Pearson

Mark Scheme (Results)

Summer 2026

Pearson Edexcel Advanced Subsidiary in Chemistry
8CH0/01

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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	**The only correct answer is B (positive)** **A** *is not correct because ionisation involves an energy change* **C** *is not correct because energy must be supplied to the atom to overcome the electronic attraction of the positive nucleus for the negative electron* **D** *is not correct because this answer includes a negative energy change*	**(1)**

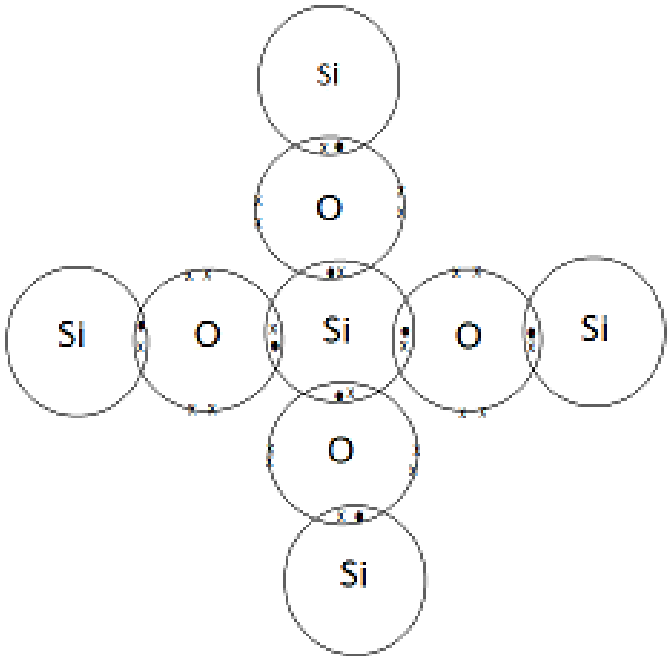
(Total for Question 1 = 1 mark)

Question Number	Answer	Mark
2	**The only correct answer is B (the direction of electron spin in an atom of an element)** **A** *is not correct because the magnitude of the emission lines gives information about the electron transitions between quantum shells* **C** *is not correct because a plot of the first ionisation energy verses atomic number shows a significant change of magnitude for the ionisation energies associated with a change of quantum shell* **D** *is not correct because a plot of successive ionisation energies verses number of electrons removed shows a significant change when a new quantum shell is involved*	**(1)**

(Total for Question 2 = 1 mark)

Question Number	Answer	Mark
3	**The only correct answer is C ($1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$)** **A** *is not correct because electrons have been removed from 3d instead of 4s* **B** *is not correct because four electrons have been removed from the gallium atom instead of three electrons* **D** *is not correct because only one electron has been removed from the gallium atom instead of three electrons*	**(1)**

(Total for Question 3 = 1 mark)

Question Number	Acceptable Answer	Additional Guidance	Mark
4(a)	An answer that makes reference to the following points: • four bonding pairs of electrons and no lone pairs on the central silicon **(1)** • two bonding pairs **and** two lone pairs of electrons represented by x's on each oxygen atom **(1)**	<u>Example of diagram</u>  Ignore electrons on outer Si atoms apart from bonding pairs shown Ignore inner shells of electrons (if shown)	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
4(b)	An explanation that makes reference to the following points: • layers (of carbon atoms) **(1)** • weak forces (between layers) **(1)**		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
4(c)	An answer that makes reference to the following points: <u>Similarity</u> • both have covalent bonds **(1)** <u>Differences</u> • diamond has a giant / lattice structure of atoms **(1)** • diamond has each carbon atom bonded to four other atoms **(1)** • carbon dioxide has (simple) **molecular** structure **(1)** • (only) carbon dioxide has London forces (between molecules) **(1)** • forces are more easily broken / weaker / require less energy to break in carbon dioxide so it has a lower boiling temperature **(1)**	Allow reference to covalent bonding for both carbon dioxide and diamond Allow in diamond each carbon atom has four strong covalent bonds Allow carbon dioxide is a simple molecule(s) Allow temporary dipole – induced dipole forces / van der Waals forces / dispersion forces Ignore dipole–dipole interactions	**(6)**

(Total for Question 4 = 10 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
5(a)	• Expression for calculation of relative atomic mass **(1)** • answer to 4 SF **(1)**	Example of calculation $\frac{(24 \times 78.60) + (25 \times 10.11) + (26 \times 11.29)}{100}$ $= 24.3269$ (g mol^{-1}) $= 24.33$ (g mol^{-1}) TE only if answer between 24 and 26 Allow units of g mol^{-1} but otherwise penalise units Correct answer with no working scores (2)	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5(b)	An explanation that makes reference to the following points: • although the number of protons / nuclear charge is increasing **(1)** • the (outer) electron being **removed** is further from the nucleus **(1)** • increased shielding down the group **(1)**	Allow the electron is being removed from a higher energy shell Ignore atomic radius Allow more electrons between the nucleus and outer electrons If no other mark awarded, allow 'decrease in electrostatic force of attraction between the outer electron and nucleus' for 1 mark	**(3)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5(c)	An answer that makes reference to the following points: • both are relative / compared to (1/12th mass of) carbon-12 **(1)** • atomic mass refers to the (weighted) average mass of all isotopes of an atom **or** **(1)** (only) isotopic mass relates to a single atom of one isotope	Some comparison is required for both marks to be awarded	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5(d)	• calculation of M_r of $SrCl_2$ **(1)** • calculate the moles of $SrCl_2$ **(1)** • calculate the number of $SrCl_2$ units **(1)** • calculate the number of chloride ions **(1)**	<u>Example of calculation</u> 158.6 (g mol^{-1}) = 5.00 ÷ 158.6 = 0.031526 (mol) = $0.031526 \times 6.02 \times 10^{23} = 1.8979 \times 10^{22}$ = $1.8979 \times 10^{22} \times 2 = 3.7957 \times 10^{22}$ = 3.80×10^{22} chloride ions in 5.00 g Correct answer with no working scores 4 marks Allow TE throughout Ignore SF except 1 SF	**(4)**

(Total for Question 5 = 11 marks)

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Question Number	Answer	Mark
6(a)	**The only correct answer is A (barium chloride)** **B** *is not correct because barium sulfate is the white precipitate produced* **C** *is not correct because calcium chloride solution is not used as a test for any ion* **D** *is not correct because calcium sulfate is not used as a test for any inorganic ion, and is only sparingly soluble in water*	**(1)**

Question Number	Answer	Mark
6(b)	**The only correct answer is D (sulfuric acid)** **A** *is not correct because hydrochloric acid is usually used for this test. Chloride ions do not interfere with this test* **B** *is not correct because nitric acid is a suitable alternative to hydrochloric acid. Nitrate ions do not interfere with this test* **C** *is not correct because ethanoic acid would produce ethanoate ions which do not interfere with this test*	**(1)**

(Total for Question 6 = 2 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
7(a)(i)	An answer that makes reference to the following point: • prevents precipitation of other ions (by the silver ions)	Accept reacts with / removes ions (that might precipitate with silver ions) Allow named anions e.g carbonate Allow to remove interference ions	**(1)**

Question Number	Answer	Mark
7(a)(ii)	**The only correct answer is D (a yellow precipitate forms)** **A** *is not correct because a precipitate is produced* **B** *is not correct because a precipitate is produced* **C** *is not correct because a white precipitate would identify the chloride ion*	**(1)**

Question Number	Answer	Mark
7(a)(iii)	**The only correct answer is B (AgI)** **A** *is not correct because* Ag_2I *would imply an* I^{2-} *ion which is incorrect* **C** *is not correct because* AgI_2 *would imply an* Ag^{2+} *ion which is incorrect* **D** *is not correct because* AgI_3 *shows* I_3^- *ion found in iodine solutions*	**(1)**

Question Number	Acceptable Answer		Additional Guidance	Mark
7(b)(i)	An explanation that makes reference to the following points: • iodine produced by oxidation of the iodide ion • sulfur produced by reduction of sulfuric acid • hydrogen sulfide produced by further reduction of sulfuric acid • reaction producing HI is not redox	**(1)** **(1)** **(1)** **(1)**	Oxidation number changes: I: −1 → 0 Oxidation number changes: S: +6 → 0 Oxidation number changes: S: +6 → −2 Penalise incorrect oxidation number changes in M2 & M3 only once Allow no change in oxidation numbers	**(4)**

Question Number	Acceptable Answer		Additional Guidance	Mark
7(b)(ii)	An explanation that makes reference to the following points: • bromide (ion) is a weaker reducing agent than iodide (ion) • sulfur (in sulfuric acid) is reduced to +4 (in SO_2) **or** sulfur (in sulfuric acid) can **not** reduce any further to 0 in S or to -2 in H_2S	**(1)** **(1)**	Allow iodide is a stronger reducing agent than bromide Do not allow the mark for an answer that refers to iodine and bromine (atoms)	**(2)**

(Total for Question 7 = 9 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
8(a)(i)	An answer that makes reference to the following points: **<u>Error 1</u>** • use (concentrated) hydrochloric acid instead of (concentrated) sulfuric acid **(1)** • chlorides are (generally) more volatile than sulfates **(1)** **<u>Error 2</u>** • use (roaring) blue / colourless Bunsen flame instead of yellow Bunsen flame **(1)** • yellow flame is not hot enough to produce a flame colour **(1)**	Allow errors in either order Allow chlorides are highly volatile Allow so the flame colour of the ion can be seen clearly / is not masked	**(4)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(a)(ii)	An answer that makes reference to the following point: • several other cations also give a red coloured flame (in a flame test)	Allow correctly named cations e.g. lithium, strontium, rubidium	**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(a)(iii)	An answer that makes reference to the following points: <u>Method 1</u> • calculation of moles of CO_2 from gas volume **(1)** • calculation of M_r of Group 2 carbonate **(1)** • calculation of A_r of M **(1)** • identification of M **(1)** <u>Method 2</u> • calculation of moles of CO_2 from gas volume **(1)** • calculation of M_r of $CaCO_3$ **(1)** • calculation of moles of $CaCO_3$ **(1)** • comparison that the moles of carbon dioxide and calcium carbonate are the same **(1)**	<u>Example of calculation</u> $= 960 \div 24000 = 4.0 \times 10^{-2} / 0.04$ (mol) $= 4 \div 4.0 \times 10^{-2} = 100$ (g mol^{-1}) 100 – 60 = 40 Allow 40 + 12 + (3 x 16) = 100 (g mol^{-1}) = calcium $= 960 \div 24000 = 4.0 \times 10^{-2} / 0.04$ (mol) 40 + 12 + (3 x 16) = 100 (g mol^{-1}) $= 4 \div 100 = 4.0 \times 10^{-2}$ (mol)	**(4)**

	Method 3 • calculation of M_r of $CaCO_3$ • calculation of *moles* of $CaCO_3$ • calculation of volume of CO_2 • comparison that the volume of carbon dioxide matches the volume collected	**(1)** **(1)** **(1)** **(1)**	40+12+(3 x 16) = 100 (g mol^{-1}) = 4 ÷ 100 = 4.0 × 10^{-2} (mol) = 4.0 × 10^{-2} × 24000 = 960 (cm^3) Allow TE throughout Ignore SF except 1 SF	

Question Number	Answer	Mark
8(a)(iv)	**The only correct answer is C (giant ionic lattice)** **A** *is not correct because Group 2 carbonates exist as a lattice, not as simple molecules* **B** *is not correct because this term describes a structure composed of covalently bonded atoms, e.g. diamond, silica* **D** *is not correct because Group 2 carbonates have a giant structure containing ions, and molecules are not ionic*	**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(b)(i)	An explanation that makes reference to the following points: • the thermal stability of the carbonates increases down the group **(1)** • the radius of cations increases (down the group) **or** charge density decreases (down the group) **(1)** • less distortion / polarisation of the carbonate ion (down the group) **(1)** • the carbon-oxygen bond is weakened less so they become more thermally stable (down the group) **(1)**	Allow reverse arguments Allow size of cation increases Do not award atomic radius increases	**(4)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(b)(ii)	• balanced equation	<u>Example of equation</u> $Ca(NO_3)_2 \rightarrow CaO + 2\ NO_2 + ½\ O_2$ Allow multiples Ignore state symbols even if incorrect	**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(c)(i)	• calculation of volume of water	<u>Example of calculation</u> $5.00 \times 10^{-2} \times 18 = 0.90 \div 1 = 0.90$ (cm^3)	**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(c)(ii)	• use of solubility data to find the volume of saturated $Ca(OH)_2$ (aq) produced **(1)** • conversion to cm^3 **and** answer to 2 or 3 SF **(1)**	<u>Example of calculation</u> $5.00 \times 10^{-2} \div 1.50 \times 10^{-2} = 3.33$ (dm^3) 3300 / 3330 (cm^3)	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(c)(iii)	An answer that makes reference to the following point: • the volume of water used to react with calcium oxide is much less than that needed to make the saturated solution	Allow water is in excess	**(1)**

(Total for Question 8 = 19 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
9(a)(i)	An answer that makes reference to the following point: • (two or more) readings within 0.1 cm^3	Accept (two or more) readings within 0.2 cm^3	**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
9(a)(ii)	• mean of 1st and 3rd titres (rough and 2nd titres excluded)	Example of calculation $\frac{26.60 + 26.50}{2}$ = 26.55 (cm^3)	**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
9(a)(iii)	• pink **(1)** • to colourless **(1)**	Allow purple Colours in reversed order scores 1 mark	**(2)**

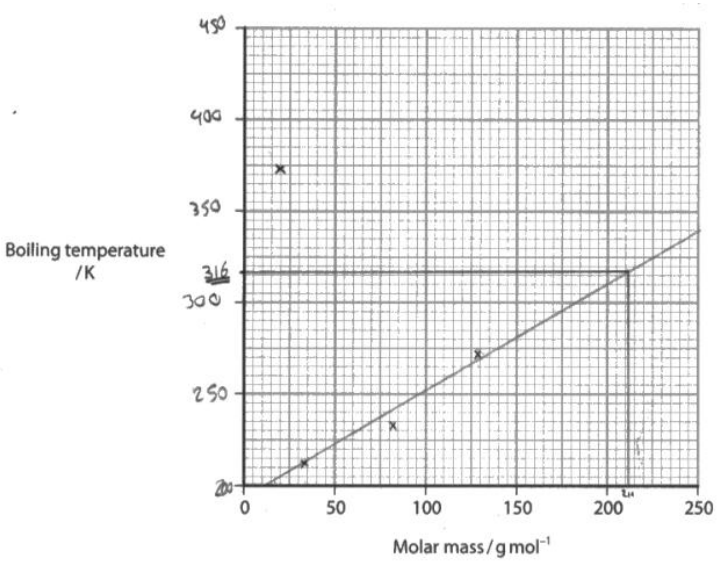
Question Number	Acceptable Answer	Additional Guidance	Mark
9(a)(iv)	• calculation of moles of sodium hydroxide **(1)** • deduce moles of hydrochloric acid **(1)** • calculate concentration of hydrochloric acid **(1)**	<u>Example of calculation</u> = $25 \times 0.310 \div 1000 = 7.75 \times 10^{-3}$ (mol) mol HCl = mol NaOH = 7.75×10^{-3} (mol) = $7.75 \times 10^{-3} \div 2.655 \times 10^{-2} = 0.2919/0.292/0.29$ (mol dm^{-3}) Correct answer with no working scores 3 marks Allow TE throughout Ignore SF except 1 SF	**(3)**

Question Number	Acceptable Answer	Additional Guidance	Mark
9(b)(i)	• uncertainty in volume is doubled **(1)** • calculation of % uncertainty using titre from third titration **(1)** **and** answer to 1 or 2 SF	<u>Example of calculation</u> $2 \times 0.05 = 0.1$ (cm^3) $\frac{0.1 \times 100}{26.50} = 0.37736 = 0.38 / 0.4$ (%) Correct answer with no working scores 2 marks Allow TE	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
9(b)(ii)	An explanation that makes reference to the following points: • one mole of sulfuric acid reacts with two moles of sodium hydroxide so the titre will be halved **(1)** • percentage error will double / increase **(1)**	Allow titre will be smaller M2 dependent on M1	**(2)**

(Total for Question 9 = 11 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
10(a)(i)	(H_2Se) 81.0 **and** (H_2Te) 129.6	Allow 81 Allow 130 Do not award 130.0	**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
10(a)(ii)	An answer that makes reference to the following points: • correct scale on vertical axis **and** graph covers ≥½ the grid **(1)** • all points plotted within ±½ a small square **(1)**	<u>Example of graph</u> Ignore lines joining points TE om 10ai  	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
10(a)(iii)	• suitable extrapolation shown on graph **(1)** • estimate of H_2Po boiling temperature **(1)**	Boiling temperature of H_2Po = 309 (K) Allow answers in the range 305 – 380 (K)	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
10(b)(i)	V-shaped / bent	Allow angular / non-linear	(1)

Question Number	Acceptable Answer	Additional Guidance	Mark
10(b)(ii)*	This question assesses a student's ability to show a coherent and logically structured answer with linkages and fully sustained reasoning. Marks are awarded for indicative content and for how the answer is structured and shows lines of reasoning. The following table shows how the marks should be awarded for indicative content. <table><tr><th>Number of indicative marking points seen in answer</th><th>Number of marks awarded for indicative marking points</th></tr><tr><td>6</td><td>4</td></tr><tr><td>5–4</td><td>3</td></tr><tr><td>3–2</td><td>2</td></tr><tr><td>1</td><td>1</td></tr><tr><td>0</td><td>0</td></tr></table>The following table shows how the marks should be awarded for structure and lines of reasoning. <table><tr><th></th><th>Number of marks awarded for structure and sustained lines of reasoning</th></tr><tr><td>Answer shows a coherent and logical structure with linkages and fully sustained lines of reasoning demonstrated throughout.</td><td>2</td></tr><tr><td>Answer is partially structured with some linkages and lines of reasoning.</td><td>1</td></tr><tr><td>Answer has no linkages between points and is unstructured.</td><td>0</td></tr></table>	Guidance on how the mark scheme should be applied: The mark for indicative content should be added to the mark for lines of reasoning. For example, an answer with five indicative marking points that is partially structured with some linkages and lines of reasoning scores 4 marks (3 marks for indicative content and 1 mark for partial structure and some linkages and lines of reasoning). If there are no linkages between points, the same five indicative marking points would yield an overall score of 3 marks (3 marks for indicative content and no marks for linkages). In general it would be expected that 5 or 6 indicative points would get 2 reasoning marks, and 3 or 4 indicative points would get 1 mark for reasoning, and 0, 1 or 2 indicative points would score zero marks for reasoning. If there is any incorrect chemistry, deduct mark(s) from the reasoning. If no reasoning mark(s) awarded do not deduct mark(s).	(6)

	Indicative content: IP1 (only) water is held together by hydrogen bonds IP2 hydrogen bonds are the strongest intermolecular force IP3 stronger intermolecular forces require more energy to break, resulting in higher boiling temperature IP4 all molecules held together by London forces IP5 increasing number of electrons causes an increase in London forces (so all compounds after H2S show an increase in boiling temperature) IP6 (permanent) dipole-dipole forces are not strong (after water)	Accept temporary / fluctuating dipole – induced dipole / dispersion forces in place of 'London forces' Allow van der Waals forces Allow only water has (permanent) dipole-dipole forces	

Question Number	Acceptable Answer	Additional Guidance	Mark

10(c)	• calculates the percentage of sulfur	**(1)**	<u>Example of calculation</u> 97.965 (%)	**(3)**
	• calculates the moles of hydrogen and sulfur	**(1)**	For hydrogen: 2.035 ÷ 1 = 2.035 (mol) For sulfur: 97.965 ÷ 32.1 = 3.052 (mol)	
	• calculates the simplest ratio **and** the empirical formula	**(1)**	Ratio 1.0 : 1.5 / 2 : 3 H_2S_3 Allow TE throughout	

(Total for Question 10 = 15 marks)
TOTAL FOR PAPER = 80 MARKS