 | • Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1)<br>• Interpretation and evaluation of the information, demonstrating throughout the skills of synthesising relevant understanding. (AO3) |

| | Mark | Descriptor | Additional Guidance |
|---|---|---|---|
| | 0 | No rewardable material. | Read whole answer and ignore all incorrect material/ discard any contradictory material.<br>An explanation for W must mention air/oxygen **and** water. |
| Level 1 | 1-2 | Additional Guidance<br>Identifies what happens to one nail with explanation<br>OR<br>Two correct observations | Possible candidate response<br>• Nail in tube W rusts (1)<br>• Tube W has rusting but not tube X (2)<br>• Tube W has rusting but not tubes X or Y (2)<br>• Brown solid seen in tube W but not the others (2)<br>• Oxygen is needed for rusting. W has oxygen so nail W rusts (1)<br>• Oxygen and water are needed for rusting. W has both so nail W rusts (2) |
| Level 2 | 3-4 | Additional Guidance<br>**Must have at least one explanation**<br>Identifies what happens to two nails with explanations of both<br>OR<br>Identifies what happens to one nail with explanation AND correct observations about both other nails | Possible candidate response<br>• Tube W rusts because it has air and water. But X does not rust. (3)<br>• W will rust because there is air and water. X and Y will not rust (4)<br>• Tube W rusts: oxygen and water are needed for rusting which tube W has. Tube X does not because it has no water (4) |
| Level 3 | 5-6 | Additional Guidance<br>**Must have at least two explanations**<br>Identifies what happens to all three nails with explanations | Possible candidate response<br>• Oxygen and water are needed for rusting. W has both so nail W rusts. X has no water so it does not rust. Y does not rust. (5)<br>• Air and water are needed for rusting. W has both so nail W rusts. X has no water and Y has no air so these so not rust (6) |

**(Total for Question 7 = 12 marks)**

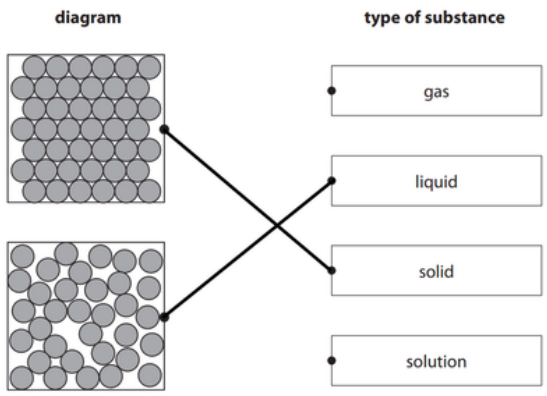
| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **8(a)** | $NH_4Cl \rightleftharpoons NH_3 + HCl$ (2)<br>• $\rightleftharpoons$ (1)<br>• HCl (1) | allow<br>reject =<br>reject<br>allow any case<br>allow ClH<br>ignore words<br>ignore balancing numbers<br>reject additional reactants or products | **(2)** | **AO2 1**<br>**0.3**<br>**4.13** |

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **8(b)(i)** | **The only correct answer is B corrosive, oxidising, toxic**<br>***A*** *is not correct because there is no flammable or explosive symbol*<br>***C*** *is not correct because there is no explosive symbol*<br>***D*** *is not correct because there is no harmful symbol* | **(1)** | **AO1 2**<br>**0.5** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **8(b)(ii)** | An explanation linking<br><br>• heat gently/ heat slowly (1)<br>• so no (risk of liquid) spitting (1)<br>OR<br>• use a water bath/ electric heater (1)<br>• so no (risk of liquid) spitting/ reduces risk of being burned (1)<br>OR<br>• point test tube away (1)<br>• so any liquid escaping doesn't hit the student (1)<br>OR<br>• use a boiling tube/ beaker (1)<br>• less likely to boil over (1)<br><br>OR<br>• tie hair back / tuck in tie (1)<br>• so that {hair/tie} does not catch fire (1)<br><br>OR<br>• hold at arm's length / clamp test tube (1) • so student does not burn themselves (1)<br><br>OR<br>• use anti-bumping granules (1)<br>• to avoid boiling over (1)<br><br>OR<br>• heat in a fume cupboard (1)<br>• so that the student does not breathe in any **toxic** fumes (1) | MP2 dependent on MP1<br><br>ignore reference to PPE<br>ignore less conc. acid<br>reject add bung / stopper/ cork/ cover<br><br>ignore use safety flame<br><br>ignore any other generic safety rules<br><br>allow test tube holder | **(2)** | **AO3 3b**<br><br>**0.6** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **8(c)** | • (2 x 39)+(2 x 52) + (7 x 16) (1)<br><br>• = 294 (1) | 294 with or without working scores 2<br>allow 78 + 104 + 112<br><br>allow 1 for correctly **evaluated** expression with **only** 1 error e.g.<br>(2 x 39) + (2 x 52) + (6 x 16) = 278 (1) (2 x 39) + (2 x 53) + (7 x 16) = 296 (1) | **(2)** | **AO2 1**<br><br>**1.43a** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **8(d)** | substitution (1)<br>• $\frac{2 \times 39}{194} \times 100$<br><br>evaluation (1)<br>• = 40.206 | 40.206/ 40.21 / 40.2/ 40 with or without working scores 2<br><br>allow 2 or more sig. fig.<br><br>$\frac{39}{194} \times 100 = 20.103.....$ (1)<br><br>No other ECF | **(2)** | **AO2 1**<br><br>**1.43b** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **8(e)** |  | iflines from a diagram go tomore than one type of substance, no mark for that diagram | **(2)** | **AO31a**<br>**AO31b**<br><br>**2.1** |

**(Total for Question 8 = 11 marks)**

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **9(a)** | selenium | allow Se<br>reject any other names or symbols | **(1)** | **AO2 1**<br>**1.17** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **9(b)** | An explanation linking any **two** from:<br>• they are in same group/ both in group 2 (1)<br>• they have {2/ same number} **outer** electrons (1)<br>• they lose {2/ same number} electrons (when reacting) / they form 2+ ions (1) | reject protons<br>reject protons | **(2)** | **AO2 1**<br>**1.17**<br>**1.24** |

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **9(c)** | **The only correct answer is D magnesium sulfide**<br>***A****is incorrect because an* $S^{2-}$ *ion is called sulfide*<br>***B****is incorrect because an* $S^{2-}$ *ion is called sulfide*<br>***C****is incorrect because an* $S^{2-}$ *ion is called sulfide* | **(1)** | **AO2 1**<br>**1.25** |

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **9(d)** | **The only correct answer is A in order of relative atomic mass**<br>***B****is incorrect because this is how the modern periodic table is arranged*<br>***C****is incorrect because elements were arranged in order of relative atomic mass*<br>***D****is incorrect because this is how the modern periodic table is arranged* | **(1)** | **AO1 1**<br>**1.15** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **9(e)** | • group7/ VII/ seven (1)<br>• period3/ III/ three (1) | allow group 17<br>ignore halogens for group 7 | **(2)** | **AO3 1a**<br>**AO3 1b**<br>**1.19**<br>**1.20** |

| Question Number | Indicative Content | Mark | AO Spec |
|---|---|---|---|
| ***9(f)** | Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlines in the generic mark scheme.<br>The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.<br><br>**AO1 (6 marks)**<br>POSITION IN PERIODIC TABLE<br>• magnesium is in group 2<br>• metals are on the left of the periodic table<br>STRUCTURE AND BONDING<br>• lattice of positive ions with delocalised electrons<br>• attraction between ions and delocalised electrons<br>• metallic bonding<br>PHYSICAL PROPERTIES<br>appearance<br>• shiny and silver-coloured when pure<br>• metals are shiny/ not dull<br>malleability<br>• magnesium is malleable<br>• layers of ions can easily slide<br>conductivity<br>• magnesium conducts {electricity/ heat}<br>• because has {delocalised electrons/ sea of electrons} / electrons can move<br>CHEMICAL PROPERTIES<br>• magnesium reacts with acid / effervesces in acid<br>• produces salt / hydrogen / relevant equation<br>• reacts with oxygen<br>• to make MgO/ relevant equation | **(6)** | **AO1 1**<br><br>**1.32d**<br>**1.40**<br>**1.18**<br>**3.11a** |

| Level | Mark | Descriptor |
|---|---|---|
| | 0 | • Norewardable material |
| Level 1 | 1-2 | • Demonstrates elements of chemical understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail (AO1)<br>• 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)<br>• 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)<br>• 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/ discard any contradictory material. Diagrams can be credited. |
| Level 1 | 1-2 | Additional Guidance<br>2properties<br>OR<br>1property explained | Possible candidate response<br>• Magnesium is malleable (1)<br>• Magnesium conducts electricity and is ductile (2)<br>• Magnesium conducts electricity because delocalised electrons move (2)<br>• Magnesium is malleable, shiny , reacts with acid, conducts and is ductile (2) |
| Level 2 | 3-4 | Additional Guidance<br>**Must have at least one explanation**<br><br>2 properties explained<br>OR<br>1 property explained with 1 or 2 further properties | Possible candidate response<br>• It is malleable because layers in its structure slide and conducts electricity (3)<br>• It is malleable because layers in its structure slide over each other and conducts when delocalised electrons move. (4) |
| Level 3 | 5-6 | Additional Guidance<br>**Must have at least two explanations**<br><br>3properties explained<br>OR<br>2properties explained with 1 or 2 further properties | Possible candidate response<br>• Magnesium is in group 2 so is a metal because this is on the left of the periodic table. It reacts with acid to make a salt and hydrogen. It is malleable (5)<br>• Magnesium has layers of ions with delocalised electrons. It is malleable because layers in its structure slide over each other and conducts when delocalised electrons move (6) |

**(Total for Question 9 = 13 marks)**

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **10(a)(i)** | Haber (process) | | **(1)** | **AO1 1**<br>**5.19C** |

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **10(a)(ii)** | **The only correct answer is B iron**<br><br>***A****is incorrect because aluminium will not catalyse in this reaction*<br>***C****is incorrect because lead will not catalyse in this reaction*<br>***D****is incorrect because the catalyst used in the Haber process is iron* | **(1)** | **AO1 1**<br><br>**5.19C**<br>**4.16c** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **10(b)(i)** | a description including:<br>OVERALL TREND<br>• increasing pressure increases the yield (1)<br><br>CHANGE IN GRADIENT<br>• (yield) increase {occurs at decreasing rate/ slows} (as pressure increases) (1) | allow as yield increases, pressure increases<br><br>allow {graph/ line/increase} is {non-linear/ curved/ gets less steep/ gradient falls/levels off/ plateaus}<br><br>yield is directly proportional to pressure<br>scores MP1 only. | **(2)** | **AO3 1a**<br>**AO3 1b**<br><br>**5.19C** |

| Question Number | Answer | Mark | AO Spec |
|---|---|---|---|
| **10(b)(ii)** | 62 (%) | **(1)** | **AO3 1b**<br><br>**5.19C** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **10(c)(i)** | ammonium sulfate | accept ammonium sulphate<br>reject ammonia sulfate, ammonium sulfide, ammonium sulfur, ammonium sulfite<br>ignore formulae | **(1)** | **AO1 2**<br><br>**5.9C**<br>**5.24aC** |

| Question Number | Answer | Additional Guidance | Mark | AO Spec |
|---|---|---|---|---|
| **10(c)(ii)** | • methyl orange (1)<br>• from yellow (1)<br>• to orange (1)<br>OR<br>• phenolphthalein (1)<br>• from pink/ magenta (1)<br>• to colourless (1) | allow to red/ pink-red<br><br>reject any other colours<br>ignore clear<br><br>allow<br>• UI = reject for MP1<br>• from blue/ purple (1)<br>• to green (1)<br><br>allow<br>• litmus = reject for MP1<br>• from blue (1)<br>• to purple/ red (1)<br><br>For each indicator, inc. UI and litmus, if colours reversed in MP2 and MP3 allow 1<br><br>MP2 and MP3 for the colours for any named indicator. | **(3)** | **AO1 2**<br><br>**5.9C**<br>**3.3** |

| Question Number | Answer | AdditionalGuidance | Mark | AO Spec |
|---|---|---|---|---|
| **10(c)(iii)** | • $\frac{24.70+24.60+24.60}{3}$ (1)<br><br>• =24.63(1) | 24.63withorwithout working scores 2 marks<br><br>allow $\frac{73.90}{3}$ (1)<br><br>allow**2ormore**d.p.<br><br>allowecfforMP2only if 1 error inoneofthe**three** values | **(2)** | **AO1 2**<br><br>**5.9C** |

**(Total for Question 10 = 11 marks)**

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